In the matter of:

CERTAIN STEEL TOY VEHICLES

Investigation No. 337-TA-31

USITC PUBLICATION 860

APRIL 1978

United States International Trade Commission / Washington, D.C. 20436

UNITED STATES INTERNATIONAL TRADE COMMISSION

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UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C.

In the Matter of:	
CERTAIN STEEL TOY VEHICLES	Investigation No. 337-TA-31

NOTICE AND ORDER CONCERNING
COMMISSION DETERMINATION

Upon consideration of the presiding officer's recommended determination and the record in this proceeding, the Commission hereby orders the termination of investigation No. 337-TA-31, Certain Steel Toy Vehicles, on the basis of a determination that no violation of section 337 of the Tariff Act of 1930, as amended, exists.

Copies of the Commission Memorandum Opinion in support of the Commission action are available to the public during official working hours at the Office of the Secretary, United States International Trade Commission, 701 E Street NW., Washington, D.C. 20436. Notice of the institution of the investigation was published in the Federal Register on April 15, 1977 (42 F.R. 19933).

By order of the Commission:

Kenneth R. Mason
Secretary

Issued: April 17, 1978

APPENDIX A

UNITED STATES INTERNATIONAL TRADE COMMISSION

Washington, D.C.

In the Matter of: CERTAIN STEEL TOY VEHICLES	Investigation No. 337-TA-31

NOTICE AND ORDER

CONCERNING PROCEDURE FOR COMMISSION

DETERMINATION AND ACTION

Notice is hereby given that --

1. The Commission will hold a hearing beginning at 10:00 a.m., e.s.t., Monday, March 20, 1978, in the Commission's Hearing Room, 701 E Street N.W., Washington, D.C., for the purposes of (1) hearing oral argument on the recommended determination of the presiding officer, concerning whether there is a violation of section 337 of the Tariff Act of 1930; (2) hearing oral argument concerning appropriate relief in the event the Commission determines that there is a violation of section 337 and determines that there should be relief; and (3) receiving information and hearing oral argument, as provided for in section 210.14(a) of the Commission's Rules of Practice and Procedure (19 C.F.R. Part 210), concerning bonding and the public interest factors set forth in section 337(d) and (f) of the Tariff Act, which the Commission is to consider in the event it determines that there is a violation of section 337 and determines that there should be relief. The latter two

proceedings are legislative in character, and therefore the hearing on remedy, bonding, and the public interest will not be subject to the requirements of 5 U.S.C. 556, 557. These phases of the hearing will be conducted in accordance with section 201.11 of the Commission Rules of Practice and Procedure (19 C.F.R. 201.11). All these matters are being heard all on the same day in order that this investigation may be completed within the time limits prescribed by section 337.

Parties and agencies wishing to make oral argument with respect to the recommended determination shall be limited in each oral argument to no more than 30 minutes, 10 minutes of which may be reserved by the staff and complainant for rebuttal.

For the purpose of the part of the hearing on relief, bonding, and the public interest factors, parties, interested persons, and agencies will be limited to no more than 15 minutes for making presentations. Participants will be permitted an additional 5 minutes for closing arguments after all the presentations have been concluded. Participants with similar interests may be required to share time. The Commission Investigative Staff will be separately allotted the full time available to a party.

Requests for appearances at the hearing should be filed, in writing, with the Secretary of the Commission at his office in Washington no later than noon, February 3, 1978. Requests should indicate the part of the hearing (i.e., with respect to the recommended determination; relief; bonding; or the public interest factors or any combination of them) in which the requesting person desires to participate. Issues of law or fact based on the record certified to the Commission may be filed with the Commission.

2. Briefs concerning exceptions to the recommended determination may be filed by any party or agency. Complainant's brief shall be filed not later than the close of business, Monday, February 13, 1978; respondent's brief and brief of the Commission investigative staff, shall be filed not later than the close of business, Tuesday, February 28, 1978; and complainant's reply brief, if any, shall be filed not later than Thursday, March 9, 1978. The Commission Investigative Staff is here being required to brief at the same time as the Respondent because their views closely parallel each other. This order of briefing will enhance the adversary opportunities and thereby presumably produce the most useful briefing in this case. We do not suggest by this order that the staff has lost its independent status in this or any other case. Briefs shall be served on all parties of record on the date they are filed. The cover of complainant's brief shall be blue; respondent's brief, red; Commission investigative staff's brief, green; and any reply briefs, gray. Concerned Government agencies may file briefs on any issue related to the recommended decision in the same style and at the same time as the Commission investigative staff. Parties, persons and agencies are encouraged to consolidate their briefing where their positions are the same and to refer to the record.

3. Written comments and information are encouraged by any party, interested person, Government agency, or Government concerning relief, bonding, and the public interest factors set forth in section 337(d) and (f) of the Tariff Act of 1930, as amended (19 U.S.C. 1337), which the Commission is to consider in the event it determines that there should be relief. Such comments and information shall be filed with the Secretary in one original and ten copies on the dates set forth below, and the comments and information shall thereafter be available for inspection and copying by any person,

except as respects in camera comments and information, which are to be treated as described below.

Comments and information on remedy, bonding and public interest will be as follows: Complainant shall file a detailed proposed Commission action, including a determination of bonding, on or before Monday, February 12, 1978. Complainant shall, at the same time, file such comment and information as it has respecting the effect of its proposed Commission actions upon the public health and welfare, competitive conditions in the United States economy, the production of like or directly competitive articles in the United States and United States consumers (the "public interest" factors). Thereafter, on or before February 28, 1978, any person, agency, or government may file written comments on and information pertaining to alternatives (if any) to the proposed Commission action and whether any Commission action ought or ought not to be taken after consideration of the effect of the action upon the public interest factors.

A request for in camera treatment of such comments and information must include a full statement of the reasons for granting in camera treatment. The Commission will then either accept such information in camera, or it will return the information.

Notice of the Commission's institution of the investigation was published in the Federal Register on April 15, 1977 (42 F.R. 19933).

By order of the Commission.

Kenneth R. Mason
Secretary

Issued: January 27, 1978

UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C.

In the Matter of	)	
	)	Investigation No. 337-TA-31
CERTAIN STEEL TOY VEHICLES	)	

NOTICE OF INVESTIGATION

Notice is hereby given that a complaint was filed with the United States International Trade Commission on March 11, 1977, under section 337 of the Tariff Act of 1930, as amended (19 U.S.C. 1337), and the complaint was amended on March 24, 1977, on behalf of Tonka Corporation, 10505 Wayzata Boulevard, Hopkins, Minnesota 55343, alleging that unfair methods of competition and unfair acts exist in the importation of certain steel toy vehicles into the United States, or in their sale, by reason of the alleged coverage of such steel toy vehicles by all claims of U.S. Letters Patents 3,462,879 and 3,730,594 and by reason of their simulation of the size, appearance and design of certain domestically manufactured products of said Tonka Corporation in such a way as to pass off such steel toy vehicles as products of said Tonka Corporation. The complaint further alleges that the effect or tendency of the unfair methods of competition and unfair acts is to destroy or substantially injure an industry, efficiently and economically operated, in the United States. Complainant requests that the imports in question be permanently excluded from entry into the United States.

Having considered the complaint and the amended complaint, the United States International Trade Commission, on April 7, 1977, ORDERED--

(1) That, pursuant to subsection (b) of section 337 of the Tariff Act of 1930, as amended (19 U.S.C. 1337), an investigation be instituted to determine, under subsection (c), whether, on the basis of the allegations set forth in the complaint, there is a violation of subsection (a) of this section in the unauthorized importation of--

(a) certain steel toy vehicles having a hinge connection, and

(b) steel toy truck beds and carrying receptacles having elements thereof cooperating to form a hinge connection

into the United States, or in their sale, by reason of such steel toy vehicles having a hinge connection allegedly being covered by one or more of the claims of U.S. Letters Patent 3,462,879;

(c) certain wheel and tire assemblies for use in toy vehicles,

(d) components of such wheel and tire assemblies, and

(e) certain steel toy vehicles containing such wheel and tire assemblies

into the United States, or in their sale, by reason of such steel toy vehicles containing a wheel and tire assembly allegedly being covered by the claims of U.S. Letters Patent 3,730,584; and

(f) certain steel toy vehicles, incorporating nonfunctional design features of complainant's steel toy vehicles

into the United States, or in their sale, by reason of such steel toy vehicles allegedly being passed off as the products of aforesaid Tonka Corporation, the effect or tendency of which is to destroy or substantially injure an industry, efficiently and economically operated, in the United

States.

(2) That, for the purpose of the investigation so instituted, the following persons, alleged to be involved in the unauthorized importation of such articles into the United States, or in their sale, are hereby named as respondents upon which the complaint, the amendments to the complaint, and this notice are to be served:

Domestic Importer

Buddy L Corporation
200 Fifth Avenue
New York, New York 10010

Foreign Exporters

Apollo Trading, Ltd.
2-22-3 chome
Yatsugi Katsushika-ku
Tokyo, Japan

Universal Trading, Ltd.
P.O. Box 79
Asakusa
Tokyo, Japan

International Sales
(Far East) Ltd.
Room 1220
Tung Ying Building
100 Nathan Road
Kowloon, Hong Kong

Foreign Manufacturers

Watanabe Toy, Ltd.
193 Nakane
Noda-cho
Chiba-ken
Japan

Kimura Toy, Ltd.
198 Tamiya
Ushiku-cho
Inashiki-gun
Ibaragi-ken
Japan

Kobori Seisakusho
8-8, 4-chome
Sumida-ku
Tokyo, Japan

Yamakatsu Kogyo, Ltd.
25, 3-chome
Nishi-Shinkoiwa
Katsushika-ku
Tokyo, Japan

Meiwa Kogyo, Ltd.
4-chome
Towa
Adachi-ku
Tokyo, Japan

Superdex Manufacturers
34 Hung To Road
3d Floor
Kwun Tong
Kowloon
Hong Kong

Bell Toy Co., Ltd.
17-1 2-chome
Shiratori
Katsushika-ku
Tokyo, Japan

Makabe Gangu Seisakusho, Ltd.
5-4 chome
Kohoku
Adachi-ku
Tokyo, Japan

(3) That, for the purpose of the investigation so instituted, Judge Myron R. Renick, United States International Trade Commission, 701 E Street, N.W., Washington, D.C. 20436, is hereby appointed as presiding officer, and

(4) That, for the purpose of the investigation so instituted, Edward M. Lebow, United States International Trade Commission, 701 E Street, NW., Washington, D.C. 20436, is hereby named as Commission Investigative Attorney.

Responses must be submitted to the parties in accordance with section 210.21 of the Commission's Rules of Practice and Procedure, as amended (41 F.R. 17710, Apr. 27, 1976). Pursuant to sectons 210.16(d) and 210.20(a) of the Rules, such responses will be considered by the Commission if received not later than 20 days after the date of service of the complaint.

Extensions of time for submitting a response will not be granted unless good and sufficient cause therefor is shown.

Failure of a respondent to file a timely response may be subject to the penalties described in section 210.21(d) of the Commission's Rules of Practice and Procedure.

The complaint, with the exception of confidential information referred to therein, is available for inspection by interested persons at the Office

of the Secretary, United States International Trade Commission Building, Washington, D.C., and in the New York City office of the Commission, 6 World Trade Center.

By order of the Commission:

Kenneth R. Mason
Secretary

Issued: April 11, 1977

UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C.

In the Matter of:	
CERTAIN STEEL TOY VEHICLES	Investigation No. 337-TA-31

COMMISSION MEMORANDUM OPINION 1/ 2/

Upon consideration of the presiding officer's recommended determination and the record in this proceeding, we have determined that there is no violation of section 337 of the Tariff Act of 1930, as amended, 3/ in the importation into, or sale in, the United States of certain steel toy vehicles because said vehicles do not infringe U.S. Letters Patent Nos. 3,730,594 ('594) and Des. 225,251 ('251), and also because such vehicles do not simulate the size, appearance, and design of certain domestically manufactured products of complainant in such a way as to pass off such steel toy vehicles as products of complainant. Moreover, assuming for the sake of argument that the patents were infringed by the imported articles, we find that the subject patents are invalid as obvious for the purposes of section 337. We have ordered the termination of the investigation.

Note: The following abbreviations are used throughout this opinion:

Tr. means "transcript".
Names of witnesses precede citations to the record of their testimony.
Numbered exhibits are identified by the proffering party, Complainant [CX], Respondents [RX], and Staff [SX]

1/ Commissioner Moore agrees with the majority opinion except that he finds the '594 patent infringed, and adopts the Administrative Law Judge's findings of fact and conclusions of law in respect to this issue.

2/ Commissioner Ablondi concurs in the result.

3/ 19 U.S.C. 1337 (Supp. IV, 1974).

Procedural History

On March 11, 1977, Tonka Corporation (hereinafter "Tonka") of Hopkins, Minnesota, filed a complaint with the United States International Trade Commission (hereinafter "the Commission") under Section 337 of the Tariff Act of 1930, as amended (19 U.S.C. 1337) (hereinafter "section 337"). The complaint alleged that "[T]here have been unfair methods of competition and unfair acts in the importation of certain steel toy vehicles into the United States, the effect or tendency of which is to destroy or substantially injure, or prevent the establishment of, an industry, efficiently and economically operated in the United States."

The complaint further alleged that respondents were manufacturing and importing steel toy vehicles infringing U.S. Letters Patent 3,462,879, (hereinafter the "'879 patent") covering a toy truck hinge, and U.S. Letters Patent 3,730,594 (hereinafter the "'594 patent") disclosing a toy truck wheel and tire assembly. Furthermore, the complaint alleged that the imported toy vehicles incorporated "nearly identically, the nonfunctional design details incorporated by Tonka in its products."

The complaint was the subject of a preliminary inquiry by the Commission Investigative Staff (hereinafter the "Staff"). After consultation with the Staff, Tonka amended its complaint on March 24, 1977. On April 7, 1977, the Commission ordered the institution of a formal investigation to determine whether there was a violation of section 337 based on the allegations in the complaint. A Notice of Investigation was issued on April 11, 1977, and published in the Federal Register on April 15, 1977 (42 F.R. 19933).

The scope of the investigation was generally defined by the following language contained in the Notice of Investigation:

> (1) That pursuant to subsection (b) of Section 337 of the Tariff Act of 1930, as amended (19 U.S.C. 1337), an investigation be instituted to determine, under subsection (c), whether, on the basis of the allegations set forth in the complaint, there is a violation of subsection (a) of this section in the unauthorized importation of--
>
> (a) certain steel toy vehicles having a hinge connection; and;
>
> (b) steel toy truck beds carrying receptacles having elements thereof cooperating to form a hinge connection
>
> into the United States, or in their sale, by reason of such steel toy vehicles having a hinge connection allegedly being covered by one or more of the claims of U.S. Letters Patent 3,462,879;
>
> (c) certain wheel and tire assemblies for use in toy vehicles,
>
> (d) components of such wheel and tire assemblies, and
>
> (e) certain steel toy vehicles containing such wheel and tire assemblies
>
> into the United States, or in their sale, by reason of such steel toy vehicles containing a wheel and tire assembly allegedly being covered by the claims of U.S. Letters Patent 3,730,584; and
>
> (f) certain steel toy vehicles, incorporating non-functional design feature of complainant's steel toy vehicles
>
> into the United States, or in their sale, by reason of such steel toy vehicles allegedly being passed off as the products of aforesaid Tonka Corporation, the effect or tendency of which is to destroy or substantially injure an industry, efficiently and economically operated, in the United States."

Named as respondents in the Notice of Investigation were one domestic importer, three foreign exporters, and eight foreign manufacturers:

Domestic Importer

Buddy L. Corporation
200 Fifth Ave.
New York, New York 10010

Foreign Exporters

Apollo Trading, Ltd.
2-22-3 Chome
Yatsugi Katsushika-ku
Toyko, Japan

Universal Trading, Ltd.
P.O. Box 79, Asakusa
Tokyo, Japan

International Sales (Far East), Ltd.
Room 1220, Tung Ying Bldg.
100 Nathan Road
Kowloon, Hong Kong

Foreign Manufacturers

Watanabe Toy, Ltd.
193 Nakane, Noda-cho
Chiba-ken, Japan

Kimura Toy, Ltd.
198 Tamiya, Ushiku-cho
Inashiki-gun
Ibaragi-ken, Japan

Meiwa Kogyo, Ltd.
4-chome, Towa
Adachi-ku
Tokyo, Japan

Superdex Manufacturers
34 Hung To Road
3d Floor, Kwun Tong
Kowloon, Hong Kong

Bell Toy Co., Ltd.
17-1, 2-Chome
Shiratori, Katsushika-ku
Tokyo, Japan

Makabe Gangu Seisakusho, Ltd.
5-4 Chome, Kohoku, Adachi-Ku
Tokyo, Japan

Yamakatsu Kogyo, Ltd.
25, 3-chome, Nishi-Shinkoiwa
Katsushika-ku
Tokyo, Japan

Kobori Seisakusho
8-8, 4-chome
Sumida-ku
Tokyo, Japan

All the respondents named in the Notice of Investigation with the exception of Kimura Toy, Ltd., of Japan, filed responses to the complaint.

On May 27, 1977, Tonka filed a motion to amend its complaint. The proposed amendments concerned the addition of allegations of infringement of U.S. Letters Design Patent 225,251 for a toy vehicle cab design. On June 9, 1977, the presiding officer granted Tonka's motion.

On June 2, 1977, the respondents filed a motion for termination of the investigation as to the issues raised by the '594 patent. Respondents argued that the discontinuance of manufacture of a particular wheel and tire assembly identified in the complaint and the discontinuance of exporting these assemblies rendered the infringement issue moot. In an order dated July 15, 1977, the presiding officer denied respondents' motion stating that cessation of the importation alone does not obviate the possibility of finding a violation of section 337.

A prehearing conference was held on September 29, 1977. Prehearing conference statements and briefs were filed on behalf of Tonka, respondents, and the staff. On October 3, 1977, the hearing commenced, pursuant to Notice (42 F.R. 44614, September 6, 1977), before Judge Myron R. Renick to determine whether there was a violation under section 337. Tonka, Staff, and the respondents with the exception of Kimura Toy, Ltd., appeared at the hearing by their respective counsel. The hearing concluded on October 12, 1977, at which time the presiding officer ordered the filing of all post hearing briefs and proposed findings of facts and conclusions of law on or before November 14, 1977, with a deadline for reply briefs on November 22, 1977. All active parties filed briefs in accordance with the aforementioned deadlines.

On representations of the active respondents that Kimura Toy, Ltd. could not be located and was not operating, complainant and Staff asked that this absent respondent be dismissed from the investigation. Kimura Toy was then dropped as a respondent.

On January 3, 1978, the presiding officer issued a recommendation that the Commission determine that there is no violation of section 337 of the Tariff Act of 1930 1/ in the importation of steel toy vehicles into the United States, by reason of the fact that said vehicles do not infringe any valid U.S. Letters Patent, and that such vehicles do not simulate the size, appearance, and design of certain domestically manufactured products of complainant in such a way as to pass off such steel toy vehicles as products of complainant. More particularly, with respect to the patent allegations, the presiding officer recommended that U.S. Letters Patent 3,730,594 be held invalid for purposes of section 337, since it would have been obvious to one skilled in the art. He further recommended that U.S. Letters Design Patent 225,251 be held invalid for purposes of section 337 since it would have been obvious to an ordinary intelligent man. Further, he recommended that, should the '251 patent be held valid, it should be held not infringed. Finally, the presiding officer held that U.S. Letters Patent 3,462,879 was no longer in issue by stipulation of the parties of record.

On January 27, 1978, the Commission issued a notice announcing a schedule for briefs with respect to the recommended determination and ordering a hearing for March 20, 1978, before the Commission to hear argument

1/ 19 U.S.C. 1337.

with respect to the recommended determination and to hear argument and receive information concerning appropriate relief, bonding, and public-interest factors set forth in subsections (d) and (f) of section 337. The notice also provided for the filing of written comments by any party, interested person, Government agency, or Government concerning relief, bonding, and the public-interest factors. Such notice was published in the Federal Register of February 1, 1978 (43 F.R. 4291).

Briefs were received from all parties. The Commission held its scheduled hearing on March 20, 1978, with all parties appearing. No advice or information was received from the Department of Health, Education, and Welfare, the Department of Justice, the Federal Trade Commission, or any other Government Agency.

Consideration of the issues presented

Pursuant to section 337 of the Tariff Act of 1930, as amended, the Commission must determine whether there is a violation of the statute and, if so, what remedy, if any, should be afforded for such violation. We have considered the recommended determination of the presiding officer, the record developed before the presiding officer, and the record of the March 20, 1978 hearing before the Commission, as well as all of the arguments, relevant submissions, and other appropriate information contained in the record certified to the Commission.

We have determined that there is no violation of section 337 in the importation of the subject steel toy vehicles into the United States, or in their sale by the owner, importer, consignee, or agent of either, the effect or tendency of which is to destroy or substantially injure an industry, efficiently and economically operated, in the United States.

Moreover, we find that neither the '594 patent nor the '251 patent would be infringed, if they were valid.

Specifically, we have determined that for purposes of section 337 and pursuant to 35 U.S.C. 103, claims 1 and 4 of the '594 Zbikowski patent are invalid, in view of the prior art. Further, we have determined that U.S. Letter Design Patent 225,251 is invalid for purposes of section 337 as obvious to one of ordinary skill in the art at the time the design invention was made, under 35 U.S.C. 103. We additionally find that U.S. Letters Patent 3,462,879 is no longer in issue by stipulation of the parties of record. 1/ Finally, we find that the imported steel toy vehicles do not simulate the size, appearance, and design of certain domestically manufactured products of the complainant in such a way as to pass off such steel toy vehicles as products of complainant. Further, since we have determined that there is no violation of section 337, questions of remedy, bonding, and the effect of any remedy on the public interest are not before us and will not be addressed. We now hereby adopt by reference the findings of facts and conclusions of law of the Administrative Law Judge (ALJ) insofar as they are supportive of and not inconsistent with our following determinations.

Invalidity of the '594 patent.--U.S. Letters Patent No. 3,730,594 ('594) was granted to the Tonka Corporation on May 1, 1973, upon an application filed on April 26, 1971, by Theodore H. Zbikowski. 2/ Tonka has been and remains the owner of said letters patent. The subject matter of the '594 patent is directed to wheel and tire arrangement for a vehicle,

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1/ See ALJ finding of fact 62.
2/ See appendix showing copy of '594 patent.

and more particularly to an arrangement of a bead on the tire which seats within a groove on the wheel to lock the tire onto the wheel. The wheel is defined in claims 1 and 4 of this patent 1/ as being cored or gusseted to reduce the thickness of the wall.

Complainant asserts that respondent's sales of imported steel toy vehicles infringe claims 1 and 4 of the '594 patent. 2/ The ALJ finds that claims 1 and 4 of the '594 patent are invalid for purposes of section 337 as obvious to one of ordinary skill in the art at the time the invention was made, under 35 U.S.C. 103. 3/

We hereinbelow summarize what we believe are the most important aspects of the ALJ's findings of facts and conclusions of law. The rationale for holding the '594 patent invalid can be found by examining the following issues:

(1) What was the problem to be solved by the '594 patent, i.e., what was the object of the invention?

(2) What is the prior art that one would look to to solve this problem?

    (a) Is the invention a simplistic mechanical invention or a complex one?

        1. If the invention is a simple mechanical one, the scope of the prior art should be very broad under doctrine of In re Heldt. 4/

(3) Using the analytical procedure of Graham v. Deere, 5/ would the patented invention be obvious to one skilled in the art at the time the invention was made in view of the then known pertinent prior art?

1/ The '594 patent is attached in the appendix.
2/ See claims 1 and 4 in the appendix, see footnote 1; see also finding 36.
3/ See ALJ's Conclusion of Law No. 1, p. 29 of his Recommended Determination.
4/ In re Heldt, 433 F.2d 808, 167 USPQ 676 (C.C.P.A. 1970).
5/ Graham v. John Deere Co., 383 U.S. 1, 148 USPQ 459 (1966).

The problem that was meant to be solved by the '594 patent.--It is obvious from looking at the abstract of disclosure in the file wrapper, that one of the main problems to be solved was that of preventing a tire from slipping off a wheel, particularly from slipping off laterally. The precise words in the abstract of disclosure are "to prohibit outward axial removal of the tire from the wheel." 1/

More particularly, page 2 of the file wrapper of the '594 patent again reiterates the problem wherein it states " . . . where a resilient material such as rubber or vinyl is used in the tire, a child may generally easily peel it off of the wheel to be lost." 2/

Finally, in the Summary of the Invention, the inventor states that:

> An object of the present invention is to provide an improved wheel and tire assembly for miniature toy vehicles wherein a tire of resilient material is actually mounted on a wheel and is so locked in place thereon as to prohibit or restrict removal when the wheel is mounted on the vehicle. 3/ (Emphasis supplied.)

Thus, it is clear from reading the file wrapper and the patent itself, that the object of the invention was to invent a wheel and tire assembly that would preclude children from easily removing the tire from the wheel when mounted on a toy vehicle. This was the problem that was to be solved.

The prior art that one would look to to solve this problem.--It is obvious from looking at the art cited by the patent examiner that he did not limit the scope of the prior art to toy vehicles. In fact, the patent examiner cited art from a broad spectrum of related patents as would be

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1/ See p. 1 of the file wrapper of the '594 patent.

2/ See p. 2, second paragraph, penultimate sentence of the file wrapper of the '594 patent.

3/ See last paragraph on p. 2 of the same file wrapper.

expected under the In re Heldt doctrine regarding simple inventions 1/ and the In re Antle case regarding prior art covering those related arts which are reasonably pertinent to the particular problem at hand. 2/

In the '594 patent, the particular problem faced was finding a means to firmly hold a hard resilient tire on a wheel, and one skilled in that particular art might well be expected to look to prior art dealing with small hard resilient tire and wheel assemblies, such as wheels on casters, grocery carts, golf carts, picnic carts, lawnmowers, and the like. Indeed, in recognizing the problem, three of the six prior art references by the examiner were cited from these broad types of related arts. He cited a patent issued to Replogle 3/ which dealt with floor tool rollers or casters; he cited Louik 4/ which dealt with wheel structures for grocery carts, picnic carts, golf carts and the like; and he cited Putsch 5/ which dealt with even a

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1/ See In re Heldt, 433 F.2d 808, 167 USPQ 676 (C.C.P.A. 1970) where the C.C.P.A. said that the more simple the art, the more broad the scope of the analogous prior art.

In this case, the appellant attacked the use of a prior art reference on the grounds that it was non-analogous art and its disclosure was therefore not legally available for combination with the other cited references. In determining whether or not this reference was non-analogous art, this court stated that when dealing with simple mechanical inventions, it is expected that one skilled in the art would look at a wide variety of related fields. In this case, the C.C.P.A. approved a reference directed to a sewage disposal when determining the obviousness of an invention dealing with storage tubes for golf clubs.

2/ See In re Antle, 170 USPQ 285 (C.C.P.A. 1971) where the C.C.P.A. said that one skilled in the art at the time the invention was made must be presumed to have looked at other related arts reasonably pertinent to his particular problem.

3/ Replogle is U.S. Letters Patent 2,175,646 (Replogle patent), filed on Oct. 14, 1936, and issued Oct. 10, 1939. It is cited by the examiner as seen on p. 14 of the file wrapper. See appendix for patent.

4/ Louik is U.S. Letters Patent 3,387,894 (Louik Patent), filed on June 13, 1966, and issued June 11, 1968. It is cited by the examiner as seen on p. 14 of the file wrapper. See appendix for patent.

5/ Putsch is U.S. Letters Patent 1,257,530 (Putsch patent), filed on Sept. 13, 1915, and issued Feb. 26, 1918. See appendix for patent.

more distant related art--certainly more distant than lawnmower wheels--that of pulley-rim coverings.

Thus, the examiner recognized that, when dealing with a simple invention, under the In re Heldt doctrine 1/ one must explore a broad spectrum of the prior art. And that certainly encompassed in this spectrum would be such related arts as floor tool rollers or casters as in Replogle, wheels for grocery carts, picnic carts, and golf carts as in Louik, and even a wheel used in pulleys as in Putsch.

Therefore, even under the examiner's spectrum of prior art, lawnmowers with small hard resilient tires on wheels would certainly be part of the art.

It follows that, given the broad spectrum of the prior art already determined by the examiner, the ALJ was entirely correct in accepting the two patents introduced by the respondents as relevant prior art that disclosed certain wheel and tire assemblies for lawnmowers. 2/ Indeed, the ALJ even found that these two patents, i.e., the Schofield and the White patents were closer prior art than Replogle, one of the patents cited by the examiner. 3/

1/ See In re Heldt, 433 F.2d 808, 167 USPQ 676 (C.C.P.A. 1970).

2/ See p. 33 of the ALJ's Recommended Determination wherein he states: "However, it does appear that the Schofield and White patents are more pertinent to the Zbikowski disclosure" than the Replogle reference. See also ALJ's findings of facts Nos. 30 and 31. The Schofield patent is U.S. Letters Patent 2,505,794, which in figures 1 and 1a discloses a wheel and tire assembly wherein the outer tire wall is longer than the inner tire wall. The White patent is U.S. Letters Patent 2,961,025, which discloses a retread tire on a lawnmower wherein the outer tire wall is longer than the inner tire wall. The White and Schofield patents are attached in the appendix.

3/ Id.

Moreover, it is important to note that the Schofield patent itself was cross-referenced by the Patent Office to Class 301, subclass 6D, a class and subclass that contains patents on wheels and axles for land vehicles. 1/

Since the invention is a simplistic mechanical invention under the doctrine of In re Heldt, the scope of the prior art should be broad and related art fields should be looked into.--The Court of Customs and Patent Appeals said in In re Heldt that the more simple the art, the broader the scope of the analogous prior art. 2/

In the Heldt case, the appellant attacked the use of a prior art reference on the grounds that it was non-analogous art and its disclosure was therefore not legally available for combination with the other cited references. In determining whether or not this reference was non-analogous art, the C.C.P.A. stated that, when dealing with simple mechanical inventions, it is expected that one skilled in the art would look at a wide variety of related fields. In this case, the Court accepted a reference directed to a sewage disposal when determining the obviousness of an invention dealing with storage tubes for golf clubs. More particularly, the court stated:

1/ Class 301 deals with wheels and axles for land vehicles, and subclass 6D deals with wheels and axles for land vehicles with drive means on wheels.

2/ In re Heldt, 433 F.2d 808, 167 USPQ 676 (C.C.P.A. 1970).

> The basic structure involved is a simple one, a thin-walled plastic tube. The problem to be solved was also a relatively simple one and was readily recognizable. Under these circumstances we cannot hold that one attempting to solve that problem would necessarily be limited to a study of other golf club storage tubes or golf accessories . . . .
>
> We find it not unreasonable in cases such as this, involving relatively simple everyday-type mechanical concepts to permit inquiry into other areas where one of even limited technical skill would be aware that similar problems exist. (Emphasis supplied.) (433 F.2d 808, 167 USPQ 676 at 679 (C.C.P.A. 1970))

Also, the Court of Customs and Patent Appeals said in In re Antle that one skilled in the art at the time the invention was made must be presumed to have looked at other related arts reasonably pertinent to his particular problem. 1/

In the case before us, the particular problem dealt with a means to hold a hard resilient tire on a wheel, and one skilled in that particular art might well be expected to look to lawnmower wheels since it is well known that they contain hard resilient tires fastened to small wheels.

More particularly, the C.C.P.A. stated in Antle 2/ that we must:

> . . . presume that the inventor would have that ability to select and utilize knowledge from other arts reasonably pertinent to his particular problem which would be expected of a man of ordinary skill in the art to which the subject matter pertains. 2/ (Emphasis supplied.)

1/ In re Antle, 444 F.2d 1168, 170 USPQ 285 (C.C.P.A. 1971).
2/ Id., at p. 287.

Finally, the Court of Customs and Patent Appeals said in In re Ellis 1/ that while diverse Patent Office classification of references is some evidence of "non-analogy", we consider that similarities and differences in structure and function of the inventions disclosed in the references carry far greater weight.

Even under the In re Ellis doctrine of prior art, the Schofield and White patents must qualify, since both the Schofield and White patents disclose in their specifications and/or diagrams, hard resilient tires mounted on small wheels, and the function of all wheels are similar, i.e., to provide locomotion for the apparatus to which it is attached.

Thus, as discussed hereinabove, the Schofield and White patents qualify as analogous prior art under all the doctrines set forth by the three C.C.P.A. cases mentioned above, i.e., In re Heldt, In re Antle, and In re Ellis.

Using the analytical procedure of Graham v. Deere, 2/ that patented invention would have been obvious to one skilled in the art of attaching hard resilient tires to small wheels, at the time the patented invention was made

(a) The Replogle patent cited by the examiner teaches a retaining lip or bead of the inside of the tire which seats in a groove on the inside of the wheel

It is clear from observing carefully figure 5 of the Replogle patent 3/ that it discloses a lip 50, which sits in a groove (unnumbered, but is seen just under lip 50) on the inside of the periphery of the wheel. The wheel as seen in the side view in figure 5 obviously teaches the use

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1/ In re Ellis, 476 F.2d 1370, 177 USPQ 526 (C.C.P.A. 1973).
2/ Graham v. John Deere Co., 383 U.S. 1 (1965).
3/ See figure 5 of U.S. Letters Patent 2,175,646 filed Oct. 14, 1936, and issued Oct. 10, 1939, to the Ohio Citizens Trust Company, in the appendix.

of a groove, furrow, or channel on the inside of the wheel to retain the lip 50 of the tire (lip 50 is called a bead in the '594 invention, but is identically the same thing).

Since it appears from the patent office file wrapper of the '594 patent (RX-1) that the only claimed nonobvious feature in issued claim 1 is the greater outside wall width of the tire in comparison with the bead on the inner sidewall, 1/ figure 5 of the Replogle patent is almost a direct anticipation of this alleged novel feature--or at the least would have made this alleged novel feature very obvious to one skilled in the art of securing hard resilient tires to small wheels.

(b) The Schofield patent, 2/ while directed to a clutch for a lawnmower, also concurrently discloses in figure 1 of its diagram, a lawnmower tire with an inner bead that has a smaller radial dimension from the outer sidewall.

It is abundantly clear from observing figure 1 of the Schofield patent that it discloses a hard resilient tire with a shorter inner sidewall (that can be called a bead, just as in the '594 patent) and a longer outer sidewall. Figure "1a" of the Schofield patent also appears to show near number "23", an inner bead that sits in a groove in the same manner as described in the '594 patent.

Therefore, the ALJ correctly concluded that the Schofield patent "displayed an outer sidewall of a tire with a greater radial dimension than the inner sidewall." 3/

1/ See p. 32 of the ALJ's recommendation; see also his findings of fact Nos. 24 to 30.

2/ The Schofield patent is U.S. Letters Patent 2,505,794 (see appendix), and was filed on Feb. 15, 1945, and issued on May 2, 1959. While it was classified by the Patent Office in class 192-45, it was also cross-referenced by the Patent Office to class 301-6D dealing with wheels and axles for land vehicles.

3/ See p. 32 of the ALJ's Recommended Determination, third paragraph from bottom of the page.

Thus, once more, the only alleged novel portion of the wheel and tire assembly--the radial dimension of said wall being substantially greater than that of the bead--contained in claim 1 is again disclosed by the prior art, 1/ the Schofield patent.

(c) The White patent directed to retread tires for lawnmowers, also discloses an outer sidewall of a tire with a greater dimension than the inner sidewall.

It is clear by observing figures 4 and 5 of the White patent 2/ that it discloses a hard resilient tire which has outer sidewall of a tire with a greater radial dimension than the inner sidewall.

The ALJ was correct in concluding that the presence of the White along with the Schofield patents render the only claimed "unique" feature of the '594 patent invalid for obviousness. 3/

(d) In view of the teachings of White, Schofield, and Replogle of a hard resilient tire having outer sidewalls with a greater radial dimension than the inner sidewalls, it would have been obvious to one skilled in the art of attaching a hard resilient tire to a wheel, to use such a tire to attach to a wheel.

The ALJ was correct in holding that the only alleged novel part of claim 1 is the tire having an outer sidewall with a greater radial dimension than the inner sidewall. 4/

1/ See p. 7 of the file wrapper of the '594 patent where the complete claim 1 discussing all the other features of the tire and wheel assembly including the groove on the outside of the wheel, was completely anticipated under section 102 by the prior art. See p. 13 for the patent examiner's complete rejection under section 102. See also ALJ's findings 24-30. See also claims 1 and 4 of the '594 patent in the appendix.

2/ The White patent is U.S. Letters Patent 2,961,025, filed Nov. 4, 1957, and issued Nov. 22, 1960, and is directed to retread tires for lawnmowers (see appendix).

3/ See p. 32 of the ALJ's Recommended Determination; see ALJ finding 31, CX-1, CX-7; Swanson, Tr. 967-68.

4/ See p. 32, the third paragraph thereof, of the ALJ's Recommended Determination.

Claim 4 is also invalid since the only alleged novel portion of this claim is subsection (h) 1/ which claims a tire where the inner lip forms a bead in the groove but does not limit the relative size of the outer lip.

Thus, claim 4 is broader than claim 1. Claim 1 only reads on tires with beads on their inner surface which are smaller in radial dimensions than their outer sidewalls, whereas claim 4 reads on all tires with inner beads irrespective of whether the outer sidewalls are larger or smaller in radial dimension. Because of claim 4's broader coverage, it also reads on the prior art of Replogle, White, and Schofield, all of which disclose an outer sidewall of a tire with an inner bead, rendering claim 4 of the '594 patent invalid. 2/ The other limitations in claim 4, subsection (a) through (g) were determined by the ALJ to be old in the art or at least very obvious. (Recommended Determination, findings 24-39).

The '594 patent would not have been infringed even if it were valid. 3/

We disagree with the presiding officer's recommendation that the '594 patent would be infringed if the patent were invalid.

We find that the '594 patent would not be infringed by the Buddy-L tire and wheel assembly (the Buddy-L wheel). More specifically, we find

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1/ See ALJ's findings 24 to 30 and also p. 32 of his Recommended Determination wherein he states that the features disclosed by sections (a) through (f) in claim 4 on p. 8 of the file wrapper are old in the art. Note also that subsection (g) of claim 4 regarding the continuous groove in the wheel was deemed old in the art and anticipated by the German patent, Muller, cited by the patent examiner when it was part of claim 1 (see claims 1 and 4 in appendix).

2/ The groove that holds the inner bead is, of course, old since the groove itself was rejected as old in the art while it was part of the original claim 1, rejected under section 102 by the examiner.

3/ See Infringement and Passing Off Chart in appendix.

that claims 1 and 4 do not read on the Buddy-L wheel either directly or under the doctrine of equivalents. We now summarize the reasons for these findings. 1/

We note first that the same two limitations in claim 1 of the Zbikowski patent appear also in claim 4, i.e., (1) the continuous groove around the periphery of the wheel and, (2) a bead from the tire seated in said groove, and are not present in the Buddy-L tire and wheel assembly. As discussed before, the Buddy-L tire and wheel assembly 2/ do not contain any grooves whatsoever, nor do their tires have any beads that seat in grooves as required by the claim language.

Moreover, the doctrine of equivalents is not available to claim 1 since its rejection was not traversed, and claim 1 was amended to meet its 102 rejection by the Patent and Trademark Office. It is apparent from looking at page 15 of the file wrapper of the '594 patent that the rejection of claim 1 under section 102 by the Patent and Trademark Office was not traversed

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1/ As the U.S. Court of Customs and Patent Appeals said in Coleco Industries, Inc. v. USITC, et al., USPQ , Apr. 5, 1978, unpublished to date, at footnote 5:

> Because the Commission made no decision on the validity issue, it is not before us. To obviate a remand on validity in the event of a reversal of a finding of non-infringement, it would be advisable for the Commission to render a decision on all appealable issues presented to it. CF. Sinclair & Carroll Co. v. Interchemical Corp., 325 U.S. 327, 65 USPQ 297 (1945) (emphasis supplied).

Thus, since the appellate court which has jurisdiction over our 337 appeals has advised us to reach "all appealable issues" before us, we hereinbelow consider the infringement issues.

2/ Supra, footnote 1.

3/ See p. 13 of the file wrapper.

in any way. 1/ In order to gain allowance of claim 1, the patentee amended claim 1 by adding the following limitation from his original claim 3:

> the radial dimension of said side wall being substantially greater than that of the bead. 2/

Thus, once having amended his claim 1 to overcome the prior art and the complete anticipation under section 102, the patentee is now estopped from using the doctrine of equivalents to expand the coverage of this particular claim. This is the traditional file wrapper estoppel doctrine which is well known in patent law. 3/

While the doctrine of equivalents is available to a reasonable extent for claim 4, it is not available to the unreasonable extent of covering such a broad area of monopoly encroaching on areas of prior art, which the unamended version of claim 1 was not allowed to cover. 4/ In essence, we have here an estoppel argument, to wit: that one cannot exclude the competition from an area of the prior art by utilizing the doctrine of equivalents where that same area would not have been available to the patentee through the original language since such broad language in the claim itself would have read on the prior art.

If claim 4 is allowed through the doctrine of equivalents to cover the snap-fit arrangement used by the Buddy-L tire and wheel assembly, then it

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1/ See p. 13 of the file wrapper.

2/ As seen on p. 12 of the ALJ's Recommended Determination, this language comprises subsection "i" of claim 1. See also claim 1 of the '594 patent in the appendix.

3/ Exhibit Supply Co. v. Ace Corp., 315 U.S. 126, 52 USPQ 275 (1942); Cohn v. Coleco Industries, Inc., 558 F.2d 53, 194 USPQ 241 (CA 2 1977); Christopher J. Foster, Inc. v. Newport News Co., 187 USPQ 733 (CA 4 1975); Laser Alignment, Inc. v. Woodruff & Sons, Inc., 491 F.2d 866, 180 USPQ 609 (CA 7), cert. denied, 419 U.S. 874, 183 USPQ 321 (1974).

4/ International Harvester Co. v. Killeter Mfg. Co., 67 F.2d 54, 61, 19 USPQ 9 (CA 9 1933); Barry v. General Tire & Rubber Co., 122 F.2d 123, 48 USPQ 343 (CA 7 1941).

runs directly into the problem of "reading on" the Mattel toy patent to Baynes. 1/ Figure 3 of the Mattel patent specifically discloses a wheel and tire assembly that utilizes a snap-fit in essentially the same manner to achieve the same result as the Buddy-L wheel. The Buddy-L wheel uses substantially the same means to accomplish substantially the same result in substantially the same way as the Mattel patent by Baynes. The Mattel-Baynes patent which discloses this snap-fit for toy vehicles has been prior art at least since July 9, 1969, when the patent was filed by Mattel. Claim 4 of the Zbikowski patent when read literally, does not read on the Baynes' snap-fit wheel and tire assembly. However, if one uses the doctrine of equivalents to expand the coverage of claim 4 of the Zbikowski patent over the Buddy-L snap-fit wheel and tire assemblies, it will also cover the patented Baynes' snap-fit wheel and tire assembly. In doing so, we would be using an equitable doctrine, the doctrine of equivalents, to achieve an inequitable effect; i.e., to further extend the coverage of a claim to an area it would not have been able to cover through its own language because of the prior art. 2/

Claim 4 of the Mattel patent specifically covers a snap-fit type wheel and tire assembly. It reads as follows:

> The wheel described in claim 1 wherein: said flanges have protuberances for deflecting and riding over one another to positions behind one another, as said elements are joined together.

1/ The Baynes patent is U.S. Letters Patent 3,566,536 granted Mar. 2, 1971, to the Mattel Corporation for a wheel assembly for a toy vehicle comprising inner and outer wheel elements that can be snapped together; the Baynes patent is Defendant's exhibit 5; see appendix for a copy. Thus, while the Baynes patent definitely reads on the Buddy-L tire and wheel assembly, or at least covers it by the doctrine of equivalents, it is not covered under either theory by the Zbikowski patent.

2/ See 7 Deller's Walker on Patents, section 558 (2d ed. 1972).

Moreover, the specifications of the Mattel patent lend further support to the specific disclosure of a snap-fit for toy vehicles. The specifications state:

> During the snapping action, the flange 38 of the outer element deflects outwardly until the protuberances 30, 40 on the flanges pass over and lie behind one another. The flanges of the inner and outer elements are designed for some interference even after the elements are snapped into place, to hold them tightly together, although at a relatively low stress level. 1/ (Emphasis supplied.)

Thus, the snap-fit fitting used by the Buddy-L tire and wheel assembly is functionally the identical snap-fit known in the toy vehicle prior art and described by the Baynes-Mattel patent 2/ for toy vehicles, and is in the record before the ALJ, as Defendant's exhibit #5. It is well known in patent law that while the range of equivalents to which a patent is entitled depends upon the scope of the invention, the range of equivalents to be allowed cannot be extended to cover means which have clear antecedents in the prior art. 3/ See 7 Deller's Walker on Patents, section 558 (2d ed. 1972).

Thus, in the case before us, the presiding officer was incorrect in extending the range of equivalents so far that it directly covered the snap-fit tire and wheel assembly of the Buddy-L tire and wheel assembly--which snap-fit tire and wheel assembly was identically disclosed in the prior art by the Baynes-Mattel toy patent, Defendant's exhibit #5.

Furthermore, when the doctrine of equivalents was applied, a foundation should have been laid for its application by showing, for example, that the '594 Zbikowski patent made a great advance in the art or that the respondent

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1/ U.S. Letters Patent 3,566,536, column 3, lines 14-20. (Issued Mar. 2, 1971, to Mattel, Inc.)

2/ Id.

3/ See International Harvester Co. v. Killefer Mfg. Co., 19 USPQ 9, 67 F.2d 54, 61, CA 9 (1933); Barry v. General Tire & Rubber Co., 48 USPQ 343, 122 F.2d 123, CA 7 (1941).

appropriated the essence of the invention. No satisfactory showing was made of either fact. Finally, we note also that the doctrine of equivalents is an exception to the rule that patentees are limited to what they claim and is not applied in all cases. 1/ See 7 Deller's Walker on Patents, section 546 (2d ed. 1972).

Invalidity Of The '251 Patent

U.S. Letters Design Patent No. 225,251 ('251) was granted to the Tonka Corporation on June 16, 1970, upon an application filed on November 12, 1968, by Vernon A. Peterson. Tonka has been and remains the owner of said letters patent. The design patent is directed to a toy truck cab and has one claim with 5 figures illustrating the design claimed.

We agree with the ALJ's holding that the '251 design patent is invalid under section 103 in that such a design would have been obvious to an ordinary intelligent person and/or to an ordinary designer in the toy car art in view of the extensive prior art of record (Recommended Determination, p. 30, conclusion No. 5).

The prior art was extensive.--The ALJ correctly determined that before the filing date of the '251 design patent, there were numerous examples of truck cabs and toy truck cabs. The '251 patent is certainly not the pioneering and originating design for truck cabs or toy truck cabs. (Recommended Determination, finding 51). All the design elements which compose the cab configuration of the '251 design patent are found in combinations of prior are references. (Recommendation Determination, finding 53) Among all the

1/ International Harvester Co. v. Killefer Mfg. Co., 19 USPQ 9, 67 F.2d 54, 61 (9 Cir. 1933); Barry v. General Tire & Rubber Co., 48 USPQ 343, 122 F.2d 123 (CA 7 1941); also see p. 3 of Judge Rich's and Chief Judge Markey's Concurring Opinion, Coleco Industries, Inc. v. USITC, Diamond Pools, Branch Brook Co., Harrow Stores, and Pool City, USPQ, unpublished to date, decided Apr. 6, 1978 (C.C.P.A. 1978).

design details in the '251, only the specific "grille" used in the '251 design is not specifically disclosed in the prior art. All other design details are disclosed. (Recommended Determination, finding 53) And the Mini grille was in the "vocabulary" of the average design engineer since 1969 and 1970. (Recommended Determination, finding 57)

A lengthy list of prior art incorporating the individual features found in the Mini cab are in the record. (Recommended Determination, findings 51, 53) And it is well known patent law that references can be combined to show the obviousness of a design even in a combination requiring rearrangement and reversal of parts. 1/ While complainant in its brief at page 19 accurately states that "a design is patentable if the elements (from the prior art) are grouped or combined in such a manner as to produce a pleasing appearance which is different from that of the prior art.", the "pleasing appearance" of the '251 patent configuration is clearly not "different" enough either to a designer or an ordinary observer to overcome its obviousness. 2/ Nothing in the authority cited by complainant runs counter to this conclusion. The overall impression must be different for a design patent consisting of old elements to be valid. 3/ Even the authority complainant offers to aver that a piecemeal approach is not adequate for finding obviousness of a design patent underscores the importance of the overall impression. Ex parte Fishback, 160 U.S.P.Q. 30 (PO Bd. Apps.), as complainant's brief states, does hold that the presence of individual design elements in the prior art does not alone establish

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1/ See In re Leslie, 547 F.2d 116, 192 USPQ 427, 439 (C.C.P.A. 1976).
2/ See Recommended Determination, findings 56, 56, and 57.
3/ "In considering patentability of a proposed design the appearance of the design must be viewed as a whole . . ." In re Application of Jennings, 182 F.2d 207, 208 (C.C.P.A. 1950).

obviousness. But in that case, the design in question, a set of sign panels with letters, numbers, and symbols against distinctive backgrounds, gave a unique impression from the manner that prior art patterns were combined. This is contrary to the design patent before us. 1/

The person skilled in the art.--The ALJ was correct in holding that the '251 design patent was obvious either under the ordinary intelligent person test or the ordinary designer in the toy car art test. (Recommended Determination, p. 36)

The Ninth Circuit and the Court of Customs and Patent Appeals hold that the obviousness appraisal is by an ordinary intelligent person, while the Second, Third, and District of Columbia circuits require a standard from the perspective of the designer having ordinary skill in the art. 2/ Expert testimony establishes obviousness to a designer of ordinary skill at the time the design was invented, 3/ whereas the survey data of parties as well as the presiding officer's own observations meet the ordinary observer standard of the Ninth Circuit and the Court of Customs and Patent Appeals. 4/

Much of the prior art design presented by the expert witnesses at the hearing were not those designs that would be within the exclusive knowledge of an expert. Commonly observed real truck body designs as well as prior design patents for toys are in the record that lead the presiding officer to the conclusion that the ordinary observer would find the '251 design obvious.

> [T]hus, the issue of obviousness of a given design is ultimately resolved subjectively according to the visual perception of the judge who finds himself cast in the role of 'the ordinary observer'. In re Leslie, 547 F.2d 116, 192 USPQ 427, 439 (C.C.P.A. 1976).

1/ See Recommended Determination, findings 56 and 57.

2/ Sidewinder Marine v. Starbuck Kustom Boats, 418 F. Supp. 224, 193 USPQ 776, 780 (D.C. Colo. 1976).

3/ Recommended Determination, finding 57.

4/ See Recommended Determination, p. 37, first full paragraph.

The '251 Patent Is Not Infringed 1/

We agree with the ALJ's determination that the '251 patent is not infringed by the Buddy-L steel toy vehicles and adopt his findings of fact and conclusions of law thereof.

The discussion on page 38 of the ALJ's recommended determination is particularly persuasive. His theory is simple and direct. The rationale is as follows:

(1) The '251 patent was allowed to issue over the prior art of the '825 patent.

(2) Therefore, the '251 patent must have been different enough from the '825 design patent to be patentable.

(3) However, the Buddy-L truck, represented by CX-37, is even more different from the '251 design patent than was the '825 design patent.

(4) Therefore, a priori, if the '825 design patent does not infringe (it couldn't, since the examiner believed the '251 design was patentably different enough from the '825 design patent to issue the new '251 patent design), the Buddy-L truck (CX-37) also could not infringe the newer '251 patent.

In order to show that the Buddy-L vehicles are more different from the '251 patent than the '825 patent design, we have analyzed the differences in the following chart herein.

1/ See Infringement and Passing Off Chart in Appendix.

No Infringement of '251 Patent

7 design elements of '251 patents not present in the '825 patent, also not present in Buddy-L truck	Patents		Buddy-L truck (CX-37)
	'251 (CX-34)	'825 (CX-31)	
(a) A forward A pillar that slopes downwardly rearwardly.	Yes	No	No
(b) The presence of a spine in the center forward surface of the wrap-around windshield.	Yes	No	No
(c) A rake to the rear of the cab which extends down to the height of the greatest width of the cab.	Yes	No	No
(d) A roof having embossures at the side edge and a peak or spine at the center.	Yes	No	No
(e) Parallelogram shaped side windows	Yes	No	No
(f) Steering wheel with one center support	Yes	No	No
(g) Grill with rectangular headlights and three longitudinal lines w/out any vertical lines.	Yes	No	No
5 additional elements where the Buddy-L truck differs even more so from the '251 patent than the '825 patent			
(a) Clear-colored windshield	Yes	Yes	No
(b) Front end that rakes backwards and down.	Yes	Yes	No
(c) Hood of movable dump portion covering over half of roof of cab.	No	No	Yes
(d) Side window with 4 sides with read pillar sloping forward.	Yes	Yes	No
(e) Headlights mounted on front fenders as opposed to being in the grill itself.	No	No	Yes

As can be seen by the chart, both the '825 and the Buddy-L truck are different with respect to the first seven design elements of the '251 patent. However, the chart points out five additional elements where the Buddy-L truck differs even more so from the '251 patent than the '825 patent. Thus, it is readily apparent that there are more differences between the Buddy-L truck and the '251 patent, than between the '825 patent and the '251 patent. And if the '825 patent design is patentably different from the newer '251 design, even more so must the Buddy-L truck design be patentably different from the '251 design. If the Buddy-L design is patentably different from the '251 design--by definition--the Buddy-L design cannot infringe the '251 design patent.

There Is No Passing Off 1/

The ALJ was correct in determining that there was on passing off, i.e., that the imported toy steel vehicles do not simulate the size, appearance, and design of certain domestically manufactured products of complainant in such a way as to pass off such steel toy vehicles are products of complainant.

In order for Tonka to have carried its burden of proving that Buddy-L passed off or attempted to pass off its toy vehicles as those of Tonka, Tonka had to prove the following:

(1) that the designs of the Tonka steel toy vehicles were primarily "non-functional". 2/

(2) that the design features of the Tonka toy vehicles had, in fact, acquired "secondary meaning" by becoming uniquely

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1/ See Infringement and Passing Off Chart in appendix.

2/ The purpose of the non-functionality requirement is to permit unrestricted competition between unpatented functional products. The law of passing off grants protection only where arbitrary, non-functional features are involved. Where competition in the underlying product--steel toy vehicles--can be undertaken without necessarily adopting the competitor's non-functional designs, the law can grant protection to such designs. If a design feature, on the other hand, contributes only to utility, durability, or effectiveness of a product or the ease with which it serves its function, it cannot be non-functional. Filter Dynamics International v. Aston Battery, Inc., 183 USPQ 102, 109.

> associated by the consuming public with the complainant as the sole source of toy vehicles having those designs; 1/ and
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> (3) that there is a likelihood of confusion in the minds of the consuming public between the Buddy-L Brute (5 inches in size, CX-37) and the Buddy-L Std. (8 inches in size, CX-41)--with the Tonka Mini (8 inches in size, CX-48 and CX-34) and the Tonka Tiny (5 inches in size, CX-31, CX-45, and RX-75). 2/

The ALJ correctly found that the design features of the Tonka theme were non-functional.--We agree with the ALJ's discussion on non-functionality found on pages 41, 42, and 43 of his recommended determination, and his finding that the complainant has proved his case regarding the non-functionality of his design features.

As the ALJ states in his recommendation, the primary function of the Mini and Tonka designs is to provide a distinctive appearance which simulates a real truck and by which the buying public can identify the toy truck manufacturer.

The evidence indicates that the design alternatives for simulating toy trucks number in the thousands and no showing has been made that any of the specific designs chosen by Tonka are primarily functional. The Eighth Circuit Court of Appeals, in one of the leading cases in this field, Truck Equipment Service Co. v. Fruehauf Corp., clearly supports this conclusion:

> where a shape or feature of construction is in its concept arbitrary, it may be or become a legally recognizable trademark because there is no public interest to be protected. In such a case protection would not be lost merely because the shape or feature also serves a useful purpose. 3/

1/ Rolls-Royce Motors Ltd. v. A & A Fiberglass, Inc., 428 F. Supp. 689, 193 USPQ 35 at 45 (N.O. Ga. 1977).

2/ See chart in appendix entitled Infringement and Passing Off.

3/ J.C. Penney Co. v. H.O. Lee Mercantile Co., 120 F.2d 949 (8th Cir. 1941).

It is the degree of arbitrariness of the construction which underlies the requirement of non-functionality. The purpose of the non-functionality requirement in examining the actions of alleged imitators is to permit unrestricted competition between unpatented functional products so that the public benefits from useful progress in the industrial and commercial arts. 1/ The law grants protection where competition may be undertaken without imitation. 2/ Here, where the design alternatives number in the thousands (finding 71), it is clear that competition will not suffer if merely one of those alternatives is protected from imitation.

The Tonka-theme did not achieve secondary meaning. We agree with the ALJ's determination that the design elements of the '251 design patent did not achieve secondary meaning. (Recommended Determination, pp. 44-46; p. 30, conclusion 9)

The ALJ after reviewing the results of consumer surveys presented by both complainant and respondent, together with the testimony concerning those surveys, correctly found that the designs 3/ of the Tonka toy vehicles had not acquired "secondary meaning." It is clear that the results of the surveys merely showed that Tonka had achieved a high level of brand awareness, but failed to show that consumer recognition of the Tonka vehicles

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1/ Truck Equipment Service Co. v. Fruehauf Corp., 536 F2d 1210, 1218 (8th Cir. 1976).

2/ Truck Equipment Service Co., supra, 1218.

3/ At the trial, it was apparent that Tonka was unable to identify a single design element which by itself had achieved secondary meaning. Instead, it relied on what is called the Tonka "theme". As stated in the ALJ's finding No. 64, the Tonka theme arises from certain design features common to the Tiny and Mini cabs consisting of the: (1) basic cab over engine design; (2) the wheel well visually centered in the cab; (3) the beltline bisecting a pointed forward angle; (4) the presence of tumblehome; (5) the roof recessed from the windshield; and (6) the windshield visible from the sides of the vehicles.

was the result of a recognition of the design of those vehicles (the Tonka "theme"), rather than of other factors (such as the quality of workmanship and durability) that the consumer public had come to associate with Tonka. According to the ALJ, this failure was "fatal" to Tonka's attempt to establish "secondary meaning" in the designs of its toy vehicles. We concur.

Findings 91 and 94 were specifically important on this issue. They conclusively found that persons in the surveys identified Tonka toys not because of the six Tonka themes, but because of the durability and strength of the materials and workmanship. Moreover, while consumers were aware of the Tonka brand name, they were unaware of the Tonka theme designs.

Finally, findings 109 and 111 were dispositive of the fact that the surveys did not prove that consumers identified Tonka toys because of the Tonka "theme." We note that nothing in the Tonka Consumer Recognition Survey tied the recognition by the tested consumers to the Tonka theme, as opposed to the other features such as durability, strength, and workmanship. Whereas, the Buddy-L Survey (RX-93) in fact showed that consumers identified Tonka toys not because of the Tonka theme--therefore not because of the non-functional design features--but because of the quality of workmanship, durability, and strength. Thus, consumers were aware of the Tonka brand, but not aware of the Tonka theme--the six design elements specified on the ALJ's finding No. 64.

There was no likelihood of confusion in the market place.--The ALJ was correct in finding that when purchasing steel toy vehicles, consumers were not confused between Tonka toy products and Buddy-L toy products. (Recommended Determination, pp. 46-48; conclusion No. 10, p. 30)

Findings 101 and 102 are most important regarding this determination. In finding 101, the ALJ found that each and every individual retail shelf package containing a Buddy-L steel toy vehicle bears the Buddy-L name conspicuously and legibly on its exterior. (Stipulation, Tr. 46). Moreover, each and every Buddy-L steel toy vehicle itself bears the Buddy-L name conspicuously imprinted on it.

Thus, the Tonka and Buddy-L trucks are sold in packages that prominently and legibly display their respective names and logos which appear prominently in several locations on each of the toy trucks themselves. Moreover, such labeling has been held by the courts to preclude the likelihood of confusion even when, as opposed to the present situation, the products themselves are identical or nearly identical. 1/ As stated in Remco v. Toymenko, 2/ also involving toy vehicles:

> Here the defendants have labeled their product, and in no way simulated the plaintiff's label or packaging. In these circumstances there is not support for the plaintiff's claim of "palming off".

Accordingly, the ALJ was entirely correct in holding that the Buddy-L toy steel vehicles were not passed off as Tonka products. 3/

1/ See The American Rolex Watch Corp. v. Ricoh Time Corp., 491 F.2d 877 (2 Cir. 1974); Bose Corp. v. Linear Design Labs, Inc., 467 F.2d 304 (2 Cir. 1972).

2/ Remco Industries, Inc. v. Toyomenka, Inc., 286 F. Supp. 948 (D.C.S.D.N.Y. 1968), aff'd 397 F.2d 97 (2 Cir. 1968).

3/ See p. 48 of ALJ's Recommended Determination wherein the ALJ also found no evidence has been presented demonstrating an intent to pass off.

APPENDIX

Infringement and Passing Off Chart
Claim 1 of the '594 patent
Claim 4 of the '594 patent
'594 patent
Schofield patent
White patent
Replogle patent
Louik patent
Putsch patent
Baynes patent
'251 patent
'825 patent

Infringement And Passing Off Chart

Common name	Size	Patent number	Exhibit number	Alleged
(1) Tiny Tonka or Tiny Cab	5 inches	'825 patent (which is CX-18)	CX-31 (CX-45 and RX-75)	
(2) Buddy L-Std	8 inches		CX-41	Alleged to be passed off as a Tonka product.
(3) Mini Tonka or Mini Cab	8 inches	'251 patent (which is CX-2)	CX-34 (CX-48)	
(4) Buddy L-Brute	5 inches		CX-37	Alleged to infringe the '251 patent.

Claim 1 of the '594 patent provides as follows:

1. In a wheel and tire assembly for a miniature toy vehicle,

   a. a wheel of rigid material having a cylindrical peripheral surface connecting inner and outer sides of the wheel,

   b. the wheel being provided with a continuous groove around said peripheral surface opening toward the inner side thereof, (similar to claim 4, subsection "g")

   c. and having a diametrically reduced hub portion on the outer side thereof concentric with said peripheral surface and projecting axially outwardly therebeyond,

   d. and being provided with radially extending shoulder means spaced axially inwardly from the outer edge of said hub portion,

   e. an annular tire of resilient material having an interior cyclindrical surface adapted to conform to and fit snugly around the peripheral surface of the wheel,

   f. said tire having an annular side wall on one side, engaging the outer side of the wheel,

   g. and having an inner peripheray tightly encircling said hub portion and abutting said shoulder means to retain the tire against axially inward movement on said wheel,

   h. and an inwardly directed annular bead on the other side seated in said groove in the wheel to retain the tire against outward axial movement from the wheel but to permit axial inward movement of said tire onto said wheel,

   i. <u>the radial dimension of said side wall being substantially greater than that of the bead whereby to simulate a tire sidewall</u>. (Note: this subsection "i" was the only change in claim 1 after it was entirely rejected by the patent office under 102 as being completely anticipated by the prior art. Sections "a" through "h" remained essentially the same)

Claim 4 of the '594 patent provides as follows:

4. In a wheel and tire assembly for a miniature toy vehicle,

   a. on a wheel having a tubular center spindle with a hub on its outer end and an inwardly opening socket in its other end for reception of an axle,

   b. an axially elongated wheel ring concentrically encircling the spindle in spaced relation thereto,

   c. a radially extending plate interconnecting the anially medial portions of the spindle and ring leaving open space on both sides thereof,

   d. a wheel rim having a cylindrical peripheral surface concentrically encircling the wheel ring in spaced relation thereto,

   e. a wheel wall interconnecting the axially inner end portions of the rim and ring leaving open space on the outer side thereof,

   f. said wheel ring extending axially outward beyond the wheel rim,

   g. said wheel rim having a continuous groove extending therearound and opening through said peripheral surface, and (See subsection "b", Claim 1)

   h. a tire mounted in encircling relation on the rim and having an annular outer side wall encircling the wheel ring and an annular inner bead seated in said continuous groove. (See subsection "h", Claim 1)

CX-1

United States Patent [19]
Zbikowski

[11] 3,730,594
[45] May 1, 1973

[54] WHEEL AND TIRE ASSEMBLY FOR TOY VEHICLES

[75] Inventor: Theodore H. Zbikowski, Mound, Minn.

[73] Assignee: Tonka Corporation, Mound, Minn.

[22] Filed: Apr. 26, 1971

[21] Appl. No.: 137,493

[52] U.S. Cl. ..... 301/63 PW, 46/221
[51] Int. Cl. B60b 5/02
[58] Field of Search ..... 152/379, 380; 301/63 PW; 46/221

[56] References Cited

UNITED STATES PATENTS

1,257,530	2/1918	Putsch	152/380
3,387,894	6/1968	Louik	301/63 PW
2,175,646	10/1939	Replogle	301/63 PW
3,048,447	8/1962	Klint	46/221 X
3,360,300	12/1967	Carter	46/221 X

FOREIGN PATENTS OR APPLICATIONS

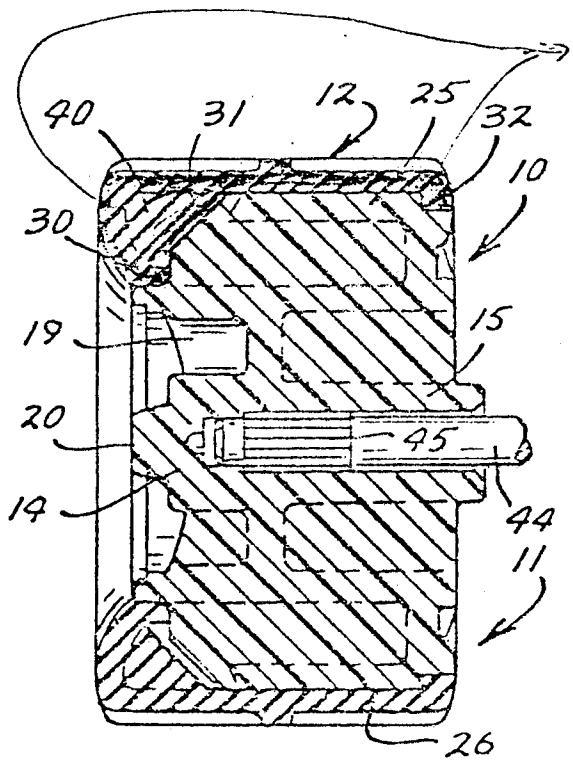
965,560	6/1957	Germany	46/221

Primary Examiner—Richard J. Johnson
Attorney—Carlsen, Carlsen & Sturm

[57] ABSTRACT

A wheel and tire assembly for toy vehicles wherein a generally cylindrical wheel of rigid material has a reduced portion projecting concentrically from the outer side thereof and a peripheral groove adjacent the inner side thereof and a tire of resilient material encircling the wheel and having an outer side wall tightly encircling the reduced portion and an annular bead on the inner side of the tire seated in said peripheral groove to prohibit outward axial removal of the tire from the wheel.

4 Claims, 6 Drawing Figures



sidewalls one of which has a greater thickness

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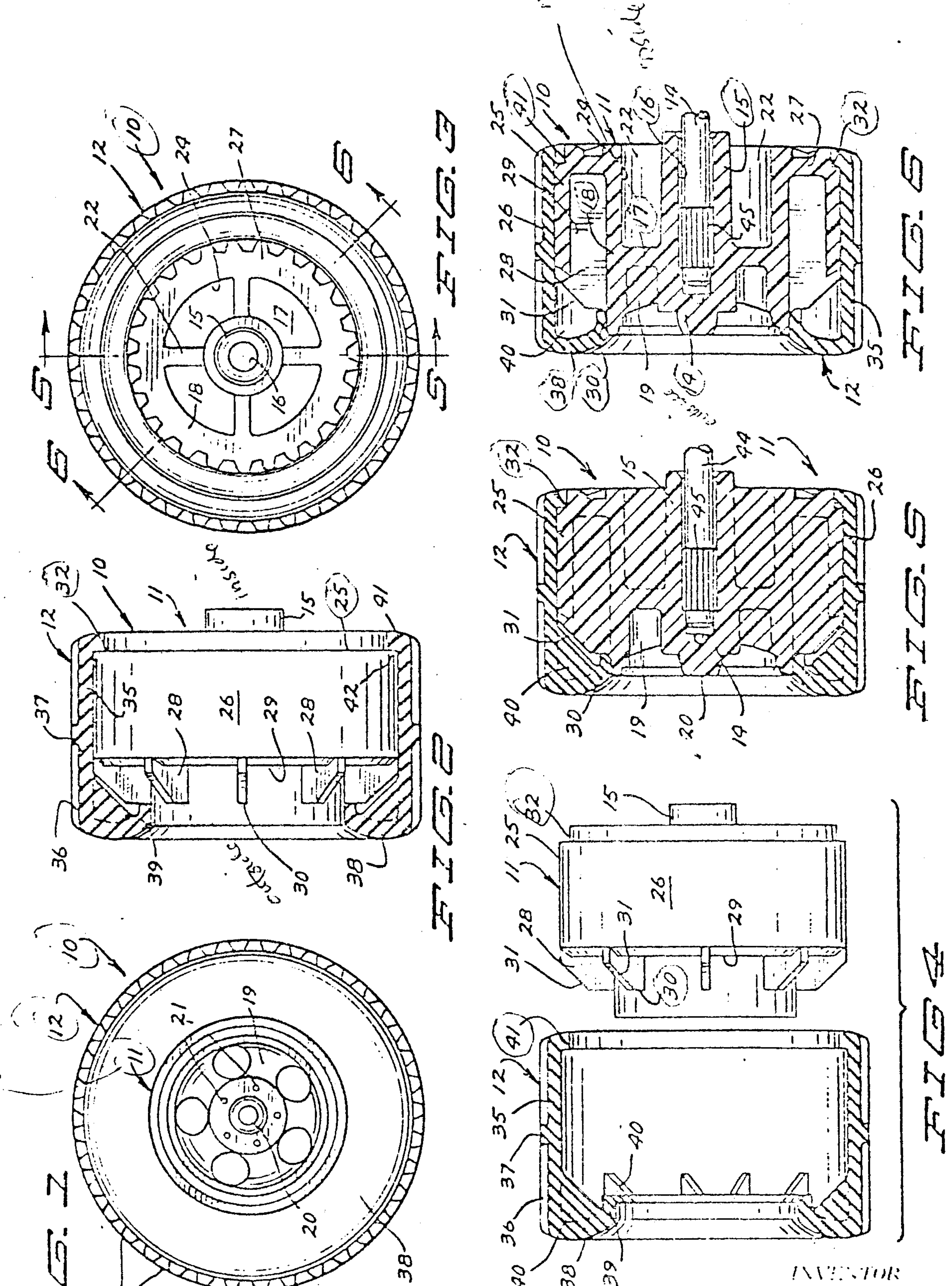

INVENTOR
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BY

ATTORNEYS

WHEEL AND TIRE ASSEMBLY FOR TOY VEHICLES

BACKGROUND OF THE INVENTION

It is highly desirable that miniature toy vehicles simulate the appearance of their operative full sized counterparts as closely as possible and yet be economically and durably produced and safe in the hands of young children.

Accordingly, manufacturers of tire bearing wheeled toy vehicles such as cars and trucks attempt to simulate the wheel, tire and hub cab of the real thing as closely as possible. This has generally been accomplished in various ways.

In one form of the structure a unitary tire and wheel member of black rubber or plastic material is either fixedly mounted or journaled on the end of an axle and a metal disk mounted concentrically on the outer side of the member to simulate the wheel or hub cap. In another form a wheel is mounted on the end of an axle and is provided with a peripheral groove or tire well in the rim into which the central internal bead of a tire of resilient material may be stretched and seated.

Neither of these structures is completely satisfactory for various reasons. In the first form mentioned the tire and wheel member must be of an undesirably hard or rigid material to assure its retention on the axle without providing a separate bearing insert. If it is of a resilient material it may be easily pulled off of the axle. Also it is not a true wheel and tire assembly. In the second form mentioned and where a resilient material such as rubber or vinyl is used in the tire, a child may generally easily peel it off of the wheel to be lost. Moreover, the latter structure at least does not readily lend itself to the mounting of tires such as sand tires which have a large axial width relative to the diameter thereof.

It is, of course, additionally desirable from a manufacturing standpoint that both the wheel and tire have relatively thin wall structures throughout both to save material and reduce the hardening or setting time after molding.

SUMMARY OF THE INVENTION

An object of the present invention is to provide an improved wheel and tire assembly for miniature toy vehicles wherein a tire of resilient material is actually mounted on a wheel and is so locked in place thereon as to prohibit or restrict removal when the wheel is mounted on the vehicle.

Another object of the invention is to provide a wheel and tire assembly for toy vehicles which more truly simulates the appearance of a real vehicle tire and wheel assembly than those heretofore known.

Still another object of the invention is to provide a wheel and tire assembly for toy vehicles which enables the mounting of a flexible tire on a rigid wheel which has an abnormally large width relative to its diameter and with both components having relatively thin wall structures throughout.

With these and other objects in view the invention broadly comprises a cylindrical cavernous wheel of rigid material having a reduced portion projecting concentrically from the outer side thereof and a peripheral groove extending around the inner edge thereof and a tire of resilient material mounted on the wheel and having an outer side wall tightly encircling the reduced portion and an annular bead on the inner side thereof seated in said groove to lock the tire against axial removal from the wheel.

BRIEF DESCRIPTION OF THE DRAWINGS.

In the drawings:

FIG. 1 is an outer side elevation of the wheel and tire assembly.

FIG. 2 is a front view of the assembly showing the wheel in elevation and the tire in diametrical cross section.

FIG. 3 is an inner side elevation of the assembly.

FIG. 4 is an exploded view of the wheel and tire prior to assembly and with the tire shown in diametrical cross section.

FIG. 5 is a diametrical cross section through the entire assembly taken on line 5—5 of FIG. 3.

FIG. 6 is a section through the assembly taken on line 6—6 of FIG. 3.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now more particularly to the drawings, reference numerals will be used to denote like parts or structural features in the different views. The wheel assembly is designated generally by the number 10 and comprises a wheel 11 of generally cylindrical shape having an annular tire 12 thereon in encircling relation.

Wheel 11 is a generally cylindrical cavernous body that is cast or molded in unitary form of a rigid material such as metal or plastic. At its center a hub 14 is formed at one end of an elongated tubular hub spindle 15 which has an axle receiving socket 16 opening axially toward the inner side of the wheel. A circular wheel wall 17 encircles the medial portion of spindle 15 and supports a cylindrical wheel ring 18 in coaxial radially spaced relation to the spindle. The outer face of wall 17 between hub 14 and ring 18 is configured to simulate a plurality of radially extending spokes 19 and the outer end of hub 14 is configured to simulate the end of an axle at 20 and a series of wheel mounting bolts 21 (FIG. 1). A plurality of circumferentially spaced spoke blades 22 connect the spindle 15 to wheel ring 18 on the inner side of wall 17 leaving recesses 24 therebetween.

An annular rim 25 having a smooth cylindrical outer surface 26 encircles ring 18 in spaced concentric relation and is integrally connected thereto by an inner wheel wall 27. A plurality of circumferentially spaced outer spoke segments 28 extend between ring 18 and rim 25 leaving outwardly opening recesses 29 therebetween. Segments 28 extend outwardly beyond rim 25 and to a point short of the outer edge of wheel ring 18 to form a tire bead seat 30 at the end of the peripheral surface of ring 18. The outer edge of each spoke segment 28 extends normal to the wheel axis a short distance just inside of seat 30 and then angles as at 31 toward rim 25 and over the outside edge thereof to the outer cylindrical surface 26 of the rim.

The rim 25 at the external corner of its junction with inner wheel wall 27 is provided with a peripheral L-shaped seat 32 which opens radially outward and axially toward the inner side of the wheel. This is a tire retention seat as will be shortly more fully described.

Tire 12 is formed of resilient material such as vinyl or rubber and has an annular wall 35 the external cylindrical surface of which may be provided with protruding transversely and circumferentially extending treads denoted respectively at 36 and 37. The outer side wall 38 of the tire curls inwardly from the outer edge of wall 35 and terminates in a bead 39 having an internal diameter equal to the external diameter of ring 18 and the head seat 30 formed on the outer end thereof. The size and shape of bead 39 is retained by integrally formed gussets 40 extending between walls 35 and 38. A relatively short circumferential bead 41 projects radially inward from the inner edge of wall 35 with the inside face 42 (FIG. 2) thereof lying on a plane perpendicular to the axis of the tire.

In preassembled condition the wheel 11 and tire 12 are in the relative positions shown in FIG. 4. To assemble the wheel is simply forced in an axial direction into the tire. The tapered edges 31 of segments 28 automatically center the wheel in coaxial relation with the tire and distend the bead 41 so that it slides onto and along surface 26 until the wheel is fully inserted into the tire and the bead 41 locks in the L-shaped seat 32. This occurs as the outer end of ring 18 enters into bead 39 which becomes firmly seated in seat 30.

An axle 44 having a serrated enlarged portion 45 is press fit into socket 16 in the spindle 15. Axles 44 with tire and wheel assemblies 10 secured on each end thereof are journaled in transversely extending positions on the toy vehicle to provide rolling support therefor.

When the wheel assembly is mounted on a vehicle particularly under a fender, it is very difficult, if not impossible, for a young child to remove the tire from the wheel as he can only pull on one side of flange 41 and cannot get a good grip on that.

The wheel 11 can be formed to have a very realistic appearance as shown in FIGS. 1 and 3. The wheel is very durable and yet the various recesses in both sides of the wheel render all of the various walls in the wheel structure quite thin for a rapid hardening in the mold to reduce production time. This is also true of the tire 12 although side wall 38 creates the appearance of a relatively thick tire. The thin walls of the tire tend to reduce shrinkage during cooling. Moreover, the components lend themselves well to assembly by automation.

Having now therefore fully illustrated and described my invention, what I claim to be new and desire to protect by Letters Patent is:

1. In a wheel and tire assembly for a miniature toy vehicle, a wheel of rigid material having a cylindrical peripheral surface connecting inner and outer sides of the wheel, the wheel being provided with a continuous groove around said peripheral surface opening toward the inner side thereof and having a diametrically reduced hub portion on the outer side thereof concentric with said peripheral surface and projecting axially outwardly therebeyond, and being provided with radially extending shoulder means spaced axially inwardly from the outer edge of said hub portion, an annular tire of resilient material having an interior cylindrical surface adapted to conform to and fit snugly around the peripheral surface of the wheel, said tire having an annular side wall on one side encircling the outer side of the wheel and having an inner periphery tightly encircling said hub portion and abutting said shoulder means to retain the tire against axially inward movement on said wheel and an inwardly directed annular bead on the other side seated in said groove in the wheel to retain the tire against outward axial movement from the wheel but to permit axial inward movement of said tire onto said wheel, the radial dimension of said side wall being substantially greater than that of the bead, whereby to simulate a tire sidewall.

2. The subject matter of claim 1 wherein a plurality of circumferentially spaced gussets integrally connect the side wall to said interior cylindrical surface of the tire.

3. The subject matter of claim 1 wherein the wheel is provided with a plurality of uniform circumferentially spaced segments having outer edges beveled from said peripheral surface toward said reduced portion to aid in assembling the wheel and tire by inserting the wheel axially outward through the bead distending the same and through the tire until the bead seats in the groove.

4. In a wheel and tire assembly for a miniature toy vehicle,

(a) a wheel having a tubular center spindle with a hub on its outer end and an inwardly opening socket in its other end for reception of an axle,

(b) an axially elongated wheel ring concentrically encircling the spindle in spaced relation thereto,

(c) a radially extending plate interconnecting the axially medial portions of the spindle and ring leaving open space on both sides thereof,

(d) a wheel rim having a cylindrical peripheral surface concentrically encircling the wheel ring in spaced relation thereto,

(e) a wheel wall interconnecting the axially inner end portions of the rim and the ring leaving open space on the outer side thereof,

(f) said wheel ring extending axially outward beyond the wheel rim,

(g) said wheel rim having a continuous groove extending therearound and opening through said peripheral surface, and

(h) a tire mounted in encircling relation on the rim and having an annular outer side wall encircling the wheel ring and an annular inner bead seated in said continuous groove.

* * * * *

192-45

SEARCH

EXHIBIT J

A-9

May 2, 1950 E. L. SCHOFIELD 2,505,794

CLUTCH FOR LAWN MOWER REELS

Filed Feb. 15, 1945 2 Sheets-Sheet 1

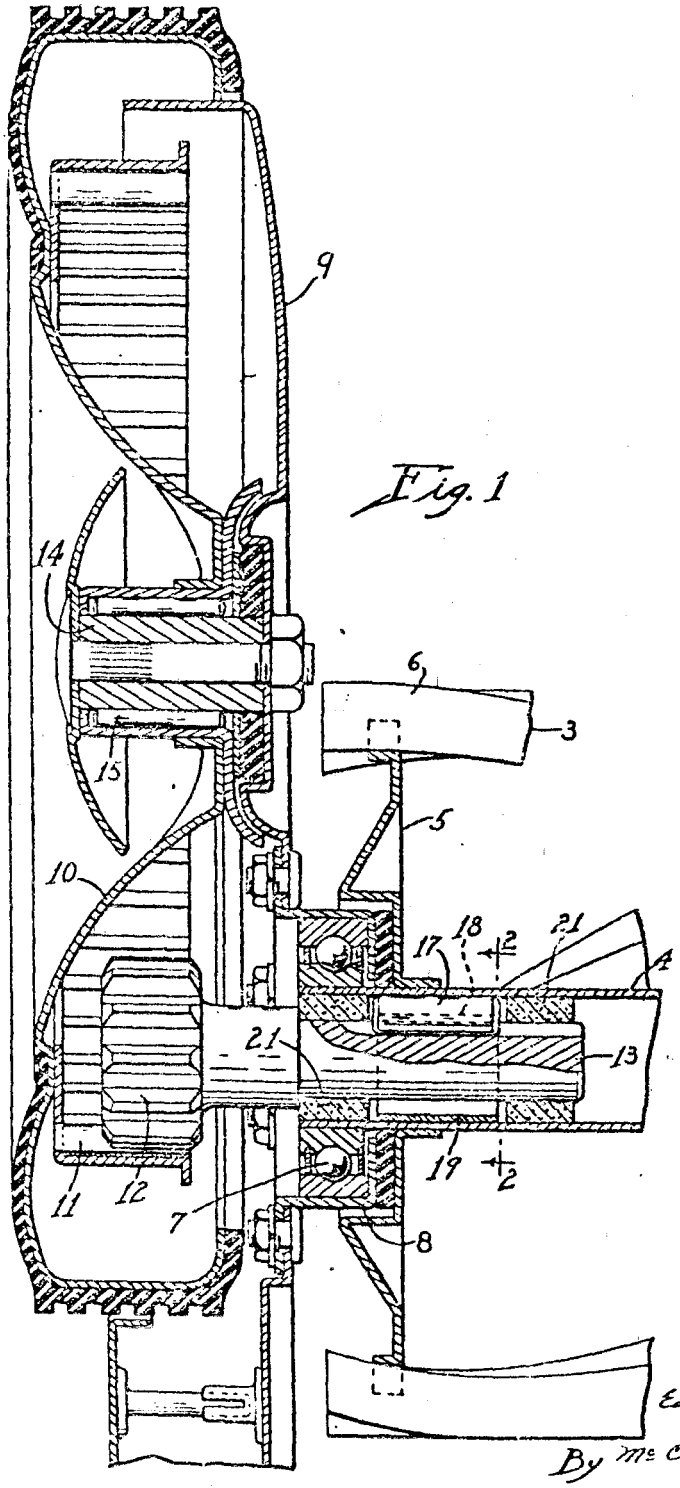

Fig. 1

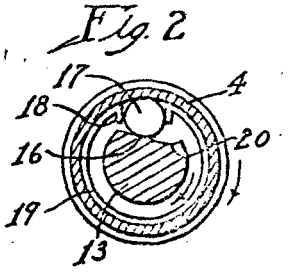

Fig. 2

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May 2, 1950 E. L. SCHOFIELD 2,505,794

CLUTCH FOR LAWN MOWER REELS

Filed Feb. 15, 1945 2 Sheets-Sheet 2

Fig. 1A

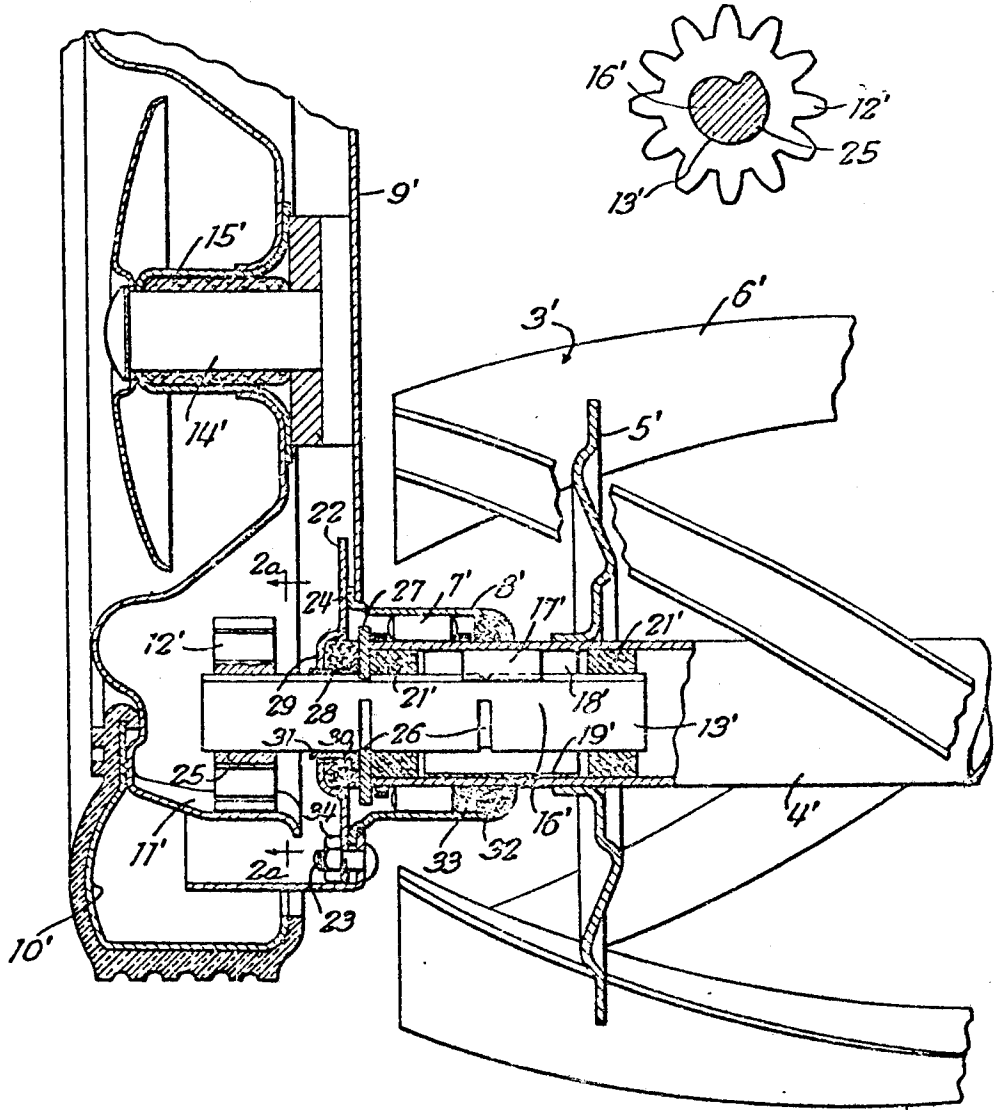
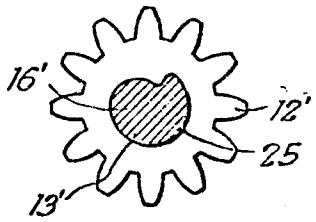


Fig. 2A



Inventor
Earl L. Schofield
Andrew F. Winterson
Atty.

UNITED STATES PATENT OFFICE

2,505,794

CLUTCH FOR LAWN MOWER REELS

Earl L. Schofield, Rockford, Ill., assignor, by mesne assignments, to Andrew F. Wintercorn, Rockford, Ill.

Application February 15, 1945, Serial No. 580,032

19 Claims. (Cl. 192—45)

1

This application is a continuation in part of my co-pending application Serial No. 488,485, filed May 26, 1943, and now abandoned and replaces the divisional application Serial No. 516,190, filed December 30, 1943, and allowed August 26, 1944 and now abandoned.

This invention relates to a new and improved clutch for a lawn mower reel.

The principal object of my invention is to provide an overrunning clutch of simple, economical, and practical construction, and one which operates smoothly and quietly and without objectionable concentration of wear at certain points, whereby to avoid the most important objection to the conventional ratchet drive heretofore employed. The ratchet teeth on the inside of the hub of the pinion in the conventional ratchet drive are subjected to severe hammering by the pawl and, as a result, get rounded or chipped off to such an extent that the pawl no longer takes hold properly and the reel is not driven satisfactorily. With my improved type of overrunning clutch, there are no teeth to get chipped or rounded and the single cylindrical roller used affords positive and yet quiet engagement without any tendency toward hammering, and the clutch provides large wearing surfaces, and since the engagement does not occur always at certain specific points much longer life is secured.

Another object of the invention is to provide a drive of the kind mentioned, using an extruded shaft to provide the cam contour for the overrunning clutch, the shaft being formed to the same cross-section from end to end, requiring no special expensive machining to get the cam contour and no separate machining of a keyway for keying the shaft to the drive pinion.

Still another object is to provide a drive of the kind mentioned in which an annular groove is provided in the shaft intermediate the ends thereof and a brass washer is swedged into the groove to assume end thrust, this washer cooperating preferably with a felt washer assembled inside a closure plate, whereby the drive is completely sealed and there is ample end tolerance, making for free and easy operation with minimum wear, and also quick and easy assembling and disassembling.

The invention is illustrated in the accompanying drawings, in which—

Fig. 1 is a substantially horizontal sectional detail through the reel drive portion of a lawn mower embodying the clutch of my invention;

Fig. 2 is a cross-section on the line 2—2 of Fig. 1.

2

Fig. 1A is a section similar to Fig. 1, showing another construction, and

Fig. 2A is a cross-section on the line 2a—2a of Fig. 1A.

Similar reference numerals are applied to corresponding parts in these views.

Referring first to Figs. 1 and 2, the reference numeral 3 designates the reel which comprises a tubular center shaft 4 onto which are welded sheet metal disks 5 for support of the reel blades 6, which, of course, cooperate with the usual cutter-bar (not shown). The reel 3 is rotatably mounted by means of its shaft 4 at its opposite ends in ball bearings 7 provided in cups 8 detachably secured to the side plates 9 that form parts of the lawn mower frame. The two wheels of the mower, one of which is shown at 10, carry internal gears 11 which have meshing engagement with drive pinions 12, the shanks 13 of which are entered in the ends of the shaft 4 for drive purposes. The wheels 10 are mounted on axle stubs 14 secured to and projecting outwardly from the side plates 9, the roller bearings 15 insuring easy turning.

The reel 3, in accordance with my invention, is arranged to be driven by an overruning clutch, consisting of a cam 16 formed on the shank 13 of the drive pinion and a single cylindrical roller 17 disposed between the cam 16 and the inner periphery of the shaft 4 and guided for radial movement between the turned-in end portions 18 of a split spring ring 19. The ring 19 tends to expand and regardless of lubricant present will exert sufficient frictional drag to keep the roller 17 from changing its location with respect to the inside of the shaft, besides maintaining the roller in accurate longitudinal alignment with the shank 13 and shaft 4 for full length contact therewith in the engagement of the clutch.

When the shank 13 is turned in a clockwise direction relative to the shaft 4, the roller 17 is cammed outwardly into wedging engagement with the inside of the shaft 4 and the reel is accordingly caused to turn with the pinion 12. However, the moment the reel 3 turns faster than the pinion 12, then the clutch disengages, the roller 17 backing away from the inside of the shaft 4 to the low end 20 of the cam 16, while still guided, of course, between the end portions 18 of the ring 19. Obviously this clutch provides large wearing surfaces and positive and quiet engagement and avoids the objections common to the old ratchet type drive employing either a gravity pawl or a spring pawl. The ordinary overrunning clutch having small coiled compres-

sion springs to urge the roller toward engaged position would not be suitable for the present purpose, because of the danger of such springs becoming clogged with dirt and rendered useless, whereas, the spring ring 19 is not easily put out of commission.

These clutches are provided at both ends of the reel and are simple to assemble and disassemble. The bearings indicated at 21 are preferably of the sintered powder type and are suitably fixed in spaced relation to one another in the end portions of the shaft 4, with the rings 19 retained therebetween. In assembling the pinions 12 on the ends of the shaft, the rollers 17 are first placed between the end portions 18 of the rings and then the shanks 13 are entered to hold the rollers 17 in place.

Referring now to Figs. 1A and 2A, 3' designates the reel of another lawn mower having a tubular center shaft 4' carrying sheet metal disks 5' on the periphery of which the reel blades 6' are mounted. Roller bearings 7' support the opposite ends of the shaft 4' and are provided in cups 8' that are detachably secured to the side plates 9' that form parts of the lawn mower frame, closure plates 22 being bolted to these side plates, as shown at 23, to clamp the cups 8' in place by means of their annular flanges 24. The two wheels of the mower, one of which appears at 10', carry internal gears 11' which have meshing engagement with the drive pinions 12' to transmit drive to the extruded shafts 13', provided in accordance with my invention, and entered in the ends of the shaft 4' for drive purposes. The wheels 10' are mounted on axle studs 14' secured to and projecting outwardly from the side plates 9', the bearings 15' being preferably of the sintered powder type and insuring easy turning.

The overrunning clutch in this mower is similar to that disclosed in Figs. 1 and 2 and consists of a cam 16' cooperating with a single roller 17' disposed between the cam and the inner periphery of the shaft 4' and guided for radial movement between the turned-in end portions 18' of a split spring ring 19'. The ring 19' tends to expand, and regardless of lubricant present will exert sufficient frictional drag to keep the roller 17' from changing its location with respect to the inside of the shaft 4' while maintaining the roller in accurate longitudinal alignment with the cam 16' and shaft 4' for full length contact in the engagement of the clutch, the operation of this clutch being the same as the clutch of Figs. 1 and 2, and, therefore, requiring no detailed description.

The shaft 13', in accordance with this invention, is extruded to the same cam contour as the cam 16' from end to end, and the center holes 25 in the drive pinions 12' being made to the same contour for a press fit of these pinions on the shafts 13' so that no keys or other drive connections are needed. In other words, the extruded shafts which are obtainable at about the same cost as ordinary shafts require no machining for either the cam contour or for keyways for keying the shafts to the pinions, so that two important savings are realized. Due to the fact that more than two-thirds of the circumference of the shafts 13' is cylindrical, as clearly appears in Fig. 2A, the shafts operate smoothly in the bearings 21' provided in suitably fixed spaced relation to one another in the end portions of the shaft 4'. In assembling, the rings 19' are entered in the ends of the shaft 4' between the bearings 21' at the time these bearings are assembled in the shaft, the rollers 17' being thereafter first placed between the end portions 18' of the rings 19' before the shafts 13' are entered in the bearings holding the rollers 17' in place.

The shafts 13' are interchangeable for the right and left hand sides of the mower, thereby further reducing production problems. With that thought in mind, there are two annular grooves 26 provided in the shafts in the same spaced relationship from the ends thereof, although only one of these grooves is required in the left hand assembly for the brass washer 27 that is swedged into the outer one of the grooves to assume end thrust. The other groove 26 is located in the vicinity of the roller 17' in this left hand assembly, and is too narrow to in any way affect the operation of the overrunning clutch. That groove is used for the mounting of the washer 27 in the right hand assembly. A felt washer 28 bears against the outer face of the end thrust washer 27 and is retained in the embossed cylindrical portion 29 of the closure plate 22 and serves to seal the bearing and clutch assembly while at the same time assuming a certain amount of end thrust transmitted thereto by the washer 27, the resilience of the felt washer insuring free and easy turning of the shaft by its allowance for end tolerance. A thin flanged ferrule 30 of cylindrical form is preferably pressed onto the shaft 13' with its flanged end against the washer 27 and with the other end 31 projecting through the center hole in the embossed portion 29 of the closure plate 22, whereby to provide a smooth cylindrical bearing surface thereon for the felt washer 28 independently of the cam contour of the shaft 13'. Another felt washer 32 inserted in the inner end of each cup 8' serves to seal the other end of the bearing to exclude dirt and water. The ring indicated at 33 is a bearing cage which fits loosely around the end portion of the shaft 4' and has circumferentially spaced slots therein containing the rollers 7', whereby these rollers are retained in proper circumferentially spaced relation and are also retained against endwise displacement. It is obvious that when the nuts 34 are removed from the bolts 23, the whole clutch and bearing assembly can be easily disassembled. This makes it an easy matter to remove the whole reel whenever that may become necessary.

It is believed the foregoing description conveys a good understanding of the objects and advantages of my invention. The appended claims have been drawn to cover all legitimate modifications and adaptations.

I claim:

1. A clutch device including, in combination, a driving member and a driven member, a cam turning with the driving member within a circular housing portion turning with the driven member, a rolling drive element movable circumferentially with respect to the periphery of the cam between high and low points at opposite ends thereof, and a split ring in close frictional contact peripherally within the circular housing and having the rolling element disposed closely between the circumferentially spaced ends thereof and guided thereby for limited radial movement toward and away from frictional driving engagement with the circular housing portion.

2. A clutch device including, in combination, a driving member and a driven member, a cam turning with the driving member within a cir-

cular housing portion turning with the driven member, an elongated drive roller movable circumferentially with respect to the periphery of the cam between high and low points at opposite ends thereof, and an elongated split ring in close frictional contact peripherally within the circular housing and having the roller disposed closely between the circumferentially spaced ends thereof and held thereby in longitudinal alignment with said cam and housing and guided thereby for limited radial movement toward and away from frictional driving engagement with the circular housing portion.

3. A clutch device including, in combination, a driving member and a driven member, a cam turning with the driving member within a circular housing portion turning with the driven member, an elongated drive roller movable circumferentially with respect to the periphery of the cam between high and low points at opposite ends thereof, and an elongated split spring ring fitting by reason of spring expansion closely within the circular housing and having the circumferentially spaced ends bent inwardly in spaced parallel relation and having the roller disposed closely between said parallel end portions and held thereby in longitudinal alignment with said cam and housing and guided thereby for limited radial movement toward and away from frictional driving engagement with the circular housing portion.

4. A clutch device including, in combination, a shaft and a tubular shaft in telescoping relation, one shaft being a driver and the other driven, a cam on the inner shaft having high and low portions in circumferentially spaced relation, a rolling drive element disposed between the inner circumference of the tubular shaft and the periphery of said cam, and a split spring ring disposed within the tubular shaft encircling the cam in close frictional contact peripherally with the inner periphery of the tubular shaft by reason of spring expansion of the ring, the circumferentially spaced end portions of said ring defining guide portions in substantially parallel spaced relation close to opposite sides of said rolling element to cage the same and guide said rolling element for limited radial movement toward and away from frictional driving engagement with the inner periphery of said tubular shaft.

5. A clutch device including, in combination, a shaft and a tubular shaft in telescoping relation, one shaft being a driver and the other driven, a cam on the inner shaft having high and low portions in circumferentially spaced relation, a rolling drive element disposed between the inner circumference of the tubular shaft and the periphery of said cam, and a split spring ring disposed within the tubular shaft encircling the cam and held by spring expansion in close contact with the inner periphery of the tubular shaft, the circumferentially spaced end portions of said ring being bent inwardly to define guide portions in substantially parallel spaced relation close to opposite sides of said rolling element to cage the same and guide said rolling element for limited radial movement toward and away from frictional driving engagement with the inner periphery of said tubular shaft.

6. A clutch device including, in combination, a shaft and a tubular shaft in telescoping relation, a cam on the first shaft having high and low portions in circumferentially spaced relation, an elongated cylindrical drive roller disposed between the inner circumference of the tubular shaft and the periphery of said cam, and an elongated split ring disposed within the tubular shaft encircling the cam and in close contact with the inner surface of said tubular shaft, the circumferentially spaced end portions of said ring being bent inwardly to define elongated guide portions in substantially parallel spaced relation close to opposite sides of said roller to cage the same, so as to prevent longitudinal misalignment of the roller with respect to the tubular shaft, and guide said roller for limited radial movement toward and away from frictional driving engagement with the inner periphery of said tubular shaft.

7. A clutch device including, in combination, a shaft and a tubular shaft in telescoping relation, a cam on the first shaft having high and low portions in circumferentially spaced relation, an elongated cylindrical drive roller disposed between the inner circumference of the tubular shaft and the periphery of said cam, and an elongated split spring ring disposed within the tubular shaft encircling the cam and held by spring expansion in close contact with the inner surface of said tubular shaft, the circumferentially spaced end portions of said ring defining guide portions in substantially parallel spaced relation close to opposite sides of said roller to cage the same, so as to prevent longitudinal misalignment of the roller with respect to the tubular shaft, and guide said roller for limited radial movement toward and away from frictional driving engagement with the inner periphery of said tubular shaft.

8. A clutch device including, in combination, a shaft and a tubular shaft in telescoping relation, one shaft being a driver and the other driven, the inner shaft being of cam shaped cross-section having high and low portions in circumferentially spaced relation, a rolling drive element operatively disposed between the inner circumference of the tubular shaft and the cam periphery of said inner shaft, said inner shaft being of substantially the same cam shaped cross-section throughout its length to permit fastening a power transmitting member on the outer end thereof without a key or other drive connection, and a power transmitting member having a cam shaped center hole provided therein drivingly receiving the outer end portion of said inner shaft.

9. A clutch device including, in combination, a shaft and a tubular shaft in telescoping relation, one shaft being a driver and the other driven, the inner shaft being of cam shaped cross-section having high and low portions in circumferentially spaced relation, a rolling drive element operatively disposed between the inner circumference of the tubular shaft and the cam periphery of said inner shaft, said inner shaft being of substantially the same cam shaped cross-section throughout its length to permit fastening a power transmitting member on the outer end thereof without a key or other drive connection, a power transmitting member having a cam shaped center hole provided therein drivingly receiving the outer end portion of said inner shaft, said inner shaft having an annular groove provided therein intermediate the ends thereof, and an end thrust washer seated in said groove and arranged to have positive end thrust engagement with the end of the tubular shaft.

10. A clutch device including, in combination, a shaft and a tubular shaft in telescoping relation, one shaft being a driver and the other driven, the inner shaft being of cylindrical form throughout the major portion of its circumference and the

remaining portion of the circumference being cam shaped with high and low portions in circumferentially spaced relation, bearings in the tubular shaft rotatably receiving said cam shaft, and a rolling drive element operatively disposed between the inner circumference of the tubular shaft and the cam shaped portion of the periphery of said inner shaft, said inner shaft being of substantially the same cam shaped cross-section throughout its length to permit fastening a power transmitting member on the outer end thereof without a key or other drive connection, and a power transmitting member having a cam shaped center hole provided therein drivingly receiving the outer end portion of said inner shaft.

11. A clutch device including, in combination, a shaft and a tubular shaft in telescoping relation, one shaft being a driver and the other driven, the inner shaft being of cam shaped cross-section having high and low portions in circumferentially spaced relation, a rolling drive element operatively disposed between the inner circumference of the tubular shaft and the cam periphery of said inner shaft, said inner shaft being of substantially the same cam shaped cross-section throughout its length to permit fastening a power transmitting member on the outer end thereof without a key or other drive connection, a power transmitting member having a cam shaped center hole provided therein drivingly receiving the outer end portion of said inner shaft, said inner shaft having annular grooves provided therein in equally spaced relation to the ends thereof, whereby said shaft is usable interchangeably for right and left handed installations, and an end thrust washer seated in one of said grooves and arranged to have positive end thrust engagement with the end of the tubular shaft.

12. A clutch device including, in combination, a shaft and a tubular shaft in telescoping relation, one shaft being a driver and the other driven, the inner shaft being of cylindrical form throughout the major portion of its circumference and the remaining portion of the circumference being cam shaped with high and low portions in circumferentially spaced relation, bearings in the tubular shaft rotatably receiving said cam shaft, and a rolling drive element operatively disposed between the inner circumference of the tubular shaft and the cam shaped portion of the periphery of said inner shaft, said inner shaft being of substantially the same cam shaped cross-section throughout its length to permit fastening a power transmitting member on the outer end thereof without a key or other drive connection, said inner shaft having an annular groove provided therein intermediate the ends thereof, and an end thrust washer seated in said groove and arranged to have positive end thrust engagement with the end of the tubular shaft.

13. A clutch device including, in combination, a shaft and a tubular shaft in telescoping relation, one shaft being a driver and the other driven, the inner shaft being of cylindrical form throughout the major portion of its circumference and the remaining portion of the circumference being cam shaped with high and low portions in circumferentially spaced relation, bearings in the tubular shaft rotatably receiving said cam shaft, and a rolling drive element operatively disposed between the inner circumference of the tubular shaft and the cam shaped portion of the periphery of said inner shaft, said inner shaft being of substantially the same cam shaped cross-section throughout its length to permit fastening a power transmitting member on the outer end thereof without a key or other drive connection, said inner shaft having annular grooves provided therein in equally spaced relation to the ends thereof, whereby said shaft is usable interchangeably for right and left handed installations, and an end thrust washer seated in one of said grooves and arranged to have positive end thrust engagement with the end of the tubular shaft.

14. A clutch device as set forth in claim 8, including a split ring in close frictional contact with the inner surface of said tubular shaft, and having the rolling drive element disposed closely between the circumferentially spaced ends thereof and guided thereby for limited radial movement toward and away from frictional driving engagement with the tubular shaft.

15. A clutch device as set forth in claim 9, including a split ring in close frictional contact with the inner surface of said tubular shaft, and having the rolling drive element disposed closely between the circumferentially spaced ends thereof and guided thereby for limited radial movement toward and away from frictional driving engagement with the tubular shaft.

16. A clutch device as set forth in claim 10, including a split ring in close frictional contact with the inner surface of said tubular shaft, and having the rolling drive element disposed closely between the circumferentially spaced ends thereof and guided thereby for limited radial movement toward and away from frictional driving engagement with the tubular shaft.

17. A clutch device as set forth in claim 11, including a split ring in close frictional contact with the inner surface of said tubular shaft, and having the rolling drive element disposed closely between the circumferentially spaced ends thereof and guided thereby for limited radial movement toward and away from frictional driving engagement with the tubular shaft.

18. A clutch device as set forth in claim 12, including a split ring in close frictional contact with the inner surface of said tubular shaft, and having the rolling drive element disposed closely between the circumferentially spaced ends thereof and guided thereby for limited radial movement toward and away from frictional driving engagement with the tubular shaft.

19. A clutch device as set forth in claim 13, including a split ring in close frictional contact with the inner surface of said tubular shaft, and having the rolling drive element disposed closely between the circumferentially spaced ends thereof and guided thereby for limited radial movement toward and away from frictional driving engagement with the tubular shaft.

EARL L. SCHOFIELD.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,583,103	Wagner	May 4, 1926
1,708,215	Chryst	Apr. 9, 1929
2,196,149	Funk	Apr. 2, 1940
2,332,061	Conkle	Oct. 19, 1943

FOREIGN PATENTS

Number	Country	Date
726,504	France	Mar. 7, 1932

EXHIBIT P

Nov. 22, 1960 R. H. WHITE 2,961,025

RETREAD TIRE

Filed Nov. 4, 1957 2 Sheets-Sheet 1

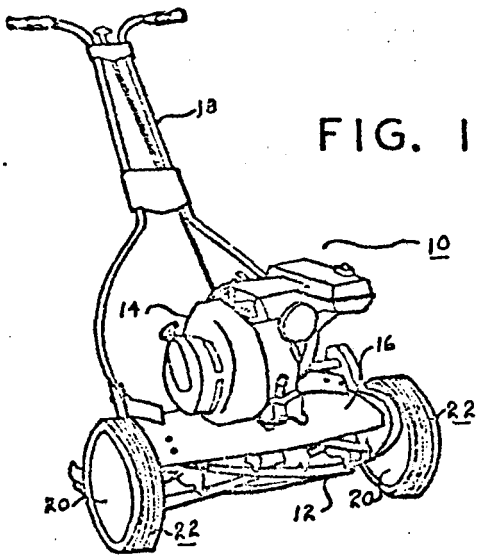


FIG. 1

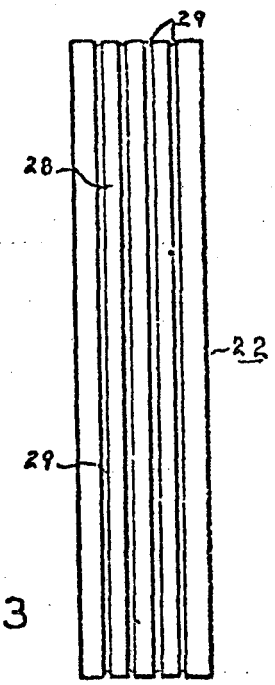


FIG. 3

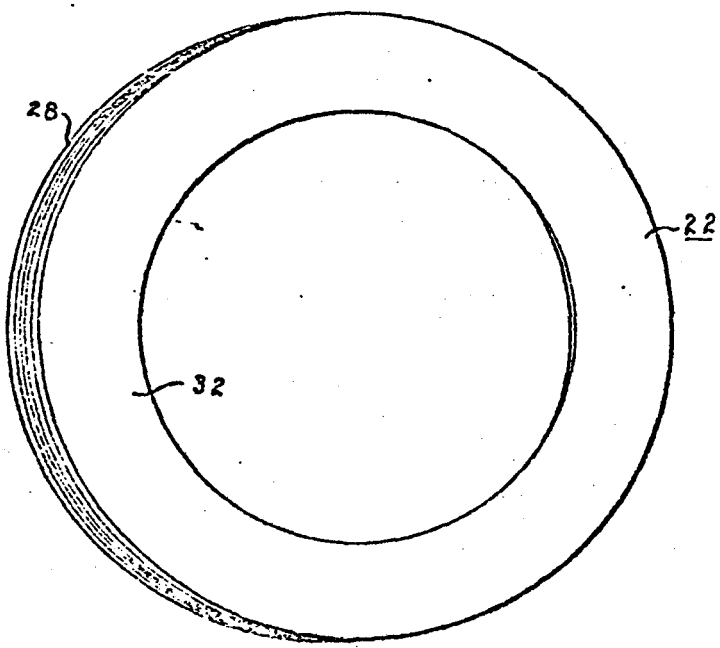


FIG. 2

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Nov. 22, 1960 R. H. WHITE 2,961,025

RETREAD TIRE

Filed Nov. 4, 1957 2 Sheets-Sheet 2

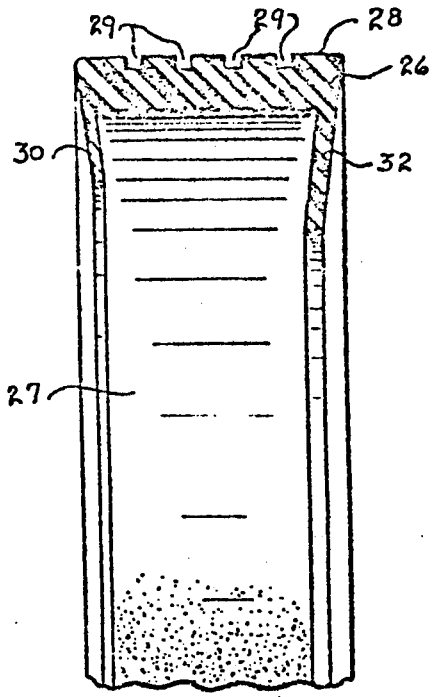

FIG. 4

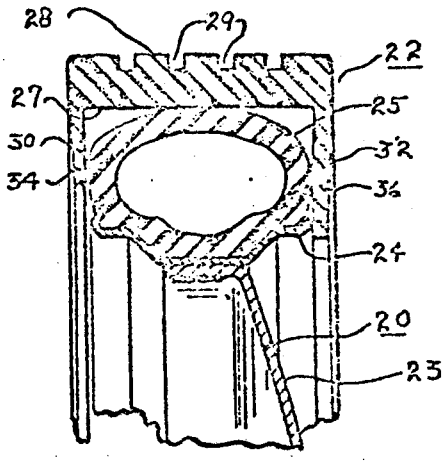

FIG. 5

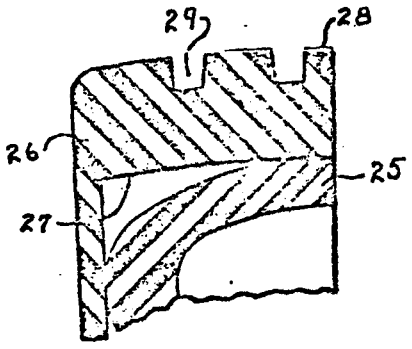

FIG. 6

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United States Patent Office 2,961,025
Patented Nov. 22, 1960

2,961,025

RETREAD TIRE

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Filed Nov. 4, 1957, Ser. No. 694,206

2 Claims. (Cl. 152—187)

This invention relates to a tire and more particularly to a tire for retreading worn out or damaged tires on lawn mowers, carts, small tractors and similar equipment.

One of the principal objects of the present invention is to provide a retread tire which is easy to apply over a worn out or damaged original tire on equipment of the aforesaid type and which can readily be removed for reconditioning and/or replacement, without employing any special tools or equipment.

Another object of the invention is to provide a tire for power lawn mowers and the like, which can be installed on the vehicle wheel without removing the worn out or damaged tire and which has the appearance of being an original vehicle tire.

Still another object of the invention is to provide a slip-on retread tire which will stay firmly in place for all normal use of the vehicle.

A further object is to provide a retread tire which grips the original tire, avoiding slippage between the two tires, and which has a tread affording good traction with the ground.

Another object of the invention is to provide a resilient, non-pneumatic retread tire which minimizes shocks and vibrations resulting from rough ground encountered in the use of the vehicle and which has a long-lasting, self-cleaning tread suitable for use on soft ground and grass and on concrete.

Additional objects and advantages will become apparent from the following description and the accompanying drawings, wherein:

Figure 1 is a perspective view of a lawn mower which is exemplary of the type of equipment for which the present tire is primarily designed;

Figure 2 is an oblique view of my tire removed from the vehicle wheel;

Figure 3 is a peripheral side elevational view of the tire removed from the wheel;

Figure 4 is an enlarged fragmentary cross sectional view of the tire removed from the wheel;

Figure 5 is an enlarged fragmentary cross sectional view of the tire and wheel on which the tire is mounted; and

Figure 6 is an enlarged fragmentary cross sectional view of my tire and the worn original tire of the vehicle, showing the manner in which the tire cleans itself during the operation of the vehicle.

Referring more specifically to the drawings, numeral 10 designates a conventional power driven reel type lawn mower, 12 the rotary cutting blades, 14 a motor for driving the blades, 16 the motor bed, 18 the mower handle, and 20 drive wheels on which my retread tires 22 have been mounted over the original unremoved tires. The use of the present tire is not limited to any particular type or make of equipment but may be used satisfactorily on either the reel, rotary or hand lawn mowers, carts, garden and lawn tractors, and similar small equipment primarily of the power driven type. It is also adapted for use with solid, hollow or pneumatic tires of rubber or rubber-like material, and can be applied to these tires either before or after the original tread has been worn from the tire.

In Figure 5 the wheel 20 of a conventional lawn mower is shown in part with my tire mounted thereon in the position it assumes during normal operation of the vehicle. The wheel consists of a disc-shaped portion 23 having a hub (not shown) and a rim 24 joined rigidly to the periphery of disc-shaped portion 23 and having mounted thereon a hollow rubber tire 25. Tire 25 is the original tire of the lawn mower and has been used until the tread is substantially removed and the edges worn until the peripheral surface is arcuate and the two outside edges appreciably rounded. While this general shape is found on most severely worn original tires, my tire will operate and can be used satisfactorily with various other shapes of peripheral surfaces, including substantially flat peripheral surfaces around the tire at and on either side of the center.

The present tire 22 has an annular body portion 26 of relatively thick rubber or rubber-like material, having inner and outer substantially flat surfaces 27 and 28 extending parallel with the axis of the wheel. The external surface 28 is provided with a tread consisting of a series of relatively deep annular grooves 29 which are rectangular in cross section and spaced uniformly from one another across the surface of the body of the tire. These annular grooves provide good traction between the tire and the ground and give an attractive appearance to the tire. The internal surface 27 is preferably roughened by sand blasting or other suitable process so that it will frictionally grip the worn suurface of the original tire and prevent relative movement between the original tire and my retread tire when the vehicle is in use. The body of the tire is held in place on the crown of the worn original tire by internal and external side walls 30 and 32, both of which are joined integrally with and extend inwardly from the outside edges of body 26 to the point where they will effectively grip the sides of the original tire as shown at numerals 34 and 36. Body 26 is somewhat flexible so that it will yield as the vehicle passes over uneven or rough ground but is firm enough to maintain its general rectangular cross sectional shape shown in Figure 5, so that both side walls 30 and 32 effectively and continuously grip the sides of the original tire regardless of the conditions encountered during operation of the vehicle. The external side wall 32 is constructed of a substantially thicker section and extends further inwardly towards the axis of the tire than the internal side wall 30 in order to prevent the tire from being accidentally removed or becoming displaced by contact with curbs or the edge of walks and driveways, frequently encountered in the operation of lawn mowers and the like.

Tire 22 can be readily and easily applied to wheel 20 over the original tire 25 by merely slipping the relatively narrow and resilient internal side wall 30 over the crown and inside edge of tire 25. When this has been done, my tire automatically adjusts itself on tire 25 in proper operating position shown in Figure 5 with internal surface 27 seated firmly on the peripheral surface of tire 25 and side walls 30 and 32 in firm engagement with the sides of said tire. As the vehicle on which my tire has been mounted is operated and traverses uneven and bumpy terrain, body 26, which is unsupported at its outside edges by worn tire 25, is continually flexed by uneven pressure being applied to the broad tread causing the body to bend inwardly to a slightly arcuate shape as shown in Figure 6. This inward flexing of the unsupported sides of body 26 causes grooves 29 to spread at their outside edges so that they lose their grip on any entrapped foreign objects such as stones, sticks, dried soil and the like which then drop from the grooves. This

constant flexing of the retread tire and the repeated spreading of the grooves keep the tire clean and grooves free of material which would otherwise interfere with effective traction between the tire and the ground. The flexing of the tire along the unsupported portion of the tire body 26 also has the further advantage of absorbing shock from bumps and vibration and of presenting a greater area of the tread to the ground or other supporting surface so that better traction is obtained than if the flexing were not present in the operation of the tire.

The retread may be used until it is worn out and then removed and replaced by a new retread tire; the original tire, having been fully protected from wear by the retread tire, remains in satisfactory condition for receiving successive retread tires.

While only one embodiment of my retread tire has been illustrated herein various changes and modifications may be made without departing from the scope of the present invention.

I claim:

1. In combination with worn tires having rounded lateral peripheral corners, a retread tire comprising a pre-formed annular body portion of firm rubber-like material having a broad external surface extending parallel with the axis of the tire and a broad rough internal surface extending parallel with the axis of the tire, a plurality of equally spaced annular grooves rectangular in cross section in said external surface encircling the tire, an inner annular side wall of rubber-like material joined integrally to one edge of said body portion and sloping inwardly throughout from said body portion toward the other edge, and outer annular side wall of rubber-like material joined integrally to said other edge of said body portion and sloping inwardly throughout from said body portion toward said inner side wall, said outer side wall being thicker and extending further toward the center than said inner side wall.

2. In combination with worn tires having rounded lateral peripheral corners, a retread tire comprising a pre-formed annular body portion of firm rubber-like material having an external surface extending parallel with the axis of the tire and a broad internal surface extending parallel with the axis of the tire, a plurality of annular grooves in said external surface, an inner annular side wall of rubber-like material joined to one edge of said body portion and sloping inwardly from said body portion toward the other edge to engage the inner side wall of said worn tire, and an outer annular side wall of rubber-like material joined to said other edge of said body portion and sloping inwardly from said body portion toward said inner side wall to engage the outer side wall of said worn tire, said outer side wall extending further toward the center than said inner side wall.

References Cited in the file of this patent

UNITED STATES PATENTS

870,796	Parker	Nov. 12, 1907	
2,365,279	Kraft	Dec. 19, 1944	
2,505,794	Schofield	May 2, 1950	
2,580,272	Bell	Dec. 25, 1951	
2,707,014	Gramelspacher	Apr. 26, 1955	
2,777,497	Hildebrant	Jan. 15, 1957	
2,787,473	Chiodo	Apr. 2, 1957	

FOREIGN PATENTS

482,704	France	Jan. 23, 1917

Oct. 10, 1939. D. B. REPLOGLE 2,175,646

FLOOR TOOL ROLLER

Original Filed Oct. 14, 1936

Fig. 1.

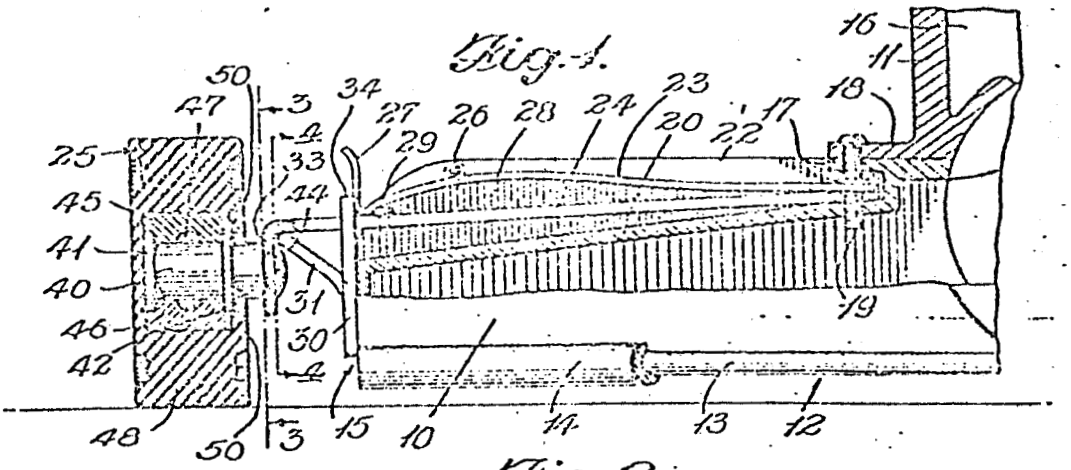
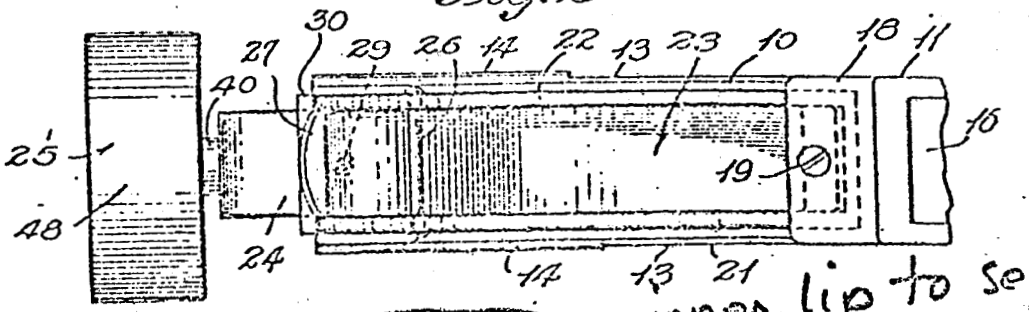


Fig. 2



inner lip to secure tire

Fig. 3.

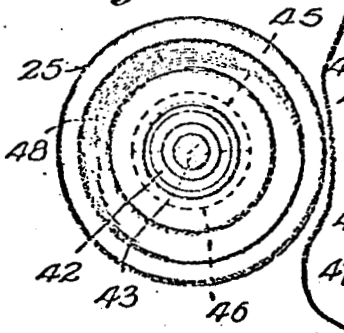


Fig. 8

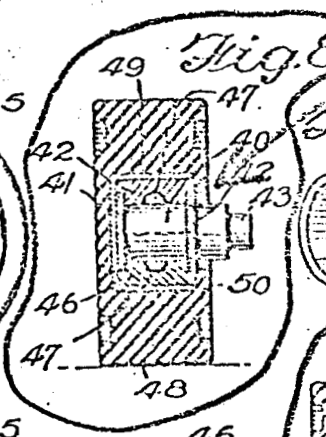


Fig. 9.

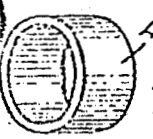
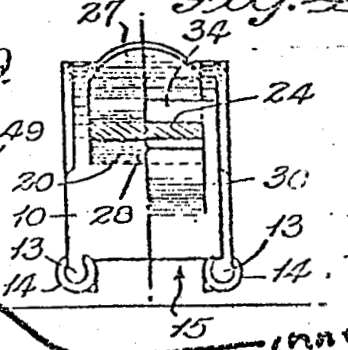


Fig. 4.



inner lip

Fig. 5.

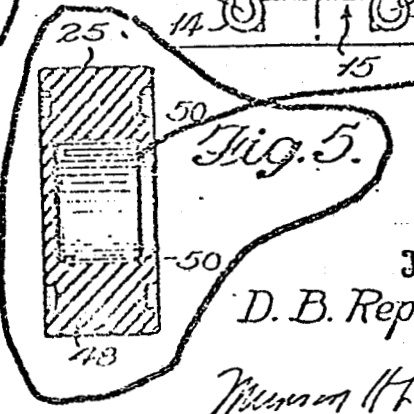
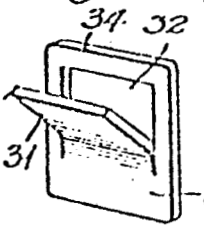


Fig. 7.



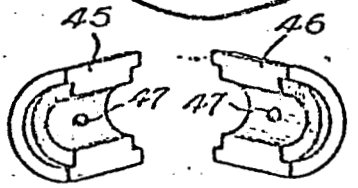


Fig. 6.

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UNITED STATES PATENT OFFICE

2,175,615

FLOOR TOOL ROLLER

Daniel Benson Replogle, Berkeley, Calif., assignor to The Ohio Citizens Trust Company, Toledo, Ohio, a corporation of Ohio, as trustee

Application October 14, 1936, Serial No. 105,600
Renewed August 7, 1939

5 Claims. (Cl. 15—155)

The invention relates to floor tool rollers and supports therefor and more particularly to improvements in attachment casters of the general type disclosed in my Patent No. 1,541,280 dated June 9, 1925. Certain features of the invention are of general application while others are more particularly related to the suction cleaner art.

One of the objects of the invention is to simplify and improve the mounting of the supporting rollers at the ends of a floor tool or the like.

Another object is to provide an improved end closure for a floor tool.

A further object of the invention is to improve the end roller itself, and the bearings thereof.

Other objects and advantages will appear hereinafter from the further detailed description of the invention.

The invention will be more readily understood by reference to the accompanying drawing in which are set forth a specific embodiment of the inventive thought for the purpose of illustration rather than by way of limitation.

In the drawing:

Fig. 1 is a longitudinal sectional view through a floor tool of a suction cleaner equipped with the improved supporting rollers, the floor tool being shown fragmentarily.

Fig. 2 is a top plan view of the same.

Fig. 3 is a view taken on line 3—3 of Fig. 1.

Fig. 4 is a section on line 4—4 of Fig. 1.

Fig. 5 is an axial section through the tire of the supporting end roller.

Fig. 6 is a perspective view showing the two-part bearing of the supporting roller, made of anti-friction material.

Fig. 7 is a perspective view of one of the end closure plates.

Fig. 8 is an axial sectional view showing the supporting roller provided with a thimble which holds the two parts of the roller bearing in assembled position.

Fig. 9 is a perspective view of the metal thimble.

For convenience the invention will be described by reference to a floor tool such as is disclosed in Replogle and Queen Patent No. 1,994,872 dated March 19, 1935, particularly Fig. 10 thereof, but it will be understood that the invention is by no means limited in its application for a floor tool of this character.

As shown the floor tool is in two parts, a lower portion 10 and an upper portion 11, each of which includes a suction nozzle. The portion 10 is provided with a large mouth 12 having front and rear lips 13 over which are fitted floor stroker members 14 forming between them end openings 15 through which air may be drawn into the interior of the tool. The other portion 11 is provided with a reduced mouth 16 through which air may be drawn into the interior when the tool is reversed as described in the aforesaid patent. It will be noted that only half of the tool is shown, the other half being similar to the portion which is shown and the tool being provided with a suction handle, not shown, such as is disclosed in the aforesaid Patent No. 1,994,872.

As shown the upper and lower members of the floor tool are provided with outwardly projecting shoulders 17 and 18 respectively which are held together by any suitable means as the assembling screw 19, it being understood that similar abutting members are provided on the other side and are similarly held together. The member 10 of the floor tool is shown as provided with a sloping wall 20 which serves as the top of the nozzle proper. From the front and rear edges of this wall rise side walls 21 and 22 which are open at the top. A flat spring 23 is adapted to be mounted between the two walls 21 and 22 and is preferably of a width to close the space between them and form with said walls and the top wall 20 of the nozzle an end pocket 28 for receiving the supporting shank 24 of an end roller to be further described but which may be generally designated by the reference numeral 25.

The rear end of the spring 23 may be held in place in any suitable manner but as shown is provided with an opening through which passes the assembling screw 19. The upward movement of the spring 23 under the influence of the roller shank 24 is limited by a spanning rivet 26 which connects the front and rear walls 21 and 22. The front end 27 of the spring is turned upwardly to form a finger grip by means of which the spring may be raised slightly to permit removal of the roller shank. The spring 23 is under constant tension serving to press the spring downwardly upon the roller shank 24 thereby tending to lift the floor tool nozzle from the floor, which tendency may be counteracted by the operator exerting sufficient downward pressure upon the floor tool through the medium of the operating handle to overcome the tension of the spring in whole or in part.

In the assembled position the inner end of the roller shank 24 preferably abuts against the screw 19 and is provided adjacent its other end but spaced a sufficient distance from the roller 25, with a stop or catch 29 which may be in the form of a small rivet head, against which the

end portion of the spring 23 fits thereby holding the shank in position except when the finger portion 27 is lifted to permit removal thereof.

Each end opening 15 of the nozzle is adapted to be partially or entirely closed by an end plate 30 carried by the roller shank 24 in a manner similar to what is described in my Patent No. 1,895,584 dated January 21, 1933. The end plate is preferably composed of hard fiber, raw hide, Bakelite or other suitable material. As shown in Fig. 7 a tab 31 is struck out from the face of the plate leaving an opening 32 to permit passage of the roller shank 24. When the parts are assembled the tab 31 abuts against a downturned portion 33 of the roller shank thereby pressing the end plate against the end of the nozzle and regulating and controlling the flow of air into the end of the nozzle. The top portion 34 of the end plate will then engage the upturned portion of the spring 23 on the side opposite to the catch 29, a sufficient portion of the spring extending above the plate to be accessible when the roller shank is to be removed from the pocket.

The roller 25 is shown as of general type disclosed in my Patent No. 1,541,230 but according to the present invention includes a spindle 40 having wheel retaining flanges 41 and 42 formed integral with the main body of the spindle and having a reduced portion 43 (Fig. 8) which is adapted to fit an opening 44 in the down-turned portion 33 of the roller shank 24. This reduced portion is subsequently upset to form a riveted connection with the shank as indicated in Fig. 1. According to the present invention the hub or bearing for this spindle is formed in two halves 45 and 46, being divided axially as indicated in Fig. 6. Each half is provided with one or more internal pockets 47 adapted to contain soapy graphite or other anti-squeak material. The bearing may be bored to fit the spindle 40 and counter-bored to fit the flanges 41 and 42 before being split in two. The hub may be formed of wood impregnated with grease if desired as disclosed in my Patent No. 1,541,230 or may be formed of Babbitt metal, graphite or other anti-friction material. The spindle 40 for mounting the roller may be a machine product having both wheel retaining flanges 41 and 42 made integral with it so that the bearings with their counter borings (to prevent induction of air and ravelings) can be placed and replaced only by separating the halves into which they are split.

A relatively thick rubber cap-shaped member 48 similar to what is described in my Patent No. 1,541,280 may be fitted over the hub and serves to hold the two halves of the hub together and in addition serves as the tire of the roller. Owing to the resilience of the material of which the tire is composed it may be expanded to fit over the hub and when assembled holds the parts firmly together. The assembled roller will rotate freely about the spindle substantially without friction and without squeaking and requires no further attention as to lubrication.

If desired a metal cup 49 such as disclosed in my Patent No. 1,541,230 may be used in connection with the bearing as indicated in Figs. 8 and 9 but this cup may be omitted if desired as indicated in Fig. 1. The tire 48 preferably has a retaining lip 50 to hold it in place.

The invention has been described in detail for the purpose of illustration but it will be understood that modifications and variations may be resorted to as will be apparent to those skilled in the art, without departing from the inventive thought involved.

I claim:

1. In a suction cleaner, a floor tool having end pockets each including side walls and a downwardly tensioned leaf spring secured at its inner end to the cleaner body between said side walls, and serving as a cover for its respective pocket, means located above the spring intermediate its ends for limiting its upward movement, roller shanks extending into said pockets between said side walls and beneath the springs, and coacting means carried by said springs and shanks for releasably retaining the shanks in place.

2. In a suction cleaner, a floor tool having end pockets each including side walls, and each having a downwardly tensioned leaf spring mounted between said side walls, and secured at its inner end to the body of the cleaner, means located above the spring intermediate its ends for limiting its upward movement, roller shanks detachably connected in said pockets and extending laterally therefrom, end rollers carried by said shanks, and releasable coacting means carried by the outer end of each leaf spring and roller shank respectively for holding the shanks in the pocket.

3. A suction cleaner as set forth in claim 1, wherein each roller shank is provided with a retaining lug near the outer end of the pocket, said lug being engaged by the outer end of the spring to normally hold the shank in position.

4. In a device of the character described; a roller shank, a roller spindle carried thereby, a two part anti-friction hub fitting over the spindle, and a resilient rubber cap holding the two halves of the hub together and serving as a tire for the roller.

5. The combination of the spindle as set forth in claim 4 having integral wheel retaining flanges; with the two piece hub having a central recess adapted to fit over the main body of the spindle and between the flanges, and counterborings adapted to fit over the wheel retaining flange.

DANIEL BENSON REPLOGLE.

June 11, 1968 L. LOUIK 3,387,894

WHEEL STRUCTURES

Filed June 13, 1966

Fig. 1.

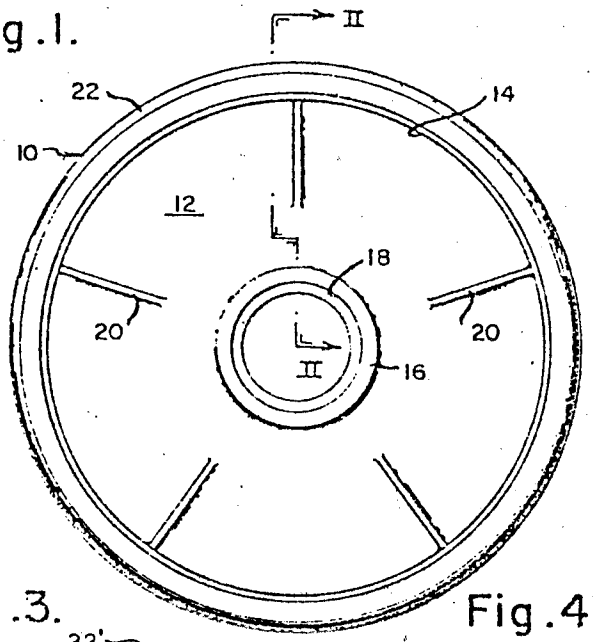


Fig. 2.

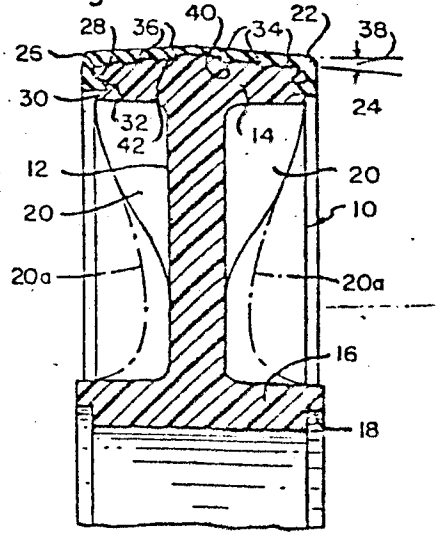


Fig. 3.

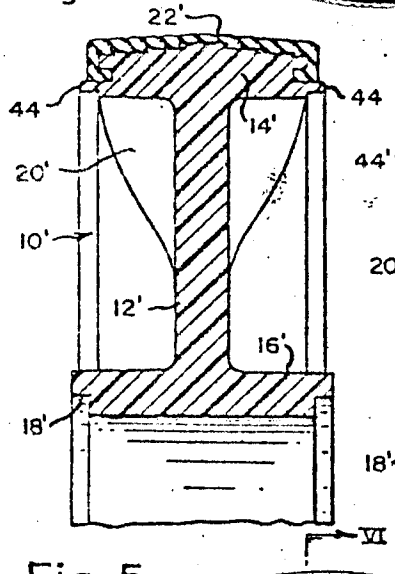


Fig. 4.

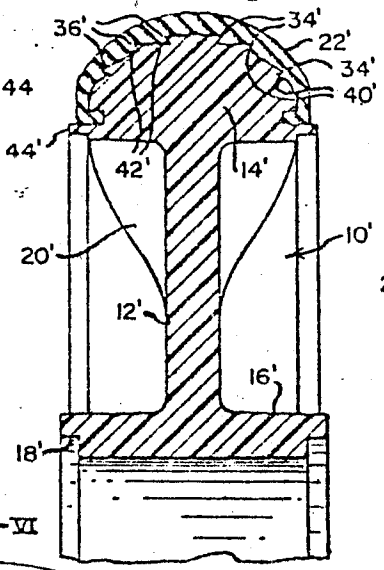


Fig. 6.

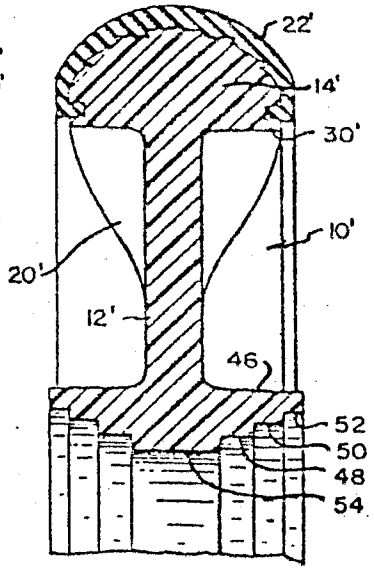
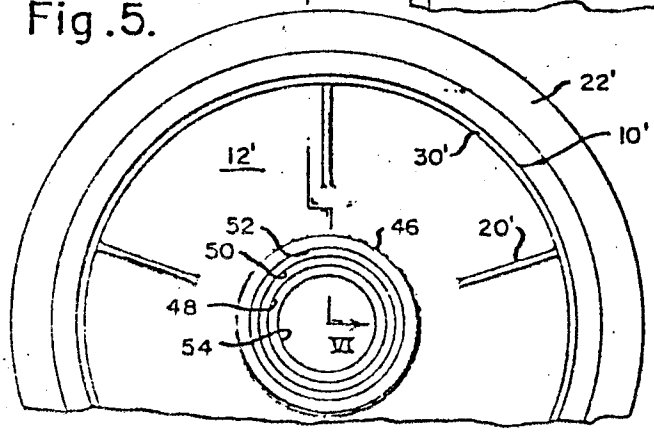


Fig. 5.



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3,387,894

WHEEL STRUCTURES

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Filed June 13, 1966, Ser. No. 557,136
8 Claims. (Cl. 301—63)

ABSTRACT OF THE DISCLOSURE

A wheel structure is disclosed suitable for various types of carts and vehicles. The wheel structure utilizes a minimum of component parts, which can be molded from plastic or other structural material. Novel means are disclosed for securing a tire to the wheel rim and for protecting the lateral surfaces of the tire. In one embodiment of the invention, the wheel hub is formed with an inward stepped configuration to accommodate differing sizes of bearings and/or hub caps.

The present invention relates to novel and efficient wheel structures, and more particularly to a relatively light weight but structurally strong wheel structure which can be molded, cast or otherwise formed from readily available plastic and other structural materials.

There is considerable demand at the present time for wheels of various shapes and sizes which can be quickly and inexpensively produced for grocery carts, large and small toy vehicles, picnic and golf carts, and the like. For many of these applications it has been necessary to fabricate the wheels from metallic or other expensive fabricational materials in order to obtain requisite structural strength. Even then structural rigidity has frequently been sacrificed in attempts to conserve such materials. In those which have been fabricated for such applications from non-metallic or conventional plastic structural materials, damage or destruction frequently occurred owing to the lack of adequate reinforcing means for the wheel structures.

In known types of wheel structures which have been developed for the aforementioned applications, and which are usually provided with tires of various types, there have been no adequate means provided for quickly mounting the tire on the wheel during the manufacture of tthe wheel structure or for easily removing the tire for repair or replacement. In most cases, particularly in the more inexpensive wheel structures of the class described, it was virtually impossible to remove the tire for replacement, which necessitated premature disposal of the wheel structure.

This particularly is the case with reference to the aforementioned grocery carts, whose wheel structures are subject to extensive and continuous wear. Such wheel structures usually are provided with an elastomeric tire fabricated from natural or a suitable synthetic rubber. Conventional wheel structures for this purpose, have been subject to uneven wear at the tire surfaces owing to the normal abuse to which the carts are subjected and particularly to the structural characteristics of known forms of wheels. Thereafter such wheels cause wobbling and other customer annoyances. The tires, however, in addition to being relatively short-lived are also very difficult to remove from conventional wheels and to replace owing to the manner in which the tires are conventionally mounted on the wheel structures.

These considerations apply to other wheeled vehicles, whether of the service or toy variety, depending upon the particular application of the vehicle and the amount of use or abuse to which it is normally subjected.

These problems and difficulties associated with prior wheel structures are overcome by the disclosed forms of

the wheel structures of the invention, wherein they are provided in some or all forms of the invention, as the case may be, with novel means for reinforcing the structures, for retaining tires thereon for facilitating the removal of the tires for repair of replacement when necessary, and for supporting the tires on the wheel structure in a manner such that it is subject to even wearing regardless of the particular application of the wheel structures. In another feature of the invention, the hub portion of the wheel structure is adapted, in certain applications thereof, for use with a variety of differing bearing structures with a result that one form of wheel structure can be utilized for mounting on a number of differing vehicles.

Generally speaking, in prior or known wheel structures a different hub structure or arrangement for the wheel had to be provided depending upon the particular type and size of the wheel bearing provided for the vehicle. This necessitated the provision of additional molds or other fabricational devices in order to accommodate the differing forms of required hub structures.

This additional difficulty is overcome by one form of my novel wheel structure which provides a hub structure which can be used, within the physical size limitations of the hub structure, with a number of bearing arrangements of differing sizes or shapes. The latter feature of my invention correspondingly reduces the number of differing molds or other fabricating devices necessary for producing such wheel structures.

During the foregoing discussion certain objects, features and advantages of the invention have been alluded to. These and other objects, features and advantages of the invention will be elaborated upon during the forthcoming description of certain presently preferred embodiments of the invention, together with preferred methods of practicing the same.

In the accompanying drawings I have shown certain presently preferred embodiments of the invention and have illustrated certain methods of practicing the same, wherein:

FIGURE 1 is a side elevational view of one form of wheel structure arranged in accordance with my invention;

FIGURE 2 is an enlarged partial sectional view of the wheel structure as shown in FIGURE 1 and taken along reference line II—II thereof;

FIGURE 3 is a similarly sectioned view of another form of wheel structure made in accordance with my invention;

FIGURE 4 is a similarly sectioned view of still another form of wheel structure of the invention;

FIGURE 5 is a fragmentary side elevational view of yet another form of wheel structure of my invention; and

FIGURE 6 is an enlarged partial sectional view of the wheel structure as shown in FIGURE 5 and taken along reference line VI—VI thereof.

Referring now more particularly to FIGURES 1 and 2 of the drawings, an exemplary form of the invention shown therein is directed to a wheel structure 10 having a relatively flat annular wheel disc 12 which is joined at its outer periphery to a rim or a tire support 14 and at its inner periphery to a hub portion 16. The hub portion 16 can be offset, as denoted by reference numeral 18, in order to accommodate a suitable bearing or wheel retainer disc (not shown). In this arrangement of the invention, the wheel disc 12, rim 14 and hub 16 can be molded or cast integrally from a suitable plastic or other structural material. It will be understood, however, that the aforementioned components can be fabricated separately and joined together by suitable means, in keeping with the spirit of my invention.

For structural strength the rim 14 is further reinforced by the wheel disc 12 by means of a plurality of radially extending ribs or gussets 20. The ribs radially engage the wheel disc 12 and engage the inner periphery of the rim 14, in this example. As illustrated in the drawings five such ribs 20 are employed in this example of the invention, although it will be obvious that a greater or lesser number of such ribs can be utilized depending upon the particular application of the invention and the amount of structural rigidity required.

If required in certain applications of the wheel structure 10, the ribs 20 also can be extended entirely across the wheel disc 12 to its inner periphery or they can be further extended for transversely extending with the junction hub portion 16 in order to provide reinforcement for the latter, also. Such alternate rib structure is denoted in FIGURE 2 by chain outline 20*a* thereof.

Mounted substantially upon the entire outer surfaces of the rim 14 is a tire 22, desirably fabricated from a suitable elastomer such as polyurethane. In a preferred form of the invention the tire 22 is sufficiently resilient or elastic to permit assembly on or removal from the rim 14 without the use of undue effort or special tools. It is also contemplated that the tire and wheel can be integrally molded. A substantially flat tire 22, as shown in FIGURES 1–3, is adaptable, for example for use on relatively soft surfaces such as lawns or carpeting.

In this arrangement of the invention tire 22 is provided along each lateral edge thereof with an inwardly and laterally extending lip 24 which defines an adjacent recess or groove 26. Similarly each lateral edge of the rim 14 is provided with outwardly and laterally extending lips 28 and 30 which define therebetween a recess 32. In this arrangement of the invention the rim lip and recess, 28, 32 are respectively interfitted with the tire lip and recess 24–26 to retain the tire on the rim. The lateral and opposite extension of adjacent rim and tire lips securely holds the tire on the rim under conditions of severe usage, such as encountered by grocery carts and the like, but permits removal and replacement of the tire without the use of specialized tools.

The rim 14 is provided with additional retaining means for the tire 22. In accordance with the latter feature of the invention the rim 14 is provided with a plurality of circumferentially extending spaced ridges 34 and 36. Desirably, each group of ridges 34 and 36 are angled away from the other group and toward the adjacent lateral edge of the rim 14. Desirably, the ridges 34 are arranged with respect to the ridges 36 with respect to an imaginary plane passing centrally through the rim 14. In this example the rim is beveled to some extent on each side of its center line as denoted by arrows 38. The tire 22 is more or less stretched over the ridges 34 and 36, and the latter tend to embed themselves into the elastomeric material from which the tire 22 is formed. Alternatively, the tire 22 can be provided with complementarily formed ridges 40 and 42, with the latter ridges being directed generally toward one another, to engage respectively and complementarily with the rim 36. The interfitting rim and tire ridge arrangement ensures retention of the tire 22 on the rim 14 during normal use of the wheel structure. However, tire 22 can be readily removed by unseating one of its lips 24 followed by peeling the lateral edge of the tire back over the rim 14. In operation, with the tire 22 being thus secured at a number of laterally displaced areas, the tire is prevented from shifting relative to the rim 14 during use and thus uneven wear of the tire is prevented.

Referring now to FIGURE 3 of the drawings a generally similar arrangement of the wheel structure is illustrated. The rim 14′ of the wheel structure, however, differs in that inner lip 44 at each lateral edge of the rim is extended outwardly of the tire 22′ in order to afford protection to the sidewall thereof from scuffing or scraping by contact with store or home furnishings, tree trunks,

and other obstacles, depending upon the application of the invention.

With reference now to FIGURE 4 of the drawings another arrangement of the wheel structure is illustrated. The latter arrangement of the invention is generally similar to that of FIGURE 3. However, the outer surface or tire engaging periphery of rim 14′ of FIGURE 4 is domed or rounded in order to induce a similar shape in the tire 22′, or alternatively to accommodate the rim 14′ to a tire 22′ which initially is so shaped. The domed structure of the rim 14′ also enhances the engagement between the ridges 34′–36′ of the rim 14′ with the adjacent surfaces of the tire 22′, or with the complementarily shaped ridges 40′–42′ thereof when so provided. The domed structure of the tire and rim of FIGURE 4 in addition reduces the frictional engagement of the wheel structure with the floor or other hard surface, particularly when the vehicle is moved around turns. This feature is of special importance in grocery cart applications and in other vehicles which are intended primarily for use on hard surfaces, as it promotes further even tire wear and prolongs the life of the tire 22′.

With reference now to FIGURES 5 and 6 of the drawings another feature of my invention is illustrated wherein hub portion 46 of the wheel structure 10′ is adapted for use with a number of differently sized bearing arrangements and/or hub caps. In furtherance of this purpose the hub portion 46 is made relatively thicker, in the radial direction, in comparison to the hubs 16 or 16′ of the preceding figures. The inner periphery of the hub 46 is provided with a plurality of stepped or offset bearing surfaces, with three such surfaces, 48, 50 and 52 being here utilized. With this arrangement, bearings and/or hub caps of differing outer diameters can be selectively engaged by an appropriate one of the surfaces 48, 50 and 52. In addition, the inmost inner peripheral surface 54 of the hub 46 can be utilized to engage yet another, smaller bearing arrangement. Alternatively one pair of the bearing surfaces 48 or 50 or the single surface 54 can be utilized for mounting the wheel structure on a suitable bearing arrangement, while the outermost stepped surface 52 can be utilized for engagement with a wheel-retaining disc or a hub cap, which can be of a decorative character, if desired.

The wheel structure 10′ of FIGURES 5 and 6 otherwise is generally similar to the domed wheel structure 10′ of FIGURE 4 with the exception that the lateral tire engaging arrangement, particularly as exemplified in FIGURE 2, is utilized. It will be understood, of course, that the stepped hub structure 46 of FIGURES 5 and 6 can be utilized in connection with any of the preceding disclosed forms of the wheel structure. It will also be understood that the wheel reinforcing means or the hub structure 46, or both, can be employed with other suitable tire and tire securing arrangements and vice versa.

From the foregoing it will be apparent that novel and efficient forms of wheel structures have been disclosed herein. It will be understood, of course, that certain features of a given wheel structure can be utilized advantageously without the corresponding use of other features thereof. Accordingly, while I have shown and described certain presently preferred embodiments of the invention and have illustrated presently preferred methods of practicing the same, it is to be distinctly understood that the invention is not limited thereto but may be otherwise variously embodied and practiced within the scope of the following claims.

I claim:

1. A wheel structure comprising in combination an annular wheel disc, a generally tubular hub member extending transversely of said disc and joined to the inner periphery thereof, a rim member joined to the outer periphery of said disc, a plurality of radially extending reinforcing gussets joined to said wheel disc and to said rim member, a tire member substantially co-extending

with the outer surface of said rim member, inter-fitting means on the lateral edges of said rim member and of said tire member for securing said tire member to said rim member, said rim member having a plurality of circumferentially extending spaced ridges on its outer surface, the ridges on one side of a central plane of said rim being angled generally away from its ridges on the other side of said plane, said ridges engaging the adjacent surfaces of said tire member to prevent shifting thereof on said rim, the outer surface of said rim being domed to facilitate engagement of said rim ridges with said tire, and said tire being stretched over said domed rim.

2. A wheel structure comprising in combination an annular wheel disc, a generally tubular hub member extending transversely of said disc and joined to the inner periphery thereof, a rim member joined to the outer periphery of said disc, a plurality of radially extending reinforcing gussets joined to said wheel disc and to said rim member, a tire member substantially co-extending with the outer surface of said rim member, interfitting means on the lateral edges of said rim member and of said tire member for securing said tire member to said rim member, said rim member having a plurality of circumferentially extending spaced ridges on its outer surface, the ridges on one side of a central plane of said rim being angled generally away from its ridges on the other side of said plane, said ridges engaging the adjacent surfaces of said tire member to prevent shifting thereof on said rim, the outer circumferential surface of said rim member being domed, and said tire member being complementarily domed for closely fitted engagement on said rim, the inner surface of said tire having a plurality of spaced circumferentially extending ridges, each of said ridges being shaped complementarily with an adjacent one of said rim ridges for inter-fitting engagement therewith to aid in retaining said tire member or said domed rim member.

3. A wheel structure comprising in combination an annular wheel disc, a generally tubular hub member extending transversely of said disc and joined to the inner periphery thereof, a rim member joined to the outer periphery of said disc, a plurality of radially extending reinforcing gussets joined to said wheel disc and to said rim member, a tire member substantially co-extending with the outer surfaces of said rim member, inter-fitting means on the lateral edges of said tire member and of said rim member for securing said tire member to said rim member, said inter-fitting means including adjacent tongue and groove structures formed on adjacent lateral edge portions of said rim member and of said tire member respectively, and a lip structure on each lateral edge of said rim member and extending outwardly of the adjacent lateral edge of said tire member for the protection of the same.

4. A wheel structure comprising in combination an annular wheel disc, a generally tubular hub member extending transversely of said disc and joined to the inner periphery thereof, a rim member joined to the outer periphery of said disc, a plurality of radially extending reinforcing gussets joined to said wheel disc and to said rim member, said hub member and said disc and said rim member being formed integrally, and said hub member being relatively thick in the radial direction and having on its inner periphery at least three axially extending stepped surfaces for accommodating wheel bearing means and hub caps of selectively different sizes.

5. A wheel structure comprising in combination an annular wheel disc, a generally tubular hub member extending transversely of said disc and joined to the inner periphery thereof, a rim member joined to the outer periphery of said disc, a tire member substantially co-extending with the outer surfaces of said rim member, inter-fitting means on the lateral edges of said tire member and on the lateral edges of said rim member for securing said tire member to said rim member, and a lip structure on each lateral edge of said rim member extending outwardly of the adjacent lateral edge of said tire for the protection of the same.

6. A wheel structure comprising in combination an annular wheel disc, a generally tubular hub member extending transversely of said disc and joined to the inner periphery thereof, a rim member joined to the outer periphery of said disc, a tire member substantially co-extending with the outer surfaces of said rim member, rectangular tongue and groove means on the lateral edges of said tire member and on the lateral edges of said rim member for securing said tire member to said rim member, said tongue and groove means being of stepped and of laterally extending and opposed configuration to prevent removal of said tire member from said rim member, said rim member being provided with a plurality of circumferentially extending spaced ridges on the outer surfaces thereof, the ridges on one side of a central plane of said rim member being angled generally away from those ridges on the other side of said plane, and said ridges engaging the adjacent surfaces of said tire member to prevent shifting thereof on said rim member.

7. The combination according to claim 6 wherein the outer surface of said rim is beveled circumferentially and toward said hub on each side of said plane to aid in at least partially embedding said ridges in the adjacent portions of said tire.

8. The combination according to claim 7 wherein said tire is provided with a like plurality of spaced circumferentially extending ridges, each of said tire ridges being shaped complementarily with the adjacent one of said rim ridges for interfitting engagement therewith.

References Cited

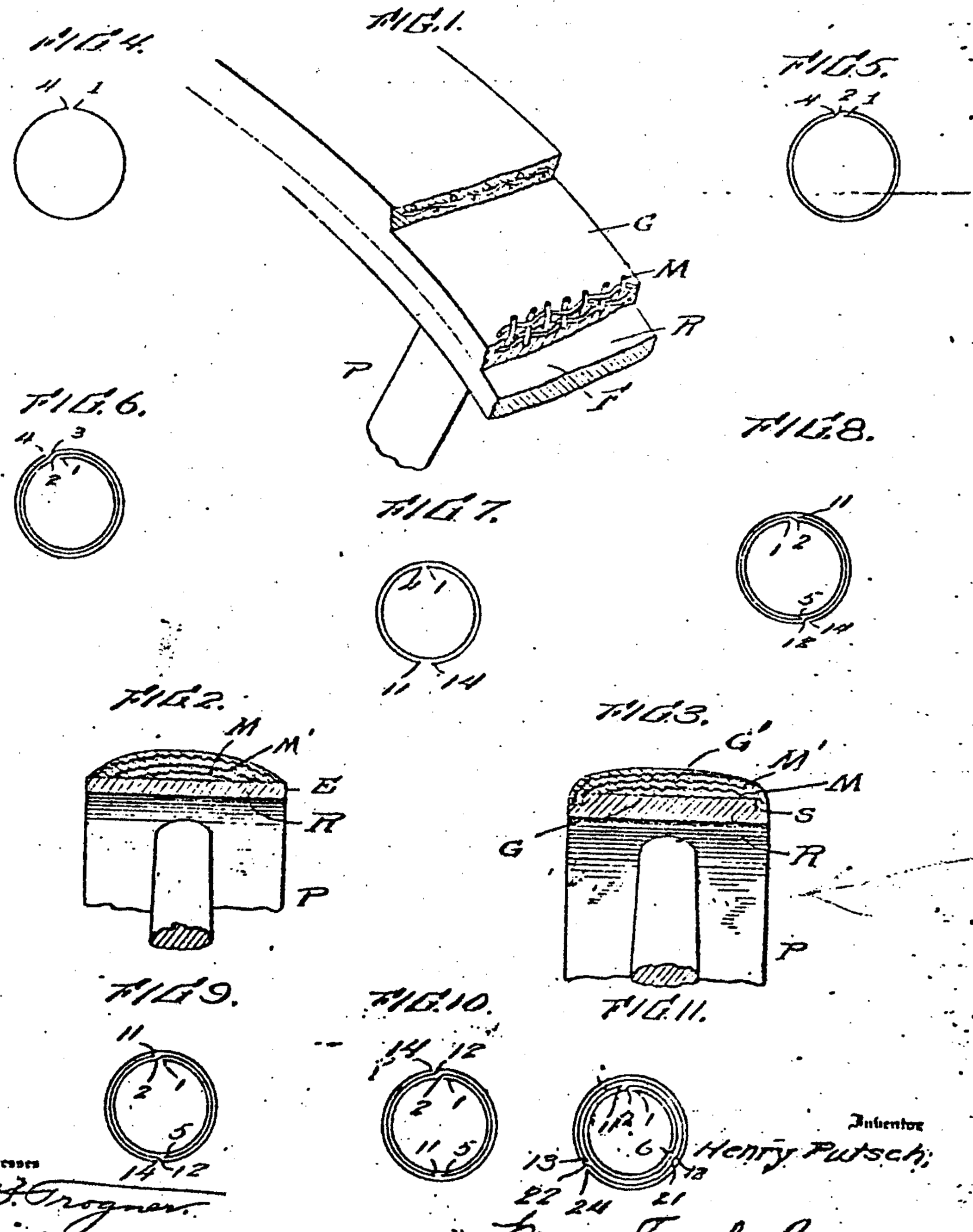
UNITED STATES PATENTS

2,955,884 10/1960 Marshall.

RICHARD J. JOHNSON, *Primary Examiner.*

H. PUTSCH.
PULLEY RIM COVERING.
APPLICATION FILED SEPT. 13, 1915.

1,257,530. Patented Feb. 26, 1918.



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UNITED STATES PATENT OFFICE.

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PULLEY-RIM COVERING.

1,257,530. Specification of Letters Patent. Patented Feb. 26, 1918.

Application filed September 13, 1915. Serial No. 50,479.

To all whom it may concern:

Be it known that I, HENRY PUTSCH, a subject of the Emperor of Germany, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Pulley-Rim Coverings; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to pulleys, and more especially to the rim coverings therefor; and the object of the same is to provide a coating for the rims or surfaces of wheels or drums, fly wheels, or pulleys carrying belts which will prevent the sliding and slipping of the belt thereon and therefore increase the power, and which will prolong the life of the belt. This object has heretofore been attained in a certain measure by coating the face of the pulley rim with various compositions and sometimes by applying strips to said face, but the gist of the present invention lies in covering said face with a coating of plastic material which is reinforced by an embedded netting of coarse mesh. Details of the invention and the manner of applying its layers of plastic and netting are set forth in the following specification and shown in the drawings wherein:

Figure 1 is a perspective view of a portion of a pulley rim covered with a two-ply coating according to my invention, the layers of the coating being shown in section on different lines and the netting of one layer being up-turned to illustrate its construction.

Fig. 2 is a cross section of a flat pulley rim which is crowned by the use of my covering, and Fig. 3 is a cross section of a special form of pulley rim described below.

The remaining views are small diagrams showing several ways in which the strips of netting may be wound as they are applied.

In the drawings the letter P designates a pulley having a rim R whose face F is usually flat transversely as shown in Fig. 1, and to this face my covering is applied either when the pulley is made or subsequently. The covering comprises a layer G of plastic, such as glue compounded with silicates mechanically mixed with dextrin; and embedded in this plastic a layer M of open-work netting such as wire cloth, asbestos, vegetable fiber, or even coarse cheesecloth or muslin. The netting is wholly embedded in the plastic as by being applied thereon before the plastic has set, and the layers are repeated if desired. A distinction is made between fabrics of coarse mesh such as canvas which has been heretofore employed for this purpose, and fabrics of open mesh which I use. Coarse mesh might imply a fabric whose warp and weft were of coarse strands or were loosely woven together; by "open mesh" I mean a fabric so woven that there are clear openings between its strands as best seen in Fig. 1 where the netting M is turned up. Also the netting is embedded within the layer of plastic so that it serves as a reinforce therefor and no part of any of its meshes appears on the exterior, at least, when the covering of the pulley is new. It results that the belt comes in contact only with the outermost layer of plastic which must therefore be of a composition possessing a suitable "cling" and which is not unduly susceptible to wear or heat. The exact ingredients of this composition form no part of the present invention, nor is the manner in which the covering is applied to the rim essential; but in order that the treated pulley shall be strictly round I prefer that each layer pass completely around the wheel and that the several convolutions of the netting, if there are several, shall break joint with each other so that at all points around the circumference of the rim there shall be an equal number of the layers or strips of netting.

Figs. 2 and 3 illustrate how the face of the rim may be arched or crowned transversely by the application of this covering. Assuming that such face is flat as shown in Fig. 2, I would apply the inner layer G of plastic direct to a strip along the transverse center of this face, then lay the inner strip M of netting over said layer of plastic while the layer was still soft and draw it tight so that it sinks into the same and is more or less completely embedded; then I would apply the next layer G' of plastic over the first reinforced layer, and have it slightly wider as shown, and over this I would apply the next strip M' of netting, this second reinforced layer reaching either completely to the edges E of the rim as shown, or only part way to such edges if there is to be a subsequent layer which need not be de-

scribed. In this manner the various layers grow successively wider and wider, the narrower ones acting as supports for the transverse center of the wider ones, and finally the outermost layer is arched or crowned as shown, and the desired contour is given to the face of the treated pulley.

In Fig. 3 the rim may or may not be flat on its face, but at its sides it is provided with shoulders as indicated at S. My improved covering may be applied in the manner already described if the face is flat, or it may be applied in an equal number of layers all over the face if the latter itself be arched; but in this instance the outermost layer, or layers, are carried over the edges of the rim and down into the shoulders as shown.

If the plastic material be such that it has any tendency to yield, or whenever it becomes worn or thin, it is undesirable that any strip of the netting should be carried around it and the ends of the strip lapped, because such lap would produce a spot in the plastic which was harder than elsewhere and which would naturally suffer most from wear. Accordingly I prefer that every strip break joint with every other, or if but a single strip of netting be employed its ends shall be brought to and quite into contact but without being lapped. The netting may be in a single strip given several convolutions, and the layers of plastic applied between them; or the netting may be in a plurality of strips applied independently. The simplest form is shown in Fig. 4 where the netting is a strip making a single convolution, beginning at 1 and passing around the plastic as above described, and terminating at 4 near the point 1 but without the ends of the strip overlapping each other. This would be used where the coating is but one layer of plastic thus reinforced with one strip of netting. In Fig. 5 the netting begins at the point 1 and makes one complete convolution to the point 2, and then it is carried out over the inner end 1 and makes another convolution, and its outer end 4 terminates over the point 2 but does not lap the inner end. This netting would probably be employed where there are two layers of plastic, although obviously the plastic might be thicker and a two-ply netting embedded in it. In Fig. 6 a single strip begins at 1 and makes a convolution, is then carried outward at 2 and makes a second convolution, is then carried out at 3 and makes a third convolution, and terminates at 4. Fig. 7 shows perhaps the simplest manner of winding two separate strips, one beginning at 7 and ending at 4 and the other beginning at 11 and ending at 14 so that the ends of the two strips break joint with each other and stand preferably at opposite sides of the pulley. The remaining views show other windings employing a plurality of strips, but the same idea prevails. The open mesh of the netting permits the plastic to ooze through the same if the netting is applied before the plastic has set, and this is true whether the netting is in one strip or more than one and is in one convolution or more than one. While a strip of wire netting might be stretched along its center for the purpose of crowning the periphery of the wheel, it will be obvious that nettings of other material are better adapted to this use.

What I claim is:

1. A pulley having on its face a coating comprising a body of adhesive, plastic material applied thereto, with an open-meshed, reinforcing fabric embedded entirely within such material, whereby the adhesive material forms a coating on each side of the fabric and is bonded together between the meshes of such fabric.

2. A pulley having on its face a coating comprising a body of adhesive plastic material applied thereto, with layers of an open-meshed, reinforcing fabric embedded entirely within such material whereby the material forms a coating on each side of each layer of fabric and the respective coatings are bonded together between the meshes of each interposed layer of fabric.

3. A pulley having on its face a coating comprising a body of hardened, viscous and adhesive material applied thereto, with an open-meshed, reinforcing fabric embedded entirely within such material, whereby the viscous material forms an adhesive coating on each side of the fabric, adhering to the pulley face and bonded together between the meshes of the fabric.

4. A pulley having on its face a coating comprising a body of hardened, viscous and adhesive material applied thereto, with layers of an open-meshed, reinforcing fabric embedded entirely within such material, whereby the viscous material forms an adhesive coating on each side of each layer of fabric, the innermost coating adhering to the pulley face, and the respective coatings being bonded together between the meshes of each interposed layer of fabric.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY PUTSCH.

Witnesses:
DANIEL R. FOLMES,
EVELYN C. GREENE.

W. R. BAYNES ET AL 3,566,536

TOY VEHICLE WHEELS

Filed July 9, 1969

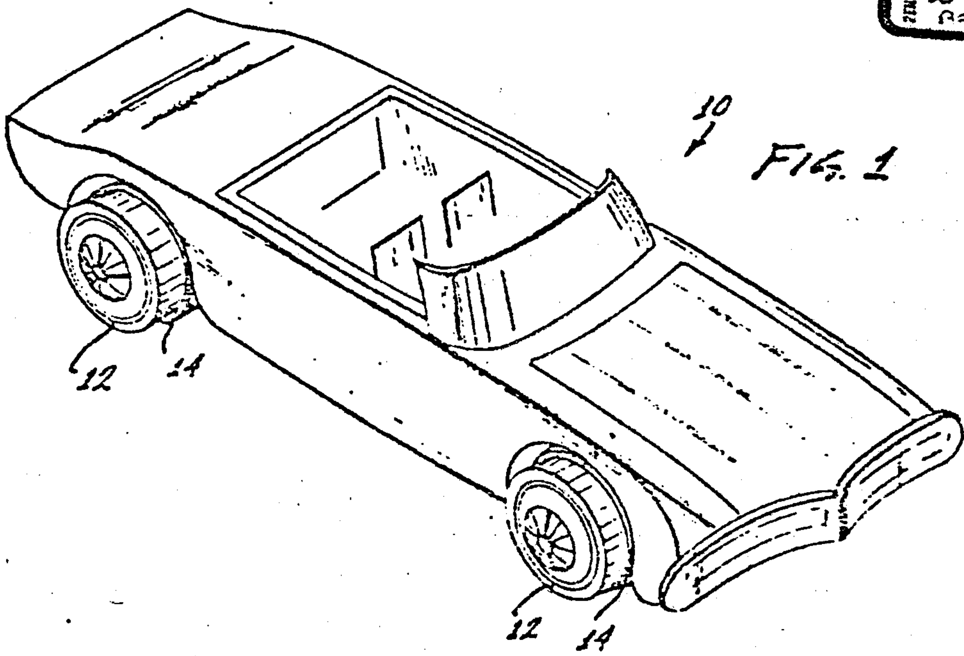


FIG. 1

FIG. 2

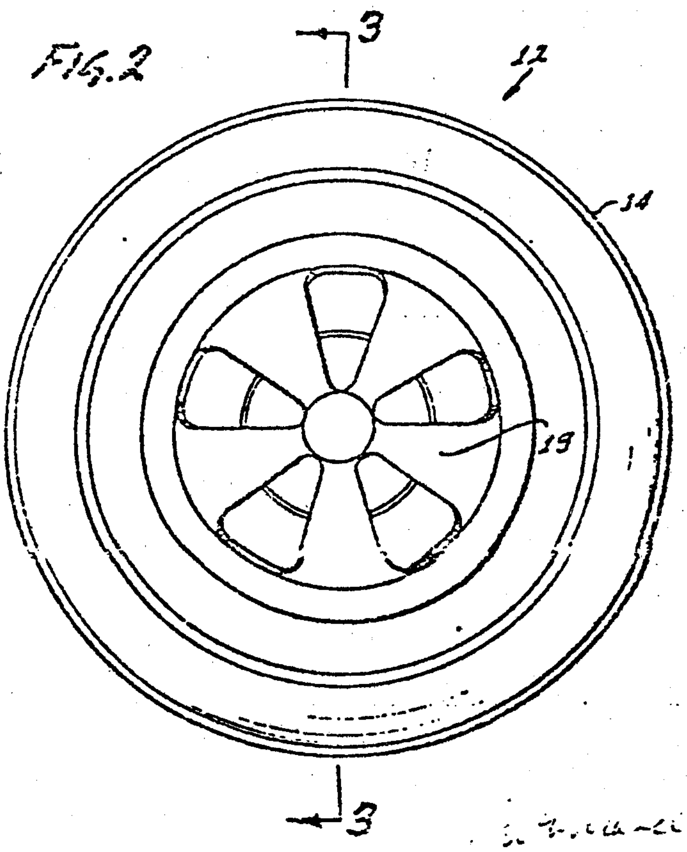
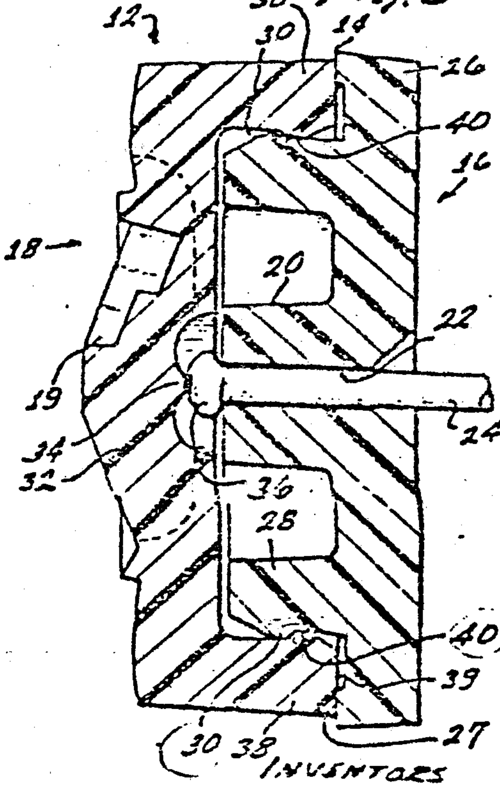


FIG. 3



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United States Patent Office 3,566,536 Patented Mar. 2, 1971

3,566,536

TOY VEHICLE WHEELS

William R. Baynes, Palos Verdes Peninsula, and Keith M. Johnson, South Laguna, Calif., assignors to Mattel, Inc., Hawthorne, Calif.

Filed July 9, 1969, Ser. No. 840,206
Int. Cl. A63h 17/26
U.S. Cl. 46—221 10 Claims

ABSTRACT OF THE DISCLOSURE

A wheel assembly for a toy vehicle comprising inner and outer wheel elements that can be snapped together over the end of an axle. The inner wheel element includes a bearing hole at the center for receiving the axle, an axially-extending flange near the rim, and a tread portion at the rim for rollably supporting the vehicle on a track. The outer wheel element has a flange that snaps over the flange of the inner wheel element to hold them together.

BACKGROUND OF THE INVENTION

Field of the invention

This invention relates to toy vehicles.

Description of the prior art

One type of toy vehicle wheel includes a main wheel element with a recess at the center for holding a small cylindrical bearing of low friction material. Such a wheel is described in patent application S.N. 696,109 by LaBranche et al., filed Jan. 8, 1968. Generally the vehicle axle is inserted through the small cylindrical bearing, the end of the axle is cold headed, and the bearing with the axle therein is press fitted into the recess in the main wheel element. A tight press fit is used to prevent a child from grasping the main wheel element and pulling it off from the cylindrical bearing. Such wheels have several disadvantages which decrease the performance and life of the vehicle.

One disadvantage of the wheel assembly described above was that the main wheel element was highly stressed because of the press fitting operation, and it could stress crack when household oil was applied by a child in attempt to lower the friction. Another disadvantage was that the press fitting reduced the diameter of the bearing hole in a somewhat indefinite amount, so a larger nominal bearing hole had to be employed which allowed wheel chatter, or high speed wobble, that slowed the vehicle. Still another disadvantage was that the outer rim surface of the wheel was not always concentric with the bearing surface that engaged the axle. Accurate concentricity between the rim and axle bearing surfaces depended upon the concentricity of several different surfaces on different parts. Construction of a toy vehicle wheel in a manner to reduce bearing and road friction to a minimum is desirable because the vehicles are often raced against each other, and a small increase in friction can cause a vehicle to lose a race.

OBJECTS AND SUMMARY OF THE INVENTION

An object of the present invention is to provide a toy vehicle which runs with a minimum of friction.

Another object is to provide toy vehicle wheels of maximum durability and minimum rolling and bearing friction.

In accordance with the present invention, a toy vehicle wheel is provided which includes an inner wheel element with a bearing hole which receives the end of an axle, and an outer wheel element that fits over the inner element and serves as a thrust bearing for the axle to keep the wheel

at the end of the axle. In one embodiment of the invention, the inner element includes a hub portion with a hole for receiving the axle, a rim for rollably supporting the vehicle on a track, and a flange extending in a generally axial direction and having a protuberance on it. The outer element includes a hub portion for abutting the end of an axle, and a circumferential portion that snaps over the protuberance of the flange to hold the outer element in place. The outer element is of smaller diameter than the rim of the inner element, so the wheel rolls on the rim of the inner element.

The use of an outer element that does not extend to the rim of the wheel makes it difficult for a child to grasp the outer element and separate it from the inner element, so the parts do not have to be held so tightly together. This, plus the use of the protuberances on the flange and outer element allows secure holding of the elements with less stress on them, and thereby reduces the possibility of cracking of stressed plastic parts if a child adds household oil to the wheel. The assembly of the elements does not result in the hub portion of the inner element being compressed appreciably, so the bearing hole therein can be formed accurately to the final size for a minimum of clearance with the axle and therefore a minimum wheel chatter. The axle bearing surface and outer rim on which the wheel rolls are portions of the same unitary part, so concentricity depends upon accuracy of a single molding die rather than depending upon accuracy several surfaces on two different parts.

The novel features of the invention are set forth with particularity in the appended claims. The invention will be best understood from the following description when read in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a toy vehicle constructed in accordance with the invention;

FIG. 2 is a side elevation view of a wheel of the toy vehicle of FIG. 1; and

FIG. 3 is a sectional view taken on the line 3—3 of FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 1 illustrates a toy vehicle 10 of the type which is unpowered and which is designed for movement by gravity or other external means. The vehicle has four wheels 12 which are mounted on a pair of axles in a manner to provide low friction with the axles as well as with the track along which the vehicle rolls. In order to reduce road friction, the wheels have narrow rim portions 14 which actually contact the track, although the wheels appear relatively wide to simulate the appearance of real vehicle tires.

As shown in FIG. 3, the wheel includes an inner element 16 and an outer element 18, which are held together. Both elements are figures of rotation, i.e. all cross sections taken through the centers are the same, except that the outer element has spokes at 19 which serve merely to enhance its appearance. The inner element 16 includes a hub portion 20 with a bearing hole 22 therein for receiving the end of an axle 24 that extends from the vehicle, the hole 22 providing an axial bearing for the axle. The radially outer portion 26 of the inner element has a diameter greater than the diameter of any portion of the outer element 18, so its rim 14 serves as a tread which supports the vehicle on a track. A flange 28 extends axially from the inner element at a location between the hub and rim portions thereof. The flange has a protuberance 30 thereon to facilitate its engagement with the outer element.

The outer element 18 has a hub portion 32 with a boss 34 on its inside which serves as a thrust bearing to abut the extreme end 36 of the axle. The outer element also has an axially extending flange portion 38 with a protuberance 40 on it for engaging the protuberance 30 of the inner element, to hold the inner and outer elements together.

The wheel is assembled by first projecting the axle 24 through the bearing hole 22 of the inner element and cold heading the outer end 36 of the axle to enlarge it so that the outer end cannot be pulled back through the bearing hole. The outer element 18 is then placed against the inner element and pressed against it to snap it into place. During the snapping action, the flange 33 of the outer element deflects outwardly until the protuberances 30, 40 on the flanges pass over and lie behind one another. The flanges of the inner and outer elements are designed for some interference even after the elements are snapped into place, to hold them tightly together, although at a relatively low stress level.

The use of a unitary member that has a bearing surface 22 for supporting the axle and rim surface at 14 for rollably supporting the wheel on a track, assures good concentricity of the axle bearing and rim. Any appreciable difference between the axis of the rim 14 and of the bearing 22 can increase road friction, particularly for the type of vehicle designed to move rapidly along steep inclines. The concentricity of the rim 14 and bearing 22 depends primarily upon the accuracy of the mold in which the inner element is formed, and such molds are easily constructed with extremely close tolerances.

The clearance between the axle 24 and the inside diameter of bearing hole 22 is preferably held to a minimum, to reduce wheel wobbling which can produce chatter when the vehicle rolls at a high speed. Such chatter can increase friction and slow down the vehicle. In previous wheels, a small cylindrical bearing was press fitted into a major wheel element, and the press fitting reduced the inner diameter of the bearing hole by an amount dependent upon the interference between the recess walls and the outer surface of the bearing. In the wheel of this invention, the diameter of bearing hole 22 is not appreciably changed during installation, since even the limited interference fit between the elements is applied through the flange 28 which can bend slightly. Thus, the bearing hole 22 can be made to have a very small tolerance with the axle 24, to hold chatter to a minimum.

As mentioned above, after the wheel is assembled, only a small stress remains in the flanges 28 and 38, partly because the protuberances 30, 40 lie behind one another to hold the elements securely together. The amount of stress is also minimized because of the long region where the protuberances are engaged. As compared with previous wheels wherein a small cylindrical bearing was press fitted into a recess, the protuberances 30, 40 of the present wheel extend along a relatively large circle so there is a large area of contact of the protuberances, and therefore secure holding is achieved while subjecting any portion of the flange to only a low stress. The amount of stress is further minimized because less secure holding is required. This is because it is more difficult for a child to grasp the outer element 18 and pull it off than was possible in earlier wheels wherein the portion forming the rim 14 was part of the outer element and could be grasped by a child to separate the outer element from the small bearing member. In order for a child to grasp the outer element 18 he must insert a fingernail between the elements, and this is difficult to do because only a small space is provided between the inner end 39 of the outer element and the radially extending walls 27 of the rim portion of the inner element. The low stresses on the parts reduce the possibility of cracking if a child places household oil on the wheel in an attempt to further reduce friction.

friction material such as Delrin, a trade name for an acetyl type plastic of low static coefficient of friction. The outer element 18 may be constructed of styrene or other lower cost material. Generally, the elements are dipped in a silicone grease prior to assembly of the wheel to provide a minimum of friction. The silicone grease generally does not cause cracking of stressed plastic parts.

Although particular embodiments of the invention have been described and illustrated herein, it is recognized that modifications and variations may readily occur to those skilled in the art, and consequently, it is intended that the claims be interpreted to cover such modifications and equivalents.

What is claimed is:

1. A wheel for a toy vehicle comprising:
a first element with radially inner and outer portions, said inner portion having a bearing hole for receiving a vehicle-supporting axle, and said outer portion having a flange extending in a generally axial direction; and
a second element including a hub portion for abutting an end of a shaft that extends through said bearing hole in said first element, said second element including an outer portion for interference fitting into engagement with said flange of said first element.

2. The wheel described in claim 1 wherein:
said outer portion of said first element includes a tread portion for rollably supporting said wheel, said tread portion being of larger diameter than any portion of said second element, whereby to maintain a high degree of concentricity between the radial axle bearing and the rolling surface of the wheel.

3. The wheel described in claim 2 wherein:
said outer portion of said second element is of larger diameter than said flange of said first element, to fit over it, whereby to hamper the grasping of said second element to pull it apart from said first element.

4. The wheel described in claim 1 wherein:
said flanges have protuberances for deflecting and riding over one another to positions behind one another, as said elements are joined together.

5. A wheel for a toy vehicle comprising:
a unitary inner member having a hub portion with a bearing hole for receiving an axle and a rim portion concentric with said bearing hole for rollably supporting said wheel; and
an outer member of smaller diameter than said inner member including a hub portion for abutting an end of said axle, said outer member including means for joining it to said inner member.

6. The wheel described in claim 5 wherein:
said rim portion of said inner member has radially extending walls; and
said outer member has an outer portion that substantially abuts said radially extending walls, whereby to hamper the grasping of said outer member to pull it off from said inner member.

7. The wheel described in claim 5 wherein:
said inner member has an axially extending flange with a radially outwardly extending protuberance; and
said outer member has an axially extending circumferential portion with a radially inwardly extending protuberance for moving behind and engaging said protuberance of said inner member.

8. A wheel for a toy vehicle comprising:
an outer wheel element with a radially inwardly extending protuberance; and
an inner wheel element with a bearing hole for receiving an axle, and a radially outwardly extending protuberance for locating behind said protuberance of said outer wheel element, whereby to hold said elements together with a minimum of stress that tends to reduce the diameter of said bearing hole.

9. The wheel described in claim 8 wherein:

bearing hole therein and an axially extending flange portion radially spaced from said hub portion, and said radially inwardly extending protuberance is located on said flange portion.

10. A wheel for a toy vehicle comprising:

a unitary inner member including a hub portion with a bearing hole therein for receiving an axle, an axially extending flange portion at a location radially out from said hub portion, said flange portion having a radially outwardly extending protuberance thereon, and a rim portion for rollably supporting said wheel; and

an outer element including a hub portion for positioning opposite said hub portion of said inner member to serve as a thrust bearing for said axle, and an axially extending outer portion of a diameter less than the diameter of said rim of said inner element,

said outer portion having a radially inwardly extending protuberance for reception behind the protuberance of said inner element.

References Cited

UNITED STATES PATENTS

1,529,870	3/1925	Caruso	46—221
2,171,923	9/1939	Fisher	46—221
2,978,277	4/1961	Caudry	301—1UX
3,389,498	6/1968	Cremer	46—221

LOUIS G. MANCENE, Primary Examiner

R. F. CUTTING, Assistant Examiner

U.S. Cl. X.R.

301—1

225,251

TOY VEHICLE CAB

Vernon A. Peterson, Minneapolis, Minn., assignor to Tonka Corporation, Mound, Minn.

Filed May 24, 1971, Ser. No. 146,583

Term of patent 7 years

Int. Cl. D21—01

U.S. Cl. D34—15

CX-2

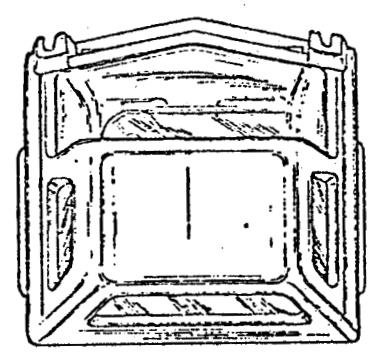

FIG. 5

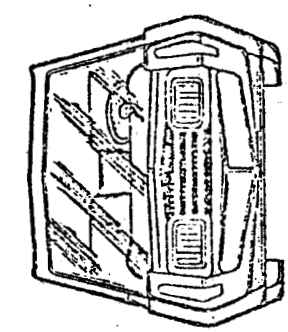

FIG. 4

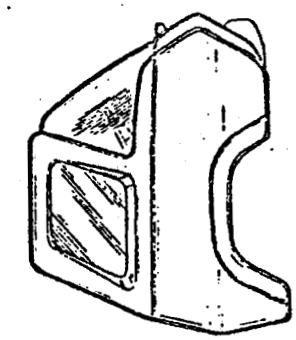

FIG. 3

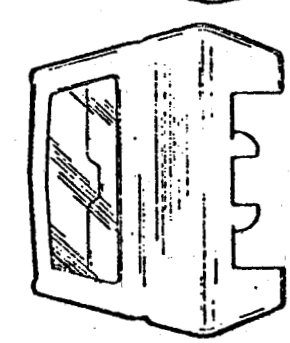

FIG. 2

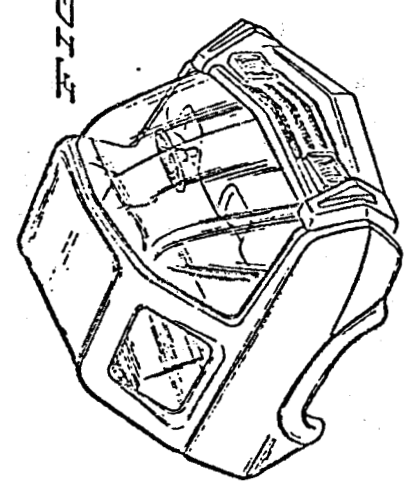

FIG. 1

FIG. 1 is a top front perspective view of a toy vehicle cab showing my new design;
FIG. 2 is a rear elevational view thereof;
FIG. 3 is a right side elevational view thereof;
FIG. 4 is a front elevational view thereof; and
FIG. 5 is a top plan view.

I claim:

The ornamental design for a toy vehicle cab, as shown.

References Cited

UNITED STATES PATENTS

D. 221,566	8/1971	Gilford	D34—15
D. 217,825	6/1970	Peterson	D34—15
D. 216,821	3/1970	Perhacs	D34—15

OTHER REFERENCES

Toys and Novelties, March 1969, p. 157, trucks at top.

JOEL STEARMAN, Primary Examiner

N. C. HOLTJE, Assistant Examiner

United States Patent Office

Des. 217,825
Patented June 16, 1970

217,825

TOY TRUCK CAB

Vernon A. Peterson, Minneapolis, Minn., assignor to Tonka Corporation, Mound, Minn., a corporation of Minnesota

Filed Nov. 12, 1968, Ser. No. 14,408

Term of patent 14 years

Int. Cl. D21—02

U.S. Cl. D34—15

CX-18

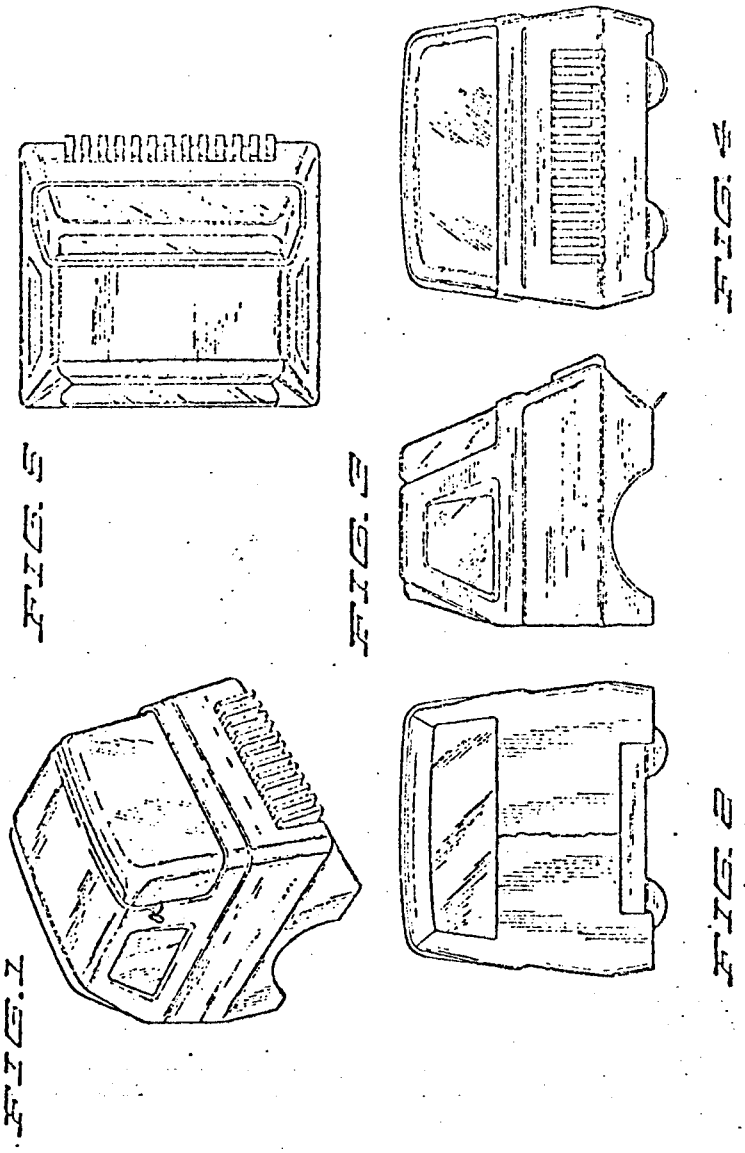

FIG. 1 is a front, right side and top perspective view of the unit showing the new design.
FIG. 2 is a rear elevation.
FIG. 3 is a right side elevation.
FIG. 4 is a front elevation.
FIG. 5 is a plan top view.
I claim:
The ornamental design for a toy truck cab, as shown.

References Cited

UNITED STATES PATENTS

D. 202,637 10/1965 Campbell ..... D34—15

EDWIN H. HUNTER, Primary Examiner

N. C. HOLTJE, Assistant Examiner

Library Cataloging Data

U.S. International Trade Commission.
In the matter of: certain steel toy vehicles. Investigation no. 337-TA-31. Commission memorandum opinion. Washington, 1978.

[34] p. 28 cm. (USITC Publication 880)

Bibliographical footnotes.

1. Toys. 2. Toys--U.S. 3. Toys--Tariff. I. Title. II. Title: Certain steel toy vehicles.

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