UNITED STATES TARIFF COMMISSION

TUNGSTEN ELECTRICAL CONTACT POINTS WORKERS OF THE SOLON, OHIO, PLANT OF THE CLEVELAND REFRACTORY METALS DIVISION OF CHASE BRASS AND COPPER CO.

Report to the President
on Investigation No. TEA-W-179
Under section 301(c)(2) of
the Trade Expansion Act of 1962

TC Publication 563
Washington, D. C.
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UNITED STATES TARIFF COMMISSION

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C O N T E N T S

Appendix Tables

CONTENTS

Note.--The whole of the Commission's report to the President may not be made public since it contains certain information that would result in the disclosure of the operation of an individual firm. This published report is the same as the report to the President, except that the above-mentioned information has been omitted. Such omissions are indicated by asterisks.

REPORT TO THE PRESIDENT

U.S. Tariff Commission,
April 2, 1973.

To the President:

In accordance with section 301(f)(1) of the Trade Expansion Act of 1962 (TEA) (76 Stat. 885), the U.S. Tariff Commission herein reports the results of an investigation made under section 301(c)(2) of that Act in response to a petition filed by a group of workers.

On January 31, 1973, the International Association of Machinists and Aerospace Workers (IAM) filed a petition for a determination of eligibility to apply for adjustment assistance on behalf of the workers of the Solon, Ohio, plant of the Cleveland Refractory Metals Division of the Chase Brass and Copper Co., Inc., a subsidiary of Kennecott Copper Corp., engaged in the manufacture of certain tungsten products. Chase plans to close the Solon plant and move its equipment to Singapore, where Chase and Wah Chang Corp. will operate a new plant under a joint venture arrangement. The Commission instituted an investigation (TEA-W-179) on February 9, 1973, to determine whether, as a result in major part of concessions granted under trade agreements, articles like or directly competitive with tungsten electrical contact points and point sets, of the types provided for in items 683.60 and 685.90 of the Tariff Schedules of the United States (TSUS), are being imported into the United States in such increased quantities as to cause, or threaten to cause, unemployment or underemployment of a significant number or proportion of the workers of such company, or appropriate subdivision thereof.

Public notice of the investigation was given in the Federal Register of February 15, 1973 (38 F.R. 4542). No public hearing was requested by any party showing a proper interest in the subject matter of the investigation, and none was held.

The information herein was obtained principally through field interviews with officials of Cleveland Refractory Metals and Chase Brass and Copper and from discussions with other domestic producers, importers, a union representative, and from data contained in the Commission's files.

Finding of the Commission

On the basis of its investigation, the Commission finds (Commissioners Moore and Ablondi dissenting) that articles like or directly competitive with the electrical contact points 1/ (of the types provided for in items 683.60 and 685.90 of the Tariff Schedules of the United States) produced by the Cleveland Refractory Metals Company Division, Solon, Ohio, of the Chase Brass and Copper Co., Inc., are not, as a result in major part of concessions granted under trade agreements, being imported into the United States in such increased quantities as to cause, or threaten to cause, the unemployment or underemployment of a significant number or proportion of the workers of such firm, or an appropriate subdivision thereof.

1/ The notice of investigation also included electrical point sets as products produced by the firm. As the investigation disclosed that the firm did not produce such sets, the Commission makes no finding with respect thereto.

Views of Chairman Bedell and Vice Chairman Parker

This investigation was conducted pursuant to section 301(c)(2) of the Trade Expansion Act of 1962 in response to a petition for a determination of eligibility to apply for adjustment assistance filed on behalf of the workers of the Solon, Ohio, plant of the Cleveland Refractory Metals Division (CRM) of the Chase Brass & Copper Co., Inc. This division is engaged in the manufacture of tungsten powder, rod, discs, and contacts.

Under section 301(c)(2) of the Trade Expansion Act of 1962, a finding must be made that each of the following statutory requirements have been met before an affirmative determination may be made by the Commission:

(1) Imports of an article like or directly competitive with an article produced by the petitioning workers must be increasing;

(2) The increase in imports must be a result in major part of trade-agreement concessions;

(3) The workers concerned must be unemployed or underemployed, or threatened with unemployment or underemployment; and

(4) The increased imports in major part the result of concessions granted under trade agreements must be the major factor in causing or threatening to cause the unemployment or underemployment.

The petition alleges that imports of articles like or directly competitive with "contact points,"--which it describes as "small round tungsten discs,"--are being imported in increased quantities due in

major part to trade-agreement concessions, and that a significant number of the workers are unemployed or threatened with unemployment in major part from such increased imports. The actual production of the company consisted of tungsten powder, rod, discs, and contacts; the powder and rod are preliminary steps in the production of discs and contacts which, in turn, are used by CRM's customers to make electrical contact points and point sets. Tungsten discs and contacts accounted for about * * * of the value of CRM's shipments of tungsten products in 1972. The firm expects to start phasing out its U.S. tungsten operations in April 1973--no other plant of the firm produces these products--and transfer the tungsten manufacturing equipment to a new plant being built in Singapore * * *.

In this case, we have made a negative determination because, whether or not imports of products like or directly competitive with those produced by the petitioners have increased, the imports which have entered to date cannot be "the major factor" in causing or threatening to cause unemployment or underemployment of the petitioning workers.

The investigation discloses that imports have been insignificant compared to U.S. production and consumption--less than *** percent. Total imports were equal to only *** percent of CRM's shipments in 1972. It does not appear that this small volume of imports had any significant impact on the operations of CRM. In addition, imports of such

items during the period 1968-72, when the duty reductions made during the Kennedy Round were being put into effect, increased only slightly, * * *. Such imports rose and fell from year to year within that period apparently without regard to the levels of duty or the annual reductions in the rates of duty. Thus, the evidence does not warrant a determination that increased imports were the major factor in causing or threatening unemployment or underemployment of the workers.

Although the workers may become unemployed when the tungsten operations cease, and thus are threatened with unemployment, such unemployment will be the result of the company's transfer of tungsten operations to Singapore, and not from increased imports. Hence, the threat of unemployment results from the anticipated transfer of the company's production activities to Singapore. Such a shift in production and the possible future importation of such articles, however, is not a basis for a determination of affirmative relief under the statute. The statute requires that imports must have increased, as the Commission noted in a recent decision. 1/

The evidence in this case shows that Chase Brass & Copper decided to terminate tungsten operations in the United States for reasons other than those related to imports. * * *. The market for tungsten discs and contacts is very competitive. The development of electronic ignition systems and

1/ Automotive Springs, Clutch Discs, and Rear Deck Lid Torsion Bars: Workers and Former Workers of the Eaton Corporation Plant, Detroit, Michigan . . . Report to the President on Investigation No. TEA-W-172 . . ., TC Publication 549, pp. 3-6, March 1973.

other technical developments presages a declining market for tungsten discs and contacts. * * *.

In view of the foregoing evidence, therefore, we have determined that increased imports of articles like or directly competitive with those produced by the petitioning workers were not a major factor in causing or threatening to cause the unemployment or underemployment of these workers.

Views of Commissioners Leonard and Young

This statement sets forth the reasons for our negative determination under section 301(c)(2) of the Trade Expansion Act of 1962 (TEA) in the instant worker investigation. 1/ The investigation was made on petition of the International Association of Machinists and Aerospace Workers (IAM) on behalf of all workers employed on tungsten products of the Cleveland Refractory Metals (CRM) plant at Solon, Ohio, where tungsten powder, rod, discs, and contacts are manufactured. The petition cites imports of "contact points," which it describes as "small round tungsten discs," as the articles being imported in increased quantities due in major part to trade-agreement concessions. Production of powder and rod are preliminary steps in the making of discs and contacts. Production of all these articles will halt in April 1973; thereafter production will be shifted to another CRM plant being built in Singapore.

We have made a negative determination because, whether or not imports of products like or directly competitive with those produced by the petitioners have increased, the imports which have entered to

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1/ Section 301(c)(2) provides:

> In the case of a petition by a group of workers for a determination of eligibility to apply for adjustment assistance under chapter 3, the Tariff Commission shall promptly make an investigation to determine whether, as a result in major part of concessions granted under trade agreements, an article like or directly competitive with an article produced by such workers' firm, or an appropriate subdivision thereof, is being imported into the United States in such increased quantities as to cause, or threaten to cause, unemployment or underemployment of a significant number or proportion of the workers of such firm or subdivision (19 U.S.C. 1901C2).

date cannot be "the major factor" in causing, or threatening to cause, unemployment or underemployment of the petitioning workers.

Statute denies consideration of future imports

Moreover, imports from Singapore, which, in the narrowest sense would be most "like" those produced at the Solon, Ohio, plant, but, more significantly, would have the most pronounced effects on employment at Solon, have not yet been "imported into the United States." Thus, while we are cognizant of the firm's intention to supply its U.S. requirements for discs and contacts from Singapore rather than from a domestic facility, such future importation is not within the scope of the statute. Anticipated imports cannot be considered since the pertinent provisions of the TEA require a determination that imports have in fact increased. "Threat" as used in section 301(c)(2) of the TEA pertains only to unemployment or underemployment and not to imports. The statute requires imports causing the unemployment or underemployment to have actually occurred. 1/

1/ Automotive Springs, Clutch Discs, and Rear Deck Lid Torsion Bars . . . Report to the President on Investigation No. TEA-W-172 . . ., TC Publication 549, pp. 3-6, March 1973.

A review of the House and Senate reports on the Trade Expansion Act confirms that the Act was not designed to provide relief from such importation as might occur in the future. In discussing Tariff Commission investigations, the reports generally use such terms as "is being imported", "increased imports", and "an imported article". The House report explicitly states:

> "Your Committee believes that it is important that adjustment assistance in all instances be given only where it has been concluded that the conditions requiring assistance were caused by increased imports resulting from tariff concessions made under trade agreements. (H.R. Report No. 1818, 87th Cong., 2d Sess. p. 23)." (Emphasis supplied)

Imports of electrical breaker point sets, ignition tune-up kits, and other articles containing tungsten discs or contacts increased during the period 1968-72. It must be decided, however, whether these are imports which can be considered. The relevant provision of law describes the import to be considered as "an article like or directly competitive with an article produced by such workers' firm, or an appropriate subdivision thereof." 1/

"Like"

The petitioning workers at the Solon plant of CRM produced tungsten discs and contacts over a full range of sizes, thicknesses, and backings for use in various consumer products. Thus, imported articles "like" the articles produced by the workers at the Solon plant of CRM are tungsten discs and contacts of various sizes, thicknesses, and backings.

"Directly competitive"

In this investigation, the question arises whether certain imported consumer products or the tungsten discs and contacts contained therein are, within the terms of the statute, "directly competitive" with the tungsten discs and contacts produced by CRM. As we have held in earlier investigations under the Trade Expansion Act, 2/ we cannot, even taking into consideration section 405(4) of that statute (which further defines "directly competitive with"), find that imported consumer products

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1/ Trade Expansion Act of 1962, sec. 301(c)(2).

2/ Certain Variable Electrical Capacitors . . .,Report to the President on Investigation No. TEA-F-32 . . ., TC Publication 423, pp. 5-8, October 1971. Loudspeakers . . ., Report to the President on Investigation No. TEA-W-158 . . ., TC Publication 522, pp. 6-10, November 1972.

(e.g., auto ignition point sets, regulators, automobiles, lawnmowers, snowmobiles, etc. or tungsten discs and contacts in such imported consumer products) are articles directly competitive with the products made by CRM.

Similar to the reasoning we presented in Certain Variable Electrical Capacitors and Loudspeakers, an auto ignition point set (let alone automobiles or other consumer products) cannot, in the context of the statute and the House Report, be deemed to be tungsten discs and contacts at a later stage of processing. Tungsten discs and contacts are finished articles requiring no further processing as does zinc ore, for example. An auto ignition point set is an assembly of processed component parts, including two tungsten contacts, two breaker arms, and various springs, screws, and other parts. Tungsten discs and contacts alone cannot perform the functions of an auto ignition point set. Nor are tungsten discs and contacts that are an integral part of an auto ignition point set any longer discs or contacts in commercial terms. They are a part of an auto ignition point set. We are not, therefore, permitted under the statute to regard imported consumer products, such as auto ignition point sets, regulators, or automobiles (or discs and contacts within such imported consumer products) as directly competitive with the discs and contacts made by CRM.

Increased imports?

Data received by the Commission from U.S. importers and consumers showed that imports of tungsten discs and contacts moved erratically during the years 1968-72, * * *. In any event, the difference between imports in the lowest year and in 1972 amounted to * * * units, or less than * * * percent of estimated domestic consumption and were equal to less than * * * percent of CRM's annual shipments of these products in 1972.

It is clear that any "increased imports" could not have been "the major factor" causing or threatening to cause unemployment or underemployment. Information obtained in the investigation shows conclusively that the lower wage rates in Singapore--* * * cents per hour versus * * * per hour in Solon, Ohio--the declining future market for tungsten discs and contacts due to the introduction of electronic ignition systems in automobiles, and the fact that CRM must compete with a highly automated lower cost domestic producer in the U.S. market were of greater importance than duty reductions in CRM's decision to transfer its operations abroad. Possibly a more important reason for the decision to transfer operations abroad is the use by CRM's parent company of CRM's tungsten operations as an entering wedge in its effort to become a multinational company. Therefore, on the basis of the evidence, we have made a negative determination.

Dissenting Views of Commissioners Moore and Ablondi

In this case, we have made an affirmative determination with respect to the tungsten products produced by CRM, because the four criteria imposed by the Trade Expansion Act are clearly met:

(1) U.S. imports of tungsten discs and contacts (CRM's main products) have increased from * * * pieces in 1968 to * * * pieces in 1972. U.S. imports of the major articles using tungsten discs or contacts, such as auto ignition points and voltage regulators, have more than * * * from * * * pieces in 1968 to * * * pieces in 1972.

(2) Such increased imports resulted in major part from a reduction in the duty of 31 percentage points that occurred as a result of trade-agreement negotiations.

(3) Although no workers making such tungsten products at the Solon plant of CRM have yet been terminated, the company has indicated that beginning in April 1973 and ending about * * *, all * * * such workers will be unemployed. Therefore, there is threatened unemployment.

(4) The threatened unemployment is directly attributable to CRM's contemplated transfer of production of tungsten products from Solon, Ohio to Singapore and the expected importation of these products into the United States in order to meet the competition in the United States from lower priced tungsten discs and contacts which are being imported in increased quantities.

In view of the foregoing, we conclude that the petitioning workers, threatened with unemployment, have met the statutory requirements for eligibility to apply for adjustment assistance, and therefore, we have made an affirmative determination.

We observe that our colleagues attach some importance to the fact that imports which may have the most adverse effect on employment at the Solon plant have not yet occurred, because production has not yet been transferred to Singapore. It appears that if the Solon plant of CRM closes as scheduled and like or directly competitive articles begin to enter in quantity from Singapore, the unemployed workers of CRM, who are thereby affected, may submit a new petition based on the facts at that time.

INFORMATION OBTAINED IN THE INVESTIGATION

Description of Articles Under Investigation

The Cleveland Refractory Metals (CRM) Division of the Chase Brass & Copper Co. produces tungsten powder, tungsten rod, tungsten discs, and tungsten contacts. Although the company sells all four products from time to time, their principal sales are of the latter two products, viz., so-called discs and contacts. More particularly, these discs and contacts are the "points" used in the production of electrical breaker points or point sets. In other words, the tungsten discs are the electrical contact points, as yet unmounted, and the tungsten contacts are such points suitably mounted for assembly into the ultimate products, i.e., electrical point sets. The worker petition filed in this case and the Commission notice are limited to a consideration of these two products made by the firm. For purposes of clarity, each of the four products produced by the firm is further described below.

Tungsten powder

CRM produces commercially pure tungsten powder from tungsten oxide (WO_3). The tungsten oxide is reduced in a hydrogen atmosphere reduction furnace, yielding pure tungsten powder. After screening and blending, the tungsten powder is ready for further processing. Besides being used in the production of rod, tungsten powder is also used in the production of tungsten carbide for metal working and other applications.

Tungsten rod

Tungsten rod is produced in several steps. Tungsten powder is placed into a mold and hydraulically pressed into a rectangularly shaped tungsten compact. 1/ Sintering converts the tungsten compact into a very dense tungsten ingot. The ingot is then passed through various swagers 2/ and grinders to produce a tungsten rod. The diameter and length of the rod depend on the number of passes through the swagers. Besides being used in the production of discs and contacts, tungsten rod is also used to draw filament wire for electric light bulbs, to make welding electrodes, for sealing glass and in other uses. Tungsten rod used for discs and contacts is made of hydrogen reduced high purity tungsten powder (99.99 percent purity) and is called contact rod.

Tungsten discs

Flat tungsten discs of various thicknesses are produced from tungsten rod on an automatic cut-off machine. After burnishing and polishing, the flat disc is used as is or further modified by such processes as serrating the surface of the disc, coining the flat disc (this operation produces a radiused or concave surface on the disc) or ventilating the disc (punching a hole in its center). These specially treated discs are either sold as is or further processed into contacts, which are used in the products cited below.

1/ A tungsten compact is an unsintered pressed tungsten shape.

2/ Swagers are metal-working machines which use a hammering process to reduce the diameter of metal products. In the course of the swaging procedure, the intermolecular relationships of the tungsten molecules are also altered, giving the metal strength and ductility.

Tungsten contacts

CRM's ultimate product is a finished tungsten contact. Such unalloyed tungsten contacts are only used in those applications that require a high melting point and severe wear resistance. Using either flat, ventilated or radiused discs and various brazing and welding techniques, the tungsten discs are mounted on a wide range of backing materials (such as rivets, studs, screws, arms, and brackets) to create a tungsten contact. These contacts are used chiefly by producers of electrical breaker points 1/ intended for internal combustion engine ignition systems (principally for automobiles, trucks, recreational vehicles, lawn mowers, snowmobiles, motorcycles, tractors, chain saws, and marine engines). Although tungsten contacts are also used in other electrical apparatus (e.g., switches, relays, and horn contacts) for making and breaking electrical circuits, most such apparatus require contacts with a higher electrical conductivity than that of unalloyed tungsten. Tungsten's conductivity may be increased by alloying the metal with copper and silver. CRM, however, produces only unalloyed tungsten discs and contacts.

1/ Electrical breaker points are produced in sets consisting of two tungsten contacts attached to metal breaker arms plus springs, screws, bushings, and various other metal or plastic parts.

Customs Treatment

Tungsten discs and tungsten electrical contacts were dutiable as electrical articles, or parts thereof, at 35 percent ad valorem under paragraph 353 of the Tariff Act of 1930, as originally enacted. As a result of subsequent tariff concessions beginning in 1939, the duty on tungsten discs and tungsten electrical contacts dedicated to use with internal combustion engines was reduced to the current rate of 4 percent ad valorem (item 683.60), whereas the duty on tungsten discs and tungsten contacts dedicated to use in electrical apparatus--such as switches and relays--for making or breaking electrical circuits was reduced to the current rate of 8.5 percent ad valorem (item 685.90).

Tungsten powder was dutiable at 60 cents per pound on the tungsten content plus 50 percent ad valorem under paragraph 302(g) of the Tariff Act of 1930, as originally enacted. Tungsten rod was dutiable at 60 percent ad valorem under paragraph 316(b) of the Tariff Act of 1930, as originally enacted. Pursuant to successive trade-agreement concessions beginning in 1948, the duty on tungsten powder was reduced to the current rate of 21 cents per pound on tungsten content plus 12.5 percent ad valorem (item 629.28), and the duty on tungsten rod was reduced to the current rate of 12.5 percent ad valorem (item 629.35).

The effective dates of the successive rates of duty applicable to tungsten powder, rod, discs, and contacts are given in the following table. All reductions in the rates of duty resulted from trade-agreement concessions.

Certain tungsten products: U.S. rates of duty June 18, 1930-Jan. 1, 1973

Effective date	Tungsten discs, tungsten electrical contacts, breaker points, electrical ignition kits, distributors, all for internal combustion engines (item 683.60) 1/ 2/	Tungsten discs, tungsten electrical contacts, breaker points, electrical apparatus for making or breaking electrical circuits (item 685.90) 1/	Tungsten powder (item 629.28)	Tungsten rod (item 629.35)
	Percent ad valorem	Percent ad valorem	Cents per pound plus percent ad valorem	Percent ad valorem
June 18, 1930	35	35	60¢ on tungsten content + 50%	60
Jan. 1, 1939	25	3/	3/	3/
Jan. 1, 1948	15	3/	42¢ on tungsten content + 25%	40
June 6, 1951	12.5	17.5	3/	30
June 30, 1956	3/	3/	3/	28.5
June 30, 1957	3/	3/	3/	27
June 30, 1958	10.5	3/	3/	25.5
July 1, 1962	9.5	3/	3/	3/
July 1, 1963	8.5	3/	3/	3/
Jan. 1, 1968	7.5	15.5	37¢ on tungsten content + 22.5%	22.5
Jan. 1, 1969	6.5	14	33¢ on tungsten content + 20%	20
Jan. 1, 1970	5.5	12	29¢ on tungsten content + 17.5%	17.5
Jan. 1, 1971 4/	5	10	25¢ on tungsten content + 15%	15
Jan. 1, 1972	4	8.5	21¢ on tungsten content + 12.5%	12.5
Jan. 1, 1973	3/	3/	3/	3/

1/ If entered on or after Jan. 1, 1965, of Canadian origin and intended for use as original equipment in the manufacture in the United States of motor vehicles, these articles previously covered by TSUS items 683.60 and 685.90 are free of duty under TSUS items 683.61 and 685.91, respectively (Presidential Proclamation 3682).

2/ The TSUS statutory rate (column 2) for item 683.60 is 35 percent ad valorem, which was the statutory rate for paragraph 353 (of the previous tariff Schedules). Importations, if any, of the above noted articles prior to August 31, 1963, were also subject to classification under the following: par. 369(c), statutory rate 25 percent ad valorem; under paragraph 370, statutory rate 30 percent ad valorem; and under paragraph 372, statutory rate 30 percent.

3/ No change.

4/ An additional 10-percent duty (surcharge) was in effect for dutiable imports for the period from Aug. 16, 1971, to Dec. 19, 1971 (Presidential Proclamations 4074 and 4098).

Ignition breaker points (which utilize tungsten contacts), electrical ignition kits (which include breaker points), as well as complete automotive distributors (of which breaker points are a part), enter under item 683.60 (see table above). 1/ Breaker points used in electrical apparatus for making or breaking electrical circuits, as well as the actual electrical apparatus--such as switches and relays--are dutiable under item 685.90 (see table above). 1/

The duties on some of the other principal import articles in which tungsten electrical contacts--as parts of breaker points--are used have also been reduced significantly as a result of trade-agreement concessions. These articles include automobiles, snow-mobiles, recreational vehicles, and motorcycles. The effective dates of the successive rates of duty applicable to the aforementioned articles under the Tariff Act of 1930 are given in the following table. All reductions in the rates of duty resulted from trade-agreement concessions.

1/ If entered from Canada under APTA, these items are free of duty as cited in table on previous page.

Specified products: U.S. rates of duty,
June 18, 1930 to Jan. 1, 1973

(In percent ad valorem)

Effective date	Automobiles, snowmobiles, recreational vehicles (item 692.10)[1]	Motorcycles (item 692.50)
June 18, 1930	10	10
June 30, 1956	9.5	10
June 30, 1957	9	10
June 30, 1958	8.5	10
July 1, 1962	7.5	10
July 1, 1963	6.5	10
Jan. 1, 1968	5.5	9
Jan. 1, 1969	5	8
Jan. 1, 1970	4.5	7
Jan. 1, 1971 [2]	3.5	6
Jan. 1, 1972	3	5
Jan. 1, 1973	3	5

1/ Motor vehicles for the transport of persons or articles--but not including any three-wheeled vehicle--entered on or after Jan. 1, 1965, and of Canadian origin, are free of duty under TSUS item 692.11 (Presidential Proclamation 3682).

2/ An additional 10-percent duty (surcharge) was in effect for the period from Aug. 16, 1971, to Dec. 19, 1971, but the total of the surcharge and the trade-concession rate of duty could not exceed the statutory 1930 rate of duty (Presidential Proclamations 4074 and 4098).

Some of the aforementioned articles have been entered under tariff items 806.30 and/or 807.00. Item 806.30 provides that imports of U.S.-made articles of metal exported for processing abroad and returned for further processing in the United States are duty free except for the value of processing outside the United States. Item 807.00 provides that imported articles assembled in whole or in part of U.S. fabricated components are dutiable only to the extent of value added abroad; the value of the U.S. components is free of duty. Although the rates of duty applicable to the value added abroad are subject to trade-agreement concessions, items 806.30 and 807.00 are not.

Markets

Tungsten powder and rod

Over 70 percent of the tungsten powder consumed in the United States is used in making tungsten carbide or tungsten filament wire for electric lamps. (The large manufacturers of tungsten carbide and tungsten wire represent a large captive market of indeterminate size since they produce powder and rod in their own facilities for processing into tungsten carbide and tungsten wire.) The remaining tungsten powder is consumed for metallurgical purposes (20 percent) and in making ferrotungsten (10 percent). CRM sells * * * of tungsten powder and rod to all the markets cited.

Tungsten discs and contacts

There are three major market segments for tungsten discs and contacts: (1) Automotive original equipment manufacturer (OEM) market and replacement market, (2) Small engine original equipment manufacturer (OEM) market and replacement market, and (3) Electrical apparatus for making and breaking electrical circuits. CRM sells its output of tungsten discs and contacts to all the markets cited.

Automotive OEM and replacement market.--Tungsten discs and contacts are used as contact surfaces in auto ignition breaker point sets, voltage regulators, and horns. The OEM market fluctuates directly with the demand for new U.S.-produced motor vehicles. The replacement parts market is influenced by the following factors--total number of motor

vehicles in use, total miles driven, and the number of engine tune-ups performed per miles driven. The replacement parts market for voltage regulators and horns is very small and has very little effect on the demand for tungsten discs and contacts.

In 1971 and 1972, the Chrysler Corp. began to offer an electronic ignition system on some of its cars, which system would eliminate breaker points in the distributor. During 1973, the Chrysler Corp. expects to make electronic ignition standard on most of its cars. It is anticipated that the electronic ignition system can last the life of the car, thereby eliminating the periodic tune-up needed by a conventional breaker point system. The electronic system is also more efficient in controlling exhaust emission since it produces a more uniform firing voltage than breaker points. In addition, the voltage regulator used with an electronic system uses electronic components instead of tungsten contacts. It is expected that by 1975, General Motors, Ford, and American Motors will have joined Chrysler in offering an electronic ignition system not requiring tungsten breaker points. As the OEM market goes increasingly to electronic ignition systems, the automotive market for tungsten breaker points will gradually disappear, except for those tungsten contacts used in some horns.

Small engine OEM and replacement market.--At present, the automotive segment represents a much larger market than the small engine segment. However, with the increasing demand for small engines for snowmobiles, minibikes, chain saws, lawn mowers, motorcycles, and boats, and increasing use of electronic ignitions in cars, the small engine segment

will tend to become of increasing importance, and perhaps the largest market for tungsten breaker points. The small-engine replacement market is estimated to be twice the small-engine OEM market.

Electrical apparatus.--Pure tungsten and tungsten-silver-copper alloy discs and contacts are used in electrical apparatus for making or breaking circuits. Discs and contacts of tungsten-silver-copper alloy constitute a much larger number than those of pure tungsten for this use owing to their higher conductivity. * * *.

Marketing channels

The majority of disc and contact producers do not assemble point sets but merely supply the tungsten contacts for them. The marketing network is further fragmented by the fact that some breaker point assemblers sell only to the OEM market, some sell only to the replacement market, and some sell in both areas. The replacement market is divided between those firms that have their own marketing network and those that sell to independent marketers or to national mass merchandisers, such as Sears, K Mart, Montgomery Ward, and Western Auto Stores. The major producers of breaker points are concentrated in the states of Wisconsin, Indiana, Illinois, Ohio, Pennsylvania, New York, Connecticut, and New Jersey.

U.S. Producers

There are about 10 domestic producers of tungsten powder and rod that are in direct competition with CRM. The major competitors are General Electric Co., Wah Chang Corp., Fansteel, Inc., GTE Sylvania, Philips Elmet Corp., and Shieldalloy, Inc. A considerable portion of the total production is captive; General Electric and Sylvania are by far the largest producers for the free market. In 1971, CRM's share of the estimated noncaptive market for tungsten powder of * * * pounds was *** percent; CRM's share of the total market in 1971 of * * * pounds was *** percent. * * *.

There are about 10 domestic producers of tungsten discs and contacts. Included are Fansteel, Inc., P. R. Mallory and Co., H. A. Wilson and Co., Philips Elmet Corp., Standard Motors, Inc., Wah Chang Corp., Kulite Tungsten Co., and CRM.
Fansteel is the largest company in this field supplying approximately * * * percent of the U.S. market. A second group of companies (P. R. Mallory, H. A. Wilson, Philips Elmet, and CRM) control about * * * percent each of the U.S. market. The remaining U.S. producers supply roughly * * * percent apiece of the U.S. market.

U.S. Consumption, Production, Exports, and Imports

Tungsten powder

U.S. consumption of tungsten metal powder rose from an estimated 7.7 million pounds, valued at an estimated $31.4 million, in 1968 to 10.7 million pounds, valued at $51.2 million, in 1970. Consumption declined in 1972 to 8.4 million pounds, valued at $44.7 million. Consumption requirements were supplied almost exclusively by domestic production, as indicated by the ratio of imports to consumption, which ranged from less than 1 percent to less than 2 percent (table 1). A major portion of powder production was captively consumed. In 1971, imports were equal to 6.6 percent of noncaptive consumption.

As shown in table 2, imports of tungsten powder have increased from 110,000 pounds in 1969 to 141,000 pounds in 1972. (Complete import data for 1968 were not available.) Imports entered under TSUS items 806.30 and 807.00 ranged between 103,000 pounds in 1969 and 130,000 pounds in 1972; they accounted for over 90 percent of total imports. Approximately 71 percent of the value of imports entered under 806.30/807.00 in 1969-72 was duty exempt.

Exports of tungsten powder, including tungsten alloy powder, rose from 47,000 pounds in 1968 to 405,000 pounds in 1970, then declined to 263,000 pounds in 1972; they represented less than 5 percent of domestic production of tungsten powder.

At the close of 1972, the U.S. National Stockpile 1/ had in inventory over 2 million pounds of tungsten powder, of which about 268,000 pounds were in excess of the quantity required to meet the stockpile objective; in the past, the stockpile has been a source of supply to industry. Of the total, about 254,000 pounds were acquired from U.S. producers in 1968, the balance in prior years.

Tungsten rod

U.S. consumption of tungsten contact rod--tungsten rod used for making tungsten discs and contacts--trended upward in 1968-72, although it changed direction each year of the period, and was at a peak in 1970, * * *.

* * * * * * *

Contact rod is the only type produced by CRM. * * *. Imports are either nil or negligible, and the U.S. requirements for tungsten rod are supplied by domestic production. A substantial portion of the U.S. production of contact rod is used in plant by the rod producers in making tungsten discs and contacts.

1/ Created by Public Law 520 (79th Congress), the Strategic and Critical Materials Stock Piling Act, to provide emergency inventories of strategic and critical materials.

Exports of tungsten contact rod are estimated to be 20,000 kilograms per year. (The published exports in 1968-72 of all wrought tungsten metal and alloys, not elsewhere classified, including discs and rods, ranged from a value of $766,000 in 1968 to $1.5 million in 1969.)

Tungsten discs and contacts

Consumption of tungsten discs trended upward in 1968-72, but the increasing use of electronic motor vehicle ignition systems and voltage regulators portends a downward trend hereafter. Since tungsten discs are made for use in tungsten contacts, the rate of consumption of both products is parallel. The number of discs consumed in 1968-72 is estimated to have increased steadily * * *.

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Consumption requirements have been supplied almost entirely by U.S. producers, imports of discs and contacts being negligible compared to total U.S. consumption.

During the years 1968-72, imports of discs and contacts ranged between * * * units * * * in 1970 and * * * units * * * in 1969, * * *.

* * * * * * *

By quantity, the total annual imports of tungsten discs and contacts in 1968-72 amounted to less than * * * percent of total estimated domestic consumption and were equal to less than * * * percent of CRM's total annual shipments. It is believed that these import data represent close to 100 percent of all imports of tungsten discs and contacts.

Imports of auto ignition points and other articles using tungsten discs or contacts have more than * * * during the years 1968-72 * * *. Virtually all such imports are for the replacement market, and most are for foreign cars. * * *. Each of the above-mentioned units contain two discs or contact. These imports represented * * * of the estimated U.S. consumption of all electrical breaker point sets utilizing tungsten contacts. Imports of completed consumer articles, such as automobiles and snowmobiles are shown in table 4.

U.S. Prices

Prices for U.S.-made hydrogen-reduced tungsten powder at the end of 1972 ranged from $4.97 to $6.74 per pound--the price largely dependent on the micron size of the particles. They averaged about $5.85 per pound, an increase of about 27 percent since the beginning of 1968.

Tungsten contact rod sells for about $19 per kilogram.

Tungsten discs are priced at about $10 to $14 per thousand if not ventilated, and $19 to $21 per thousand if ventilated (hole in center).

The prices of contacts are widely variable, depending not only on the treatment of the disc--whether perforated, cupped (radiused), cross-hatched, or otherwise surface treated--and on the diameter and thickness of the disc, but also on the complexity of the structure to which the disc is bonded. Representative prices are $21 per thousand and $31 per thousand.

Cleveland Refractory Metals

Cleveland Refractory Metals (CRM) is a division of Chase Brass and Copper Co., Inc., which is a wholly owned subsidiary of Kennecott Copper Corp. CRM is the only division of the corporation making the products under investigation.

CRM is an outgrowth of the Cleveland Tungsten Manufacturing Co., which in 1935 purchased an instrument firm that had been producing tungsten powder, rod, discs, contact, and tungsten specialty items since 1916. In 1939, the company was reorganized as Cleveland Tungsten, Inc., and was acquired in 1946 by the Molybdenum Corp. of America as a wholly owned subsidiary.

In 1966, Chase Brass and Copper Co., Inc., purchased Cleveland Tungsten, Inc., from Molybdenum Corp. and shortly thereafter moved its rhenium division from Waterbury, Conn. to the Cleveland facility. With the consolidation of all Chase's refractory metals activities in the Cleveland Tungsten plant, the division was renamed Cleveland Refractory Metals to reflect the new scope of operations. Cleveland Tungsten, Inc. was dissolved; CRM was not incorporated.

CRM's plant is located on 15 acres of industrial land in the Solon Industrial Park in Solon, Ohio. Downtown Cleveland is 18 miles northwest and Interstate 271, a six-lane-divided highway, is only 2 miles to the West.

CRM is housed in a 6-year-old, modern, one-story brick, metal-clad and concrete block, steel frame building consisting of 67,000

square feet. Office space occupies about 3,700 square feet, laboratory facilities occupy 5,000 square feet and available manufacturing space amounts to 30,000 square feet.

CRM has produced the following products: tungsten, molybdenum, and rhenium fabricated products and rhenium chemical products. CRM is now divided into three operating departments: rhenium chemical, metallurgical, and tungsten.

The rhenium chemical department is staffed completely by salaried chemical technicians and chemists. This department processes byproduct residue obtained from fumes, which contain rhenium, from Kennecott's copper refineries, into rhenium chemicals and rhenium powder. The rhenium chemicals are sold to petroleum refineries for use as a catalytic agent either alone or with platinum in the production of gasoline. The rhenium powder is sold to outside parties and is also used in the plant's metallurgical department. The chemical department will be relocated and retained by Chase when the main plant is disposed of.

CRM's metallurgical department currently has three product lines: X-ray targets, rhenium metal forms, and molybdenum tubing. Using powder metallurgy, this department produces an X-ray target 1/ consisting of tungsten, rhenium, and molybdenum metals; Chase is currently negotiating the sale of this operation. The metallurgical department

1/ "A metallic insert . . . in the anode of an X-ray tube, upon which the stream of cathode rays impinge and from which X-rays emanate" (Webster's New World Dictionary of the American Language, Second College Edition, 1972).

oversees a rhenium fabrication operation which produces various specialty rhenium products such as sheet for space age uses. This operation will be transferred to the rhenium chemical department when the present plant is closed and the rhenium chemical operation is relocated. The metallurgical department also produced molybdenum tubing but this operation has already been sold by Chase, although the firm is currently working off inventories.

The tungsten department produces tungsten powder, rod, discs, and contacts Tungsten powder and rod are sold by CRM to other firms but most of the powder and rod produced is used in CRM's disc and contact production. The company plans to close the tungsten department and send the equipment to Singapore where Chase and Wah Chang Corp. have entered into a joint venture to produce discs and contacts for export to Europe, Japan, and the United States. * * *.

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A-20 through A-27

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STATISTICAL APPENDIX

Table 1.--Tungsten powder: U.S. production, imports for consumption, exports of domestic merchandise, and apparent consumption, 1968-72

(Quantity in thousands of pounds; value in thousands of dollars)

Year	Production	Imports 1/	Exports 2/	Apparent consumption	Ratio (percent) of imports to consumption
			Quantity		
1968	7,702	3/	47	4/ 7,700	5/
1969	9,205	6/ 110	64	9,251	1.2
1970	10,989	6/ 75	405	10,659	.7
1971	7,505	99	327	7,277	1.4
1972	4/ 8,500	141	263	8,378	1.7
			Value		
1968	4/ 31,424	3/	221	4/ 31,400	5/
1969	4/ 40,226	6/ 541	291	40,476	1.3
1970	4/ 52,857	492	2,140	51,209	1.0
1971	4/ 37,750	610	1,684	36,676	1.7
1972	4/ 45,305	577	1,205	44,677	1.3

1/ Imports include "lumps, grains, and powders."
2/ Exports include metal and alloy powder.
3/ Data for total imports not available. Published data do not include imports under item 806.30.
4/ Estimate by the U.S. Tariff Commission.
5/ Not available.
6/ Data possibly understated.

Source: Production compiled from official statistics of the U.S. Bureau of Mines, except as noted; imports and exports compiled from official statistics of the U.S. Department of Commerce.

Table 2.--Tungsten powder: U.S. rates of duty and imports for consumption, total, and U.S. articles processed or assembled abroad and entered under tariff items 806.30 and 807.00, 1969-72

Item	1969	1970	1971	1972
	(Cents per pound plus percent ad valorem)			
	33¢ on tungsten content + 20%	29¢ on tungsten content + 17.5%	25¢ on tungsten content + 15%	21¢ on tungsten content + 12.5%
	Quantity (1,000 pounds)			
Total imports	1/ 110	75	99	141
806.30/807.00 imports	1/ 103	65	88	130
	Value (1,000 dollars)			
Total imports	1/ 541	492	610	577
806.30/807.00 imports:				
Total	1/ 497	459	535	528
U.S. value (duty exempt)	1/ 338	330	409	357
Foreign value added (dutiable)	1/ 158	129	126	170

1/ Imports in 1969 possibly understated.

Source: Compiled from data in official publications of the U.S. Department of Commerce and the U.S. Tariff Commission.

Note.--Imports include "lumps, grains, and powder." The great bulk of imports enter under item 806.30 and consist largely of material extracted from U.S.-made tungsten carbide scrap.

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Table 4.--Certain motor vehicles: U.S. factory sales, imports for consumption, exports of domestic merchandise, and apparent consumption, 1967-71

(In thousands of units)

Article	U.S. factory sales	Imports	Exports	Apparent consumption	Ratio (percent) of imports to consumption
New automobiles:					
1967	7,437	1,023	1/ 281	8,179	12.5
1968	8,822	1,620	1/ 330	10,112	16.0
1969	8,224	1,847	1/ 333	9,737	19.0
1970	6,547	2,013	1/ 285	8,275	24.3
1971	8,585	2,587	1/ 387	10,785	24.0
Snowmobiles:					
1967	1/ 19	84	2/ 1	102	82.2
1968	1/ 121	120	2/ 5	236	51.0
1969	1/ 89	194	11	272	71.1
1970	1/ 121	254	21	354	71.7
1971	1/ 168	230	36	362	63.6

1/ Partly estimated.
2/ Estimated.

Source: Factory sales of automobiles compiled from data supplied by the Automobile Manufacturers Association; all other information compiled from official statistics of the U.S. Department of Commerce, except as noted.

A-33 through A-37

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