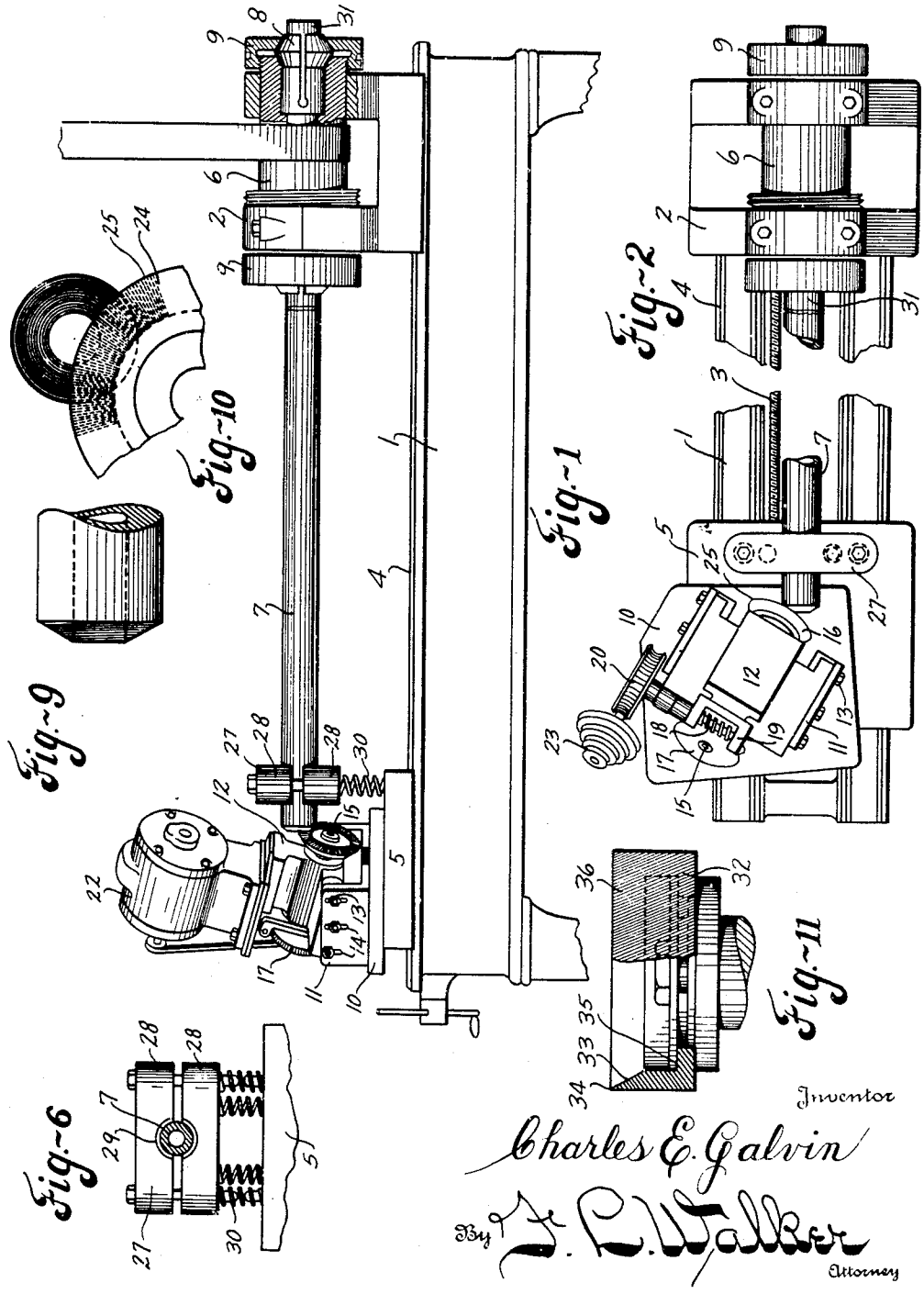
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Feb. 22, 1949. C. E. GALVIN 2,462,090

WOOL CUTTING MACHINE AND METHOD

Filed Aug. 3, 1940 2 Sheets-Sheet 1



Inventor
Charles E. Galvin
By L. C. Walker
Attorney

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WOOL CUTTING MACHINE AND METHOD

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Fig.-3

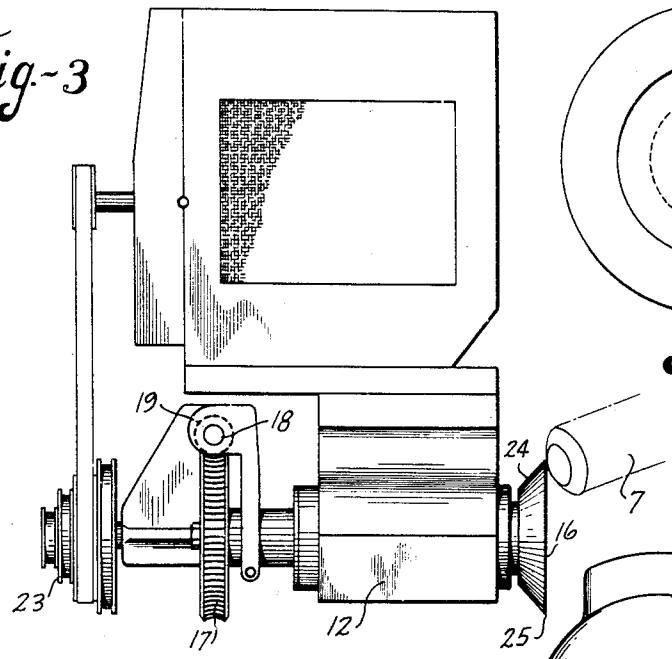


Fig.-7

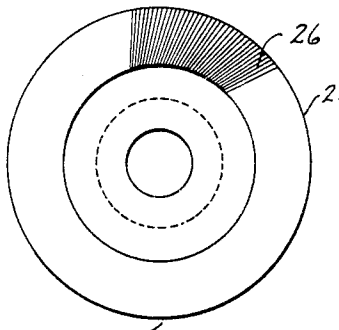


Fig.-8

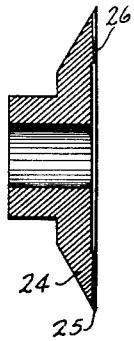
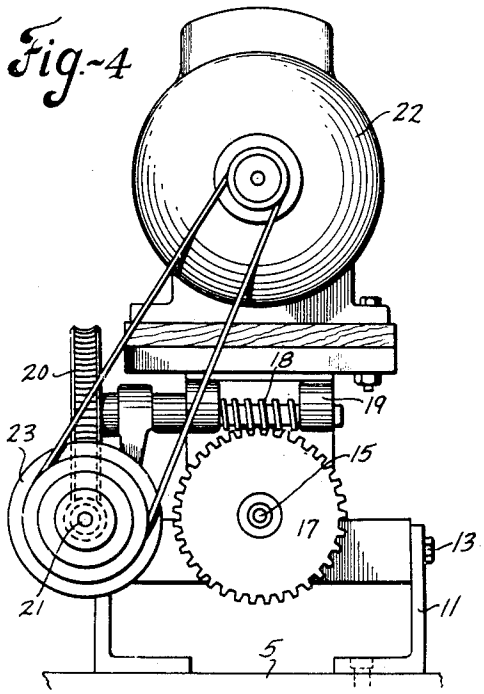


Fig.-4



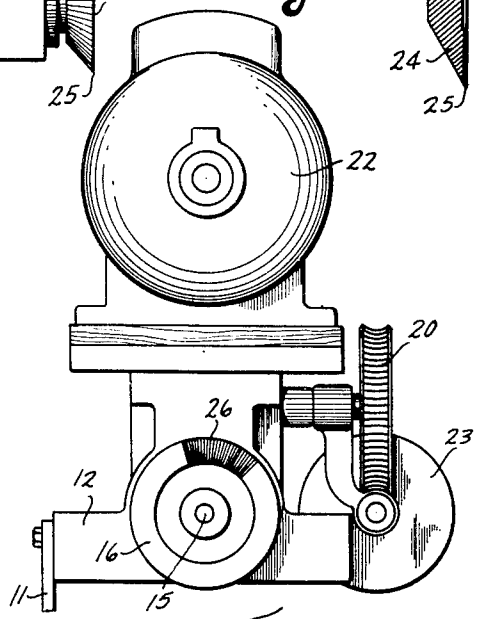


Fig.-5

Inventor

Charles E. Galvin

By F. E. Walker

Attorney

EXAMINER

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WOOL CUTTING MACHINE AND METHOD

Charles E. Galvin, Springfield, Ohio, assignor, by decree of distribution and assignment, to Reece M. Carey, Springfield, Ohio

Application August 3, 1940, Serial No. 350,170

19 Claims. (Cl. 29—4.5)

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This invention pertains to the manufacture of metallic wool, and more particularly to a method and apparatus, which, while capable of producing ordinary steel wool and stainless steel wool, is especially adapted for production of wool from non-ferrous metals and alloys.

Although numerous attempts have been made to produce metallic wool by turning operations upon round stock and upon coiled wires wound upon a drum, and also from solid bars by planing operations, the usual and customary method of producing metallic wool has been by drawing long lengths of wire past serrated cutters, which by a planing action remove multiple fine filaments lengthwise from the wire.

The wire so used for manufacture of steel wool is of relatively small size, being approximately .106 inch in diameter.

While such wire cutting method is quite satisfactory for making steel wool, it is not satisfactory for production of non-ferrous wool such as aluminum, copper, brass, magnesium, and that of various metal alloys, because the tensile strength of the reduced section of wire before a commercial quantity of wool has been removed becomes insufficient to overcome the resistance of any considerable number of cutting tools. Moreover, machines for commercial production of metallic wool by wire cutting methods are of large size, expensive construction, and require considerable power for their operation.

In the present method there is contemplated the production of metallic wool from thick wall drawn tubing by means of a rotary serrated cutter engaging the terminal end of the stock tube, preferably, but not necessarily, in a plane inclined to its axis. Such method and apparatus are not to be confused, however, with prior methods of cutting metallic shavings from a cylindrical roll of sheet metal by turning shavings from the end of the roll. Shavings are recognized in this industry as a quite different product from metallic wool.

The object of the invention is to improve the apparatus as well as the means and mode of operation of cutting metallic wool whereby such apparatus may not only be economically constructed, but will be more efficient in use, uniform in operation, automatic in action, of small size and compact form, having relatively few operating parts, and unlikely to get out of repair.

A further and highly important object of the invention is to provide an apparatus and method of cutting metallic wool in commercial quantity, not only from steel and stainless steel stock, but

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also for producing metallic wool from non-ferrous metals such as aluminum, copper, nickel, Monel metal, bronze, brass, magnesium, and from various alloys of these and other metals.

A further object is to enable rapid production of metallic wool in considerable quantity and of uniform texture and grade or size.

A further object of the invention is to enable the production of metallic wool strands or filaments of uniform transverse size or diameter and to mechanically control such production with accuracy.

A further object of the invention is to enable the uniform cutting of metallic wool of different grades or size by the adjustment of the same cutting tool.

A further object of the invention is the production of maximum wool with minimum waste and to enable utilization of all, or substantially all, of the stock.

A further object is to provide an improved form of cutting tool capable of simultaneously removing multiple fine continuous filaments of uniform size and considerable length.

A further object of the invention is to provide an improved form of wool cutting apparatus having means for relatively feeding the stock tube and rotary cutter.

A further object of the invention is to provide a new method of wool cutting, including the hereafter mentioned steps and to provide metallic wool stock material in improved form for cutting operations.

A further object of the invention is to provide a metallic wool cutting apparatus having the advantageous structural features and inherent meritorious characteristics herein mentioned.

With the above primary and other incidental objects in view as will more fully appear in the specification, the invention intended to be protected by Letters Patent consists of the features of construction, the parts and combinations thereof and the mode of operation or their equivalents, as hereinafter described or illustrated in the accompanying drawings.

In the drawings, wherein is illustrated the preferred, but not necessarily the only form of embodiment of the invention, Fig. 1 is a front elevation of an assembled wool cutting apparatus embodying the present invention. Fig. 2 is a top plan view thereof, partly broken away. Fig. 3 is a side elevation of the cutter unit showing the relation of the rotary cutter to the revolving stock tube. Fig. 4 is a rear elevation of the cut-

ter unit illustrating a portion of the cutter drive mechanism as viewed from the left of Fig. 3.

Fig. 5 is a front end elevation of the cutter unit as viewed from the right of Fig. 3. Fig. 6 is a detail view of the stock rest. Figs. 7 and 8 are respectively a front and sectional view of the rotary cutter. Fig. 9 is an enlarged side view of a portion of the stock tube. Fig. 10 is an end view of the stock showing the course of the cuts. Fig. 11 illustrates an annular form of cutting tool.

Like parts are indicated by similar characters of reference throughout the several views.

While the present apparatus and mode of operation are capable of producing commercial wool from steel and from stainless steel, it is especially adapted for cutting metallic wool from non-ferrous metals which cannot be economically, profitably or practically produced on conventional wire cutting machines.

There is a wide field for comminuted metals, as, for example, aluminum in the paint industry, and for comminuted magnesium in the manufacture of explosives and pyrotechnics. A simple and convenient method of reducing metals to powder is to first cut the material into relatively fine wool and then pulverize the wool. Other fields of usefulness of non-ferrous wools, especially aluminum wool, is in the manufacture of filter pads for various purposes, both commercial, industrial and domestic, since such pads are readily washed and cleaned without deterioration. The ability of non-ferrous filters, particularly those of aluminum wool, to withstand moisture renders them especially desirable for air strainers for automobiles and for hot air heating and air conditioning systems. Such aluminum pads are non-inflammable, whereas steel wool is highly inflammable and dangerous to use for such purposes.

Various metallic wools, especially those from non-ferrous metals, have been found quite desirable as catalytic agents in chemical operation, since such wools possess increased contact surface areas, and they pass gasses and liquids quite readily without deterioration.

One of the more extensive fields for aluminum wool is for household purposes, for cleaning kitchen utensils, window glass, mirrors and other surfaces. Since the purpose is to remove adherent matter, it is not necessary that the wool shall exert a decisive cutting action, but to the contrary, it is desirable that adherent material be removed without scratching or abrading the surface of the utensil or the glass, leaving the surface clean but unmarred. Aluminum wool when used for such purpose is not subject to rust and deterioration as is steel wool. Steel wool in the presence of moisture oxidizes and rusts and soon crumbles. It is common to impregnate steel wool cleaning pads with red dyed soap which disguises and conceals rust spots.

When steel wool is used for cleaning aluminum utensils, minute particles of the steel wool become broken off and embedded in the aluminum material. In the presence of an acid or alkaline solution which acts as an electrolite, an electrolytic action is induced which causes decomposition of the aluminum and results in pitting or perforation of the vessel walls. A like condition exists when other aluminum surfaces are cleaned or treated with steel wool. This is especially true of airplane and hydroplane parts which are exposed to sea water, for cleaning which steel wool is now disapproved. Aluminum and most

other non-ferrous wools are not subject to these objections. Hence, although non-ferrous wools have not heretofore been produced in commercial quantities, there exists a quite extensive field for their use.

While steel wool has for many years been a common article of manufacture and commerce, the production of aluminum and other non-ferrous wools have been commercially impracticable. Manufacture of non-ferrous wool, especially magnesium and analogous wool, involves problems not encountered in the production of steel wool. The tensile strength of non-ferrous wire, after a reasonable quantity of wool has been removed, is usually insufficient to withstand the tension or pulling strain necessary for conventional wool cutting operations. As result, the partially cut wire breaks or tears apart. That is, too large a cross section of the wire must be left to afford sufficient strength to enable it to be pulled past the final cutters. This necessitates uneconomical and unprofitable waste. Due to softness of non-ferrous materials in the conventional methods of wool manufacture by the wire cutting process, fibers are frequently picked up by the cutters and are broken into short pieces or formed into bunches, thereby causing excessive waste and scrap material. The proportion of non-ferrous wire which necessarily must be left to afford the required tensile strength for drawing the stock material past the cutters during the final pass and the exceedingly high percentage of wool waste renders the conventional wire cutting method uneconomical and unprofitable for commercial production of aluminum and other non-ferrous wool.

For the present wool cutting method the stock material comprises heavy walled drawn tubing. A practical size of such tubing which has been successfully demonstrated is that having an outside diameter of two and a half to three inches, and an inside diameter of one and a half inches, thus affording wool stock walls of one-half inch to three-fourths inch in thickness. The cutting face from which wool is removed is of conical form having approximately thirty degrees inclination to the axis of the tube, affording a wool producing face of approximately seven-eighths inch to an inch and a quarter. Such stock tubing is usually supplied in lengths of ten to fourteen feet. It is to be understood that such statement of dimensions of the stock and its cutting face are for illustrative purposes and with no intent or desire of limiting the stock size thereto.

For economy and convenience of construction, the operative parts of the wool cutting apparatus forming the subject matter hereof is shown mounted on the bed 1 of an ordinary turning lathe of which 2 is the head stock and 3 the usual lead screw. Mounted on the ways 4 of the bed 1 is a traveling tool carriage or cutting unit 5 which is uniformly advanced toward the head stock 2 by operation of the lead screw 3. The latter may be driven from the head stock 2 or from an independent source of power, not shown.

The head stock 2 is provided with a hollow spindle 6 through which the stock tube 7 is introduced. This spindle 6 in the present instance also serves as the drive pulley for the drive belt. The stock tube is secured in longitudinally adjusted relation to the spindle for unison rotation by a chuck or adjustable collet in one or preferably both ends of the spindle. As illustrated in Fig. 1, the end of the hollow spindle 6 is counterbored

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and receives a longitudinally split clutch sleeve 8 having a tapered terminal head and which surrounds the stock tube 7. Threaded on the end of the spindle 6 is a flanged collar 9 having a beveled opening at its center within which the tapered head of the split clutch sleeve 8 is engaged. The adjustment of the collar 9 upon the end of the spindle serves to compress and contract the sleeve 8 into firm driving engagement with the stock. When the cutting unit has completed its traverse of the bed 1 and approached closely to the head stock, the cutting unit is returned to its starting point, and the collars 9 are loosened and the stock tube manually advanced through the spindle until in cutting relation with the returned cutter unit whereupon the stock tube is again secured to the spindle by tightening the collars 9.

The cutter unit 4 is operatively connected with the lead screw for uniform travel motion toward the head stock 2. The rate of travel may be varied by changing the speed of rotation of the lead screw 3, by gear change or other speed regulation as is common in lathe construction. Mounted on the carriage or base 10 is a cradle support 11 in which is mounted for oscillatory adjustment a head 12 having studs 13 carrying clamp nuts and extending through slots 14 in the cradle support 11. By adjusting the clamp nuts on the studs 13 the inclination of the head 12 may be regulated. The head 12 is disposed in inclined relation to the axis of the stock tube 7 both vertically and horizontally as indicated in Figs. 1 and 2 respectively. Mounted in the inclined adjustable head 12 is a rotary shaft 15 which carries at its forward end a rotary cutting disc 16 and at its rear end the worm wheel 17 of a speed reduction gear train. The worm wheel 17 intermeshes with a worm 18 mounted in bearings 19 which carries on its shaft a second worm wheel 20. The worm wheel 20 intermeshes with a matching worm on the shaft 21. The shaft 21 is actuated at variable speeds by a belt drive from an electric motor 22 located on top of the head 12, which drives a stepped pulley 23 on the second worm shaft 21. The power transmission system is such that the cutter shaft 15 and cutting disc 16 are rotated at an exceedingly slow rate of speed.

The cutter disc is circular and for ordinary wool cutting is approximately five inches in diameter. This is mentioned only for illustrative purpose and is not intended as a limitation of size. The periphery of the cutting disc 16 is smoothly beveled on its outer or rear side 24 to a sharp cutting edge 25 which is intersected by a full complement of radial corrugations or indentations 26 on the face of the disc. The intersection of the edge of the disc by the radial indentations 26 on its face affords a succession of fine cutting teeth, the size and number of which are commensurate with the number of the indentations or corrugations 26. The number of such radial indentations and resulting peripheral teeth varies from eight hundred to eighteen hundred. Cutters for the generally staple grades of wool contain about thirteen hundred and twenty such corrugations and peripheral teeth.

The cutting disc 16 is made to engage the tapered terminal face of the stock tube at or slightly below the horizontal diameter and is slowly rotated on a rising path inwardly toward the axis of the stock tubing. The latter is rotated at a much higher rate of speed in reverse direction toward the cutter. For ordinary operating conditions the stock tube 7 is rotated at a peripheral

speed of nine hundred to fourteen hundred feet per minute. The cutter disc 17 makes one complete rotation in three minutes, or a third rotation per minute. One outstanding point of superiority of the present method and apparatus is that the work produced is uniform and that the grade or degree of fineness of the cut filaments is mechanically controlled with great accuracy by regulation of the speeds of the cutter, the stock and the feed.

By varying the relative speeds mentioned, several different grades of wool can be produced from the same cutter. Change of cutter rotation, faster or slower, determines the thickness of the severed filament or strand. Regulation of the screw feed determines the width of the strand. After having been once set by proper correlation of the respective speeds, the character of production and grade or size of the filaments remains always the same. By changing the shape of the indentations or corrugations of the cutter face, and consequently the shape of the peripheral cutting teeth, strands or filaments of different cross sectional shape may be produced. The apparatus has great flexibility for producing wool of different texture or character, but is remarkably constant and uniform in its production of the type material for which it is adjusted.

As a particular tooth of the multiplicity engages the stock at its outside periphery, and slowly travels inwardly, the high speed rotation of the stock against the moving cutter tooth causes a continuous involute cutting to be taken in closely related paths of ever decreasing radii, until the particular tooth passes beyond the terminus of the cone at the inner periphery of the tubing. However, simultaneously with such particular tooth, other like teeth, both preceding and following, are likewise removing continuous involute cuttings and thus producing a great number of like filaments, which together form a continuous ribbon of metallic wool flowing from the cutter.

The end of the stock tube from which cuttings are being taken is revolubly supported in a resilient work rest 27 which includes two separable members 28 having therebetween a bearing 29 for the stock tube. The stock rest members are supported by a number of helical springs 30 on the traveling carriage and thus is movable axially of the stock in unison with the advancement of the cutter unit.

The particular apparatus illustrated was assembled and used for demonstration and actual production operations, and is provided with separate drives to facilitate operations at different relative cutter and stock speeds and feeding ratio. Obviously, the best operating relations having been determined, the cutter motor and speed reduction train may be dispensed with. The cutter shaft 15 and cutter 16 may be driven at their low speed directly from the lead screw 3, simultaneously with the feeding advancement of the cutter unit thereby. In such event a simple variable speed connection is preferably made between the lead screw 3 and the cutter shaft 15 by which the cutter rotation may be varied within reasonable limits. The rate of feed may be varied by the usual lead screw variable drive as found in conventional lathes. It is quite necessary that chatter and vibration be reduced to a minimum.

In order that all or substantially all the stock tube may be utilized for wool production, a short stub 31 of base metal is preferably, although not necessarily, welded to the end of the stock tube, and grasped within the hollow spindle on the

final stock adjustment. By holding the tube 7 by such stub 31 during the final cutting stage, the stock material may be cut into commercial wool quite up to the weld, thus minimizing the waste of stock. The slow rotation of the cutter disc insures that any particular group of cutter teeth shall remain in operative relation with the work during only comparatively short periods. The cutter teeth are permitted a much greater idle period in which to cool after each cutting engagement. The teeth being exceedingly fine, there is some danger of burning off the teeth by frictionally induced heat, if not permitted to cool. However, the present method permits amply long cooling intervals intermediate succeeding wool cutting operations.

In Fig. 10 there is illustrated more or less diagrammatically the operating relation of the cutter and stock. The cutter rotates at a very slow rate of speed, approximately one-third revolution per minute, while the stock tube 7 rotates at a relatively high speed of rotation. Each succeeding tooth formed by the indentations 26 of the cutter removes from the tapered face of the tube a fine filament in a continuous circular path of ever contracting radius. The path of each cut has been illustrated generally in Fig. 10. It must be understood, however, that the succeeding turns are quite close and, in fact, merge one into another and comprise a great number of such turns simultaneously generated. Therefore, because of the small scale on which they are formed, Fig. 10 is not intended to show the actual relation of succeeding convolutions, but only their direction and shape. It is to be further understood that each tooth in engagement with the stock tube will produce such a continuous tapered helical or spiral filament, so that a considerable number of such filaments will simultaneously be in process of production. They will form a ribbon or roving of wool which flows evenly and uniformly from the cutter, without interruption.

To secure the best cutting action it is desirable that the stock material be of a substantial degree of hardness. The working of the material and the tool pressure thereon incident to the filament cutting action so changes the molecular structure or grain of the material as to materially increase the degree of hardness of the resulting wool. Such increased hardness of wool due to cutting operation occurs to greater degree in working aluminum than when operating on other metals. The resulting aluminum wool is quite likely to be found to be brittle and incapable of withstanding crushing, distortion and twisting, as it comes from the machines, but may tend to break up into small bits or chaff. The increased hardness of the wool product may be sufficient, unless it is treated to normalize it and render it more pliable and less fragile, that, although of aluminum, it will be sufficiently hard to cut and scratch and work to which it is applied and will possess an excessive abrading action undesirable for many of the purposes to which aluminum wool will ordinarily be applied. Therefore, after cutting and before use, the wool is preferably heat treated or annealed by subjecting the wool product to a temperature of approximately six hundred and sixty degrees Fahrenheit, for a period of ten minutes to an hour and a half, dependent upon the grade, volume and character of the wool and the purpose to which it is to be applied, after which it is air cooled. The treatment of non-ferrous wool after cutting forms no part, per se, of the present invention, but forms the subject matter of a copending application wherein such method is more fully disclosed and claimed.

Because of difficulties of manufacture, aluminum and other non-ferrous wools have not been available heretofore in commercial quantities, but, being produced by the present method and apparatus, now supply a wide range of usefulness. Aluminum wool in particular is especially efficacious and desirable for filters and strainers for filtering air and liquids, and as dust collectors.

Formed into pads, it is useful for cleaning and scouring, especially for those applications wherein steel wool is found too harsh and abrasive, and is made into cleaning pads with or without soap impregnation. Pads of aluminum wool possessing extensive surface or contact areas of the filaments, and being highly porous, are useful as a catalytic agent in the chemical industry. Being quite soft and pliable or malleable after suitable heat treatment, the aluminum wool is useful for caulking purposes. Being unaffected by moisture, water and ordinary acids which would be destructive of steel wool, and weighing but a small proportion of the weight of ferrous and other non-ferrous wools, aluminum wool finds many applications for industrial purposes. By initially reducing aluminum and other non-ferrous metals to wool form, the metal can be more economically comminuted or powdered for paint purposes and other industrial uses. This is especially true of the reduction of magnesium for manufacture of pyrotechnics, explosives, photo flash powder, flares and the like by initially reducing it to wool form before its final reduction to powder.

The present apparatus and wool cutting method thus materially improves the former mode of reduction of metals by chipping or forming into shavings preparatory to refining for the purposes mentioned.

In Fig. 11 is shown a modified form of cutter 32, applicable to cutting wool from various kinds of metal, including ordinary steel and stainless steel, and usable interchangeably with the disc cutter disclosed in the preceding figures. For some conditions of use and character of material the ring type cutter illustrated in Fig. 11 is preferable to the previously described disc cutter. The cutter 32 is of annular form, the interior of which is beveled at 33 to a peripheral cutting edge 34, and is internally flanged at 35 for engagement of a clamp disc by which the cutter is secured to a revoluble head. The outer periphery of the cutter ring is cylindrical and is corrugated at 36, which corrugations intersect the cutting edge 34 forming corresponding teeth. The corrugations for cutting wool of different grades or cutting material of different character vary from extremely fine to relatively coarse size, the range being from approximately eight hundred to eighteen hundred corrugations about a cutter of five inches in diameter. The average for standard grades of wool is approximately a thousand to fourteen hundred corrugations per cutter. Such corrugations are usually V shaped in cross section, forming marginal teeth of like form, although for special shapes of wool filaments they may be of other shapes.

Although such corrugations or serrations 36 may be disposed parallel with the axis of the cutter, and will work quite satisfactorily and produce wool of good quality, they are preferably disposed in inclined relation to the axis of the cutter or in

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parallel spiral relation about the periphery of the cutter.

Furthermore, it is not necessary that the corrugations 26 of the disc cutter be disposed radially as in Fig. 7, but may be inclined in tangential relation to an inner circle as disclosed in Fig. 10. The spiral disposition of the corrugations of the disc cutter enables the severed wool filaments to flow more easily in ribbon or roving form from the point of operation.

From the above description it will be apparent that there is thus provided a device of the character described possessing the particular features of advantage before enumerated as desirable, but which obviously is susceptible of modification in its form, proportions, detail construction and arrangement of parts without departing from the principle involved or sacrificing any of its advantages.

While in order to comply with the statute the invention has been described in language more or less specific as to structural features, it is to be understood that the invention is not limited to the specific features shown, but that the means and construction herein disclosed comprise the preferred form of several modes of putting the invention into effect, and the invention is therefore claimed in any of its forms of modifications within the legitimate and valid scope of the appended claims.

Having thus described my invention, I claim:

1. An apparatus for production of metallic wool, including means for mounting a length of thick, solid walled metallic tubing for rotary motion, and a rotary cutter eccentrically mounted in overlapping relation with a terminal face of the stock material and having traveling cutting engagement therewith at one side only of the axis of rotation of the stock, in a plane inclined to said axis, and means for differentially rotating the stock tubing and the cutter whereby the stock tubing rotates at a greater speed than the cutter, the arrangement being such that a plurality of parallel spiral cuts are simultaneously made upon a conical terminal face of the tubing.

2. The herein described method of producing metallic wool, including providing metallic wool stock material in thick walled tubular form, and simultaneously removing from a terminal face thereof a plurality of parallel spiral filaments by progressive engagement of a cutting tool traveling thereacross and providing cooling and rest periods for successive cutting portions of the tool of greater duration than the cutting periods thereof.

3. The herein described method of producing metallic wool by subjecting a terminal face of a revolving cylindrical body of metallic wool stock material to the action of a slowly rotating toothed cutter having traveling engagement therewith intermediate the axis and periphery of the stock and simultaneously removing from the engaged face of the stock material a plurality of parallel spiral filaments.

4. A metallic wool making apparatus, including a mounting for a length of metallic wool stock material, a rotary serrated cutter mounted in overlapping relation with a terminal face of the stock material for rotation about an eccentric axis, means for simultaneously rotating the stock and the rotary cutter at different rates of speed, and feed means for relatively advancing the stock and cutter one toward the other axially of the stock.

5. A metallic wool making apparatus, including a mount for a length of metallic wool stock material,

a rotary serrated cutter eccentrically mounted relative to the axis of the stock material for rotary engagement in overlapping relation with a terminal face of the stock in a plane inclined to the axis thereof, and means for simultaneously differentially rotating the stock and the cutter in intersecting paths of travel wherein the cutter is slowly rotated and the stock rotated at a greater speed, the arrangement being such that a plurality of parallel spiral filaments are simultaneously cut from the engaged face of the stock material.

6. A metallic wool making apparatus, including a mount for a length of thick solid walled tubular metallic wool stock, a rotary corrugated cutter mounted in offset overlapping relation with a terminal face of the tubular stock material for cutting engagement in a plane inclined to the axis thereof, and driving means for differentially rotating the cutter and stock to simultaneously remove from the engaged face thereof a plurality of parallel spiral filaments.

7. In a metallic wool cutting apparatus, a mount for stock material to be cut, a rotary cutter mounted in offset overlapping relation with the stock material, means for rotating the stock material, and means for rotating the cutter relative to the stock material, the construction and arrangement being such that only an everchanging, limited, segmental portion of the circumference of the cutter is in engagement with the stock material at a time, the alternating, non-engaging periods of succeeding segmental portions of the cutter being of greater duration than their engaging periods.

8. A metallic wool cutting apparatus, including means for rotating a length of stock material, a rotary cutter having a beveled face and a corrugated face intersecting the beveled face to afford a circular toothed cutting edge, means for rotating the cutter at a speed materially less than that of the stock material in cutting relation with a terminal face of the length of stock, and feeding means for relatively adjusting the cutter and stock in a direction axially of the latter.

9. A metallic wool cutting apparatus for producing wool from a solid walled tubular length of stock material, a rotary cutter having a beveled face and a corrugated face intersecting the beveled face and forming a toothed cutting edge, mounting means for the cutter upon which the cutter rotates in engagement with a terminal face of the tubular stock material in a plane inclined to the axis thereof, and means for rotating the stock material and the rotary cutter at different rates of speed.

10. A metallic wool cutting apparatus for producing metallic wool from an elongated length of material, including a rotary toothed cutter having cutting engagement with a terminal face of the stock material for simultaneously removing therefrom a plurality of metallic wool filaments, and means for differentially rotating the cutter and stock whereby the traveling teeth of the cutter will describe a plurality of closely adjacent parallel involute paths of travel upon the face of the stock and feeding means for relatively advancing the stock and cutter one toward the other axially of the stock.

11. A metallic wool cutting apparatus wherein metallic wool is produced from thick, solid walled tubing, including a rotary toothed cutter having cutting engagement with a terminal face of the tubular material in a plane inclined to the axis thereof whereby a conical face is formed on the tube, from which the wool is removed, means for

simultaneously differentially rotating the cutter and tubing in opposing directions, the stock being rotated at a relatively high rate of speed while the cutter is slowly rotated, the arrangement being such that a plurality of parallel spiral cuts are simultaneously made upon the conical face of the stock tubing.

12. A tool for production of metallic wool, comprising a rotary cutter engageable with a terminal face of a revoluble work piece, including intersecting circular faces forming a cutting edge, one of the intersecting faces being corrugated, and the other plain, and a series of cutting teeth formed on the cutting edge by the intersection of the corrugations therewith, the simultaneous relative rotation of the work piece and rotary cutter being such that the cutting teeth of the latter define a succession of involute paths upon the terminal face of the work piece from which continuous filaments of metallic wool are thereby removed.

13. A tool for production of metallic wool, comprising a rotary cutter engageable with a terminal face of a rotary work piece, including intersecting circular faces forming a cutting edge, one of the intersecting faces being corrugated and the other plain, the corrugations of said one face being inclined to diametrical planes of the cutter coincident with the intersection of the corrugations with the cutting edge, and a series of cutting teeth formed on the cutting edge by the intersection of the corrugations therewith, the relative rotation of the rotary work piece and rotary cutter being such that the cutting teeth of the latter will remove from the terminal face of the former spiral filaments of metallic wool intermediate the periphery and axis of the work piece.

14. A tool for production of metallic wool, comprising a rotary recessed cutter engageable with a terminal face of a revoluble work piece, including an exterior cylindrical corrugated surface and an interior beveled surface intersecting the cylindrical corrugated surface and forming a cutting edge, and a series of cutting teeth formed on the cutting edge by intersection of the corrugations therewith, adapted by the relative rotation of the cutter and work piece to remove from the latter a succession of spiral filaments extending from the periphery of the work piece inwardly toward the axis thereof.

15. A tool for production of metallic wool, comprising a rotary recessed cutter engageable with a terminal face of a revoluble work piece, including an exterior cylindrical corrugated surface and an interior beveled surface intersecting the cylindrical corrugated surface and forming a cutting edge, the corrugations of said face being inclined to diametrical planes of the rotary cutter coincident with the intersection of the particular corrugations to the cutting edge, and a series of cutting teeth formed on the cutting edge by the intersection of the corrugations therewith, and effective to remove from the terminal face of the revoluble work piece multiple filaments of metallic wool transversely thereof.

16. A cutting tool for production of metallic wool, comprising a rotary disc engageable with a terminal face of a revoluble work piece, including a flat corrugated face and a peripheral beveled face intersecting the corrugated face, and a toothed cutting edge formed by the intersection of the corrugations with the beveled face, the construction and arrangement being such that during relative rotation of the work piece and disc multiple metallic wool filaments will be progressively removed from the terminal face of the work piece.

17. A tool for production of metallic wool, comprising a rotary cutter disc engageable with a transverse face of a revoluble work piece, including a flat corrugated face, the corrugations of which are inclined to diametrical planes of the disc, a peripheral beveled face intersecting the corrugated face and a toothed cutting edge formed by the intersection of the corrugated and beveled faces movable across the transverse face of the work piece from the periphery toward the axis thereof, the construction and arrangement being such that multiple filaments of metallic wool are removed thereby from the transverse face of the work piece.

18. A tool for production of metallic wool, comprising a rotary cutter disc engageable with a transverse face of a revoluble work piece, including a flat corrugated face, the corrugations of which are approximately radially disposed relative to the center of rotation of the disc, a peripheral beveled face intersecting the corrugated face, and a toothed cutting edge formed by the intersection of the corrugated and beveled faces, the construction and arrangement being such that the concurrent rotation of the disc and work piece cause multiple spiral filaments of metallic wool to be removed from the transverse face of the work piece.

19. The herein described method of producing metallic wool, including the step of simultaneously removing a plurality of parallel spiral filaments of metallic wool from a terminal conical face of a continuous length of solid, thick walled drawn metallic tubing.

CHAS. E. GALVIN.

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