May 9, 1933. W. A. STEINBART 1,907,453

METHOD OF AND MACHINE FOR MAKING STEEL WOOL

Original Filed Nov. 27, 1923 2 Sheets-Sheet 1

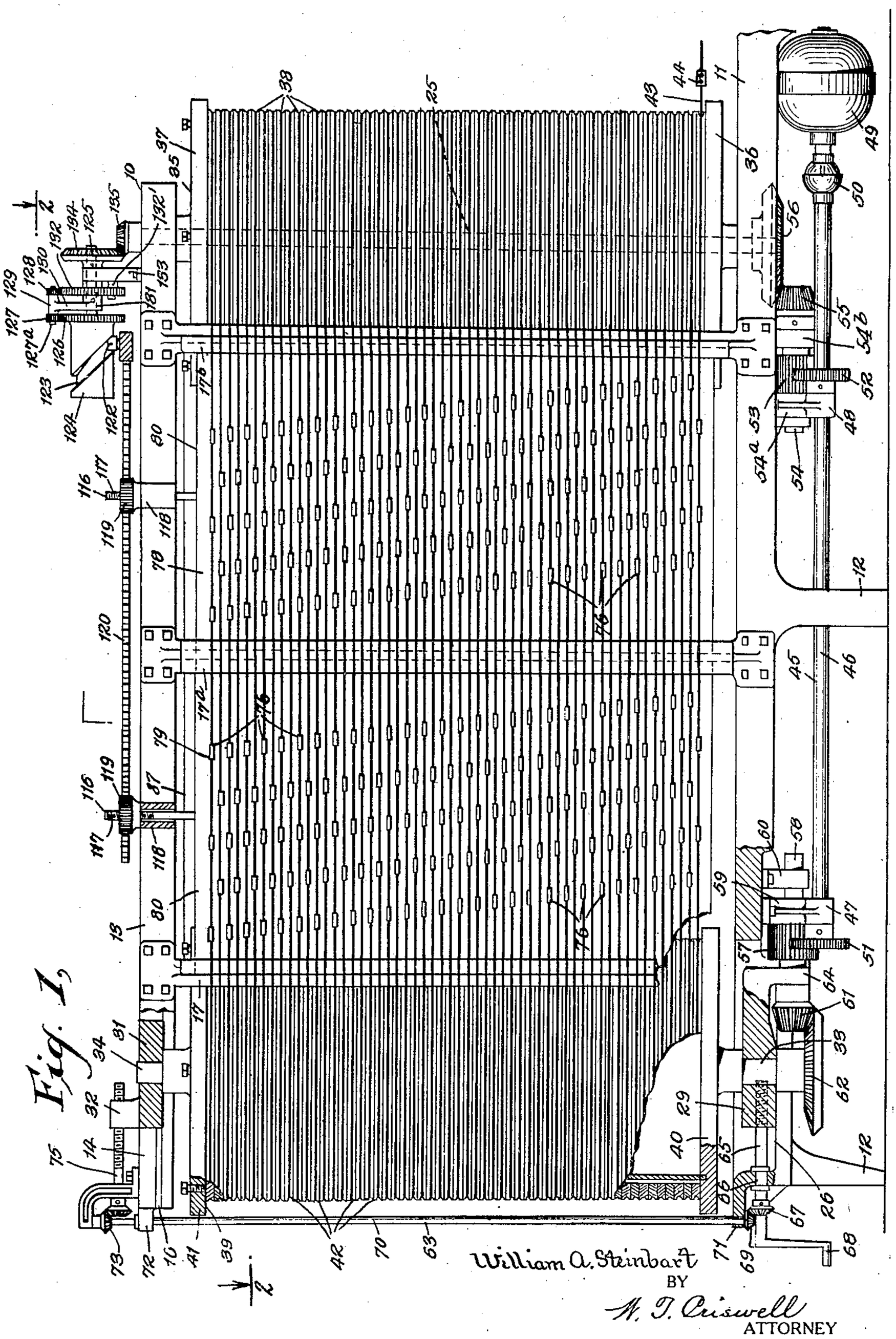

Fig. 1

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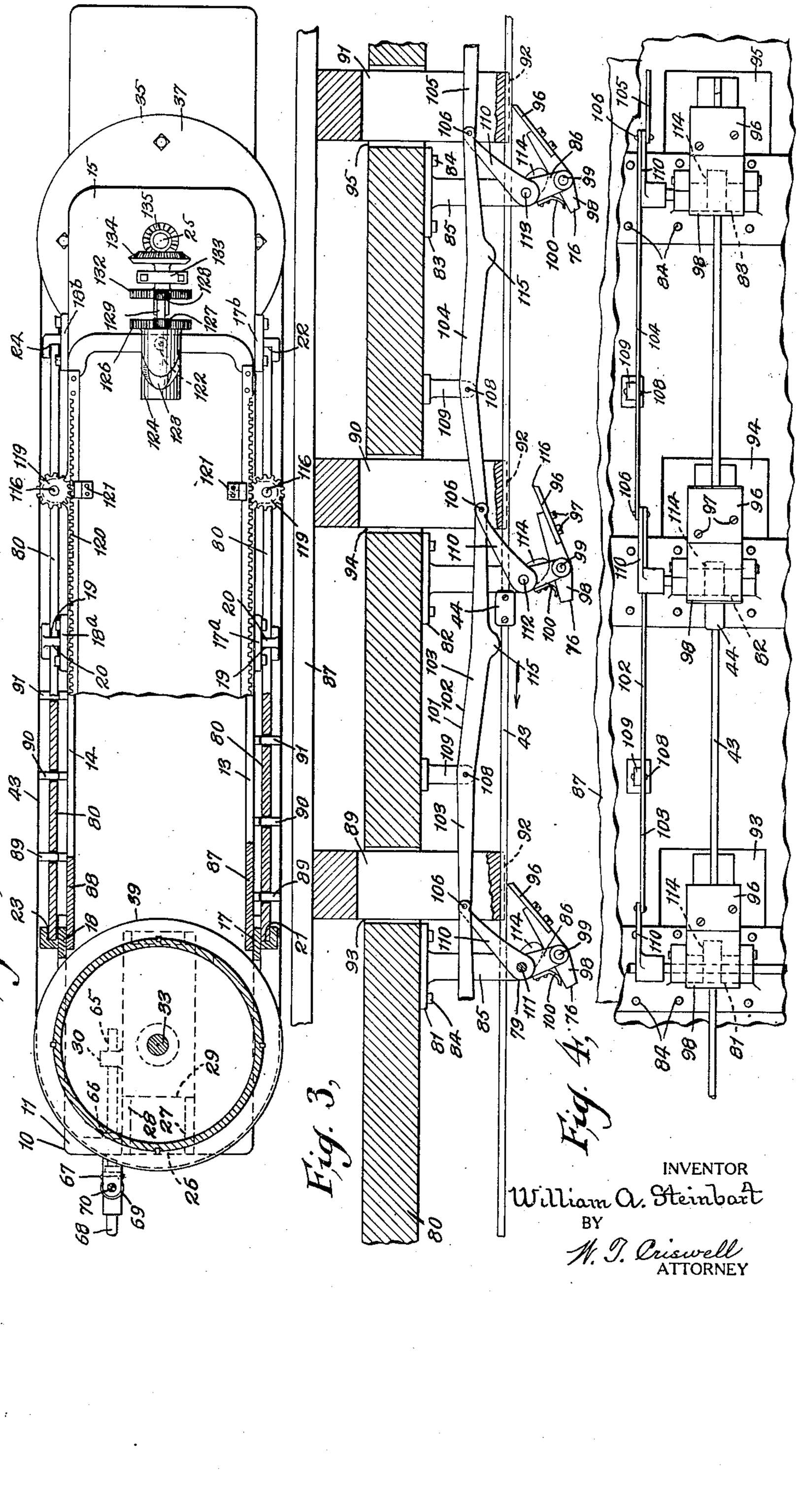

Fig. 2,

Fig. 3,

Fig. 4,

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UNITED STATES PATENT OFFICE

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METHOD OF AND MACHINE FOR MAKING STEEL WOOL

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My invention has for its object primarily to provide a method of and machine designed to be employed for making steel wool for use in various arts mainly for cleaning and polishing metal, and which is of a form whereby the wool may be cut with unusual facility, in order to permit of the production of large quantities within limited periods as occasion may require.

A further object of the invention resides in the provision of a method and apparatus for making metal wool wherein a length of wire may be fed and guided through an apparatus in a unidirectional way and reduced to attenuated condition by a single run through the apparatus, thus enabling a much greater quantity of wool to be made in a given length of time than by other methods and apparatus and also obviating the necessity of numerous reversals in the direction of travel of the wire from which the wool is formed.

Other objects of the invention are to provide means operative for adjusting the adjustable rotary member toward and from the other rotary member; to provide means operative by the operation of the driving means whereby the cutters will be moved determined distances across the convolutions of the wire when transmitted; and to provide a machine for making steel wool of simple, efficient and durable construction adapted to be made in appropriate sizes and shapes.

With these and other objects in view, the invention will be hereinafter more fully described with reference to the accompanying drawings forming a part of this specification in which similar characters of reference indicate corresponding parts in all the views, and will then be pointed out in the claims at the end of the description.

The apparatus employed in carrying out the invention contains a frame in which are mounted two spaced apart grooved rotary drums both driven at the same speed for feeding and guiding the wire from which the wool is made in a series of convolutions, together with a plurality of cutters arranged to engage the convolutions of wire for cutting the wire into fine fibrous portions during transmission of the wire, the cutters being of sufficient number to reduce the wire to attenuated condition during a single unidirectional travel of the wire.

In the drawings, Figure 1 is a side elevation, partly broken away, of one form of a machine for making steel wool embodying my invention.

Fig. 2 is a detail sectional view, partly broken away, taken on the line 2—2 of Fig. 1.

Fig. 3 is an enlarged fragmentary detail sectional view, showing part of one of the removable side panels of the machine with a member of the wire cutters and the associated parts of the machine which carry the cutters, and

Fig. 4 is an enlarged fragmentary view, showing an elevation of the cutters and the associated parts illustrated in Fig. 3.

The machine has a frame 10 which may be composed of a substantially rectangular base board or plate 11 supported on a suitable number of standards or legs, as 12. At a distance above the base-plate 11 are two spaced parallel bars, as 13, 14, both of lengths approximately similar to the length of the base plate. On the top of one of the end portions of the bars 13, 14 may be a board or plate 15, and in the inner faces of the other end portions of these bars may be registered grooves, as 16. Intermediate the ends of the bars 13, 14 and the base plate 15 are sets of vertical bars, as 17, 17^a, 17^b and 18, 18^a, 18^b. The bars 17, 17^a, 17^b have their ends bolted or otherwise secured to the outer edge of the upper bar 13 and to one of the side edges of the base plate 11. The bars 18, 18^a, 18^b have their ends bolted or otherwise secured to the outer edge of the upper bar 14 and to the other side edge of the base plate 11. The vertical bars of each set are spaced equidistances apart, and the bars of each set are provided at corresponding parts of the sides of the frame 10. In both of the side edges of each of the bars 17^a, 18^a are lengthwise grooves 19, 20, and in the opposed side edges of the bars 17, 17^b are lengthwise grooves 21, 22, while in the opposed side edges of the bars 18, 18^b are lengthwise grooves 23, 24.

In openings or bearings provided at one end

of the base plate 11 and at one end of the board 15 is journaled a vertical shaft, as 25, having its ends protruding below the base plate and above the board: The end of the base plate 11 under the grooved ends of the upper bars 13, 14 of the frame is cut out lengthwise to provide a substantially rectangular opening, as at 26, and on the lower parts of the side edges of this opening are two alined flanges as 27, 28, Fig. 2. In the opening 26 and movable on the flanges 27, 28 is a slidable block or plate 29 having a protruding interiorly threaded sleeve, as 30. Between the upper bars 13, 14 of the frame 10 and in the grooves 16 of the bars is another slidable block 31 having a protruding interiorly threaded sleeve, as 32. In an opening in the block 29 is journaled a stud 33 of a length so that its ends protrude below and above the block, and in an opening in the block 31 is journaled the upper end of a stud 34 which extends below the bars 13, 14 of the frame.

On the part of the vertical shaft 25 between the base plate 11 and bars 13, 14 of the frame 10 is held a rotary member or drum 35 having between its end plates, as 36, 37, a series of peripherally grooved wheels 38. Held to the studs 33, 34 also between the base plate 11 and bars 13, 14 is another rotary member or drum 39 having between its end plates 40, 41 a series of peripherally grooved wheels 42. The number of wheels of one drum are similar to the number of wheels of the other drum, and the grooves of all of the drums are of widths for receiving and transmitting a wire, as 43, preferably of steel in helical or spirally convoluted arrangement for being cut into fibrous or wool like portions. When it is desired to transmit through the machine a number of strips of wire the ends of the strips may be fastened together by a suitable union or connection, as 44. By mounting the grooved rotary member or drum 39 on the studs 33 and 34 which in turn are carried by the slidable blocks 29 and 31 the drum 39 may be adjusted toward and from the grooved drum 35 for holding the wire 43 taut on both drums, as will be hereinafter more fully explained.

The rotary members or dums 35, 39 are driven simultaneously when the machine is operated by means, as 45, which may include a drive shaft 46 journaled in two bearings, 47, 48 which extend downwardly from the underside of the base-plate 11 of the frame 10 of the machine. The drive shaft 46 may be driven by an electric motor, as 49, or other source of power generating energy, and if required the shaft of the motor may be connected to the drive shaft 46 by a suitable universal coupling, as 50. On the free end of the drive shaft 46 is a gear 51, and on this shaft in spaced proximity to the coupling 50 is another gear 52. The gear 52 is in mesh with a wide gear 53 held on a stud 54 which is journaled in two spaced bearings 54[a], 54[b] extending downwardly from the base plate 11 of the frame of the machine, and also on the stud 54 is a bevel gear 55, in mesh with a bevel gear 56 held on the lower end of the vertical shaft 25 of the grooved drum 35. The gear 51 is in mesh with a wide gear 57 held on a stud 58 which is slidably rotatable in spaced bearings 59, 60 also extending downwardly from the underside of the base plate 11 of the frame of the machine under the grooved drum 39. The gear 57 is considerably wider than the gear 51 so that when the stud 58 is slidably moved both gears will remain in mesh. On the stud 58 is a bevel gear 61 in mesh with a bevel gear 62 held on the lower end of the stud 33 of the grooved drum 39.

The stud 58, bevel gears 57 and 61 are movable when the drum 39 is adjusted toward and from the drum 35 to hold the wire taut, and the adjustment of the drum 39 is accomplished by adjusting means, as 63, which may be composed of a yoke or sleeve, as 64, provided on the slidable block 29 so that it surrounds the part of the stud 58 between the gears 57 and 61. In the threaded sleeve 30 of the slidable block 29 is screwed the threaded end of a shaft 65 having a part intermediate its ends journaled in a box bearing, as 66, provided on the underside of the baseplate 11 of the frame of the machine, and on the shaft 65 is a bevel gear 67. The shaft 65 may be rotated by a crank handle 68 which may be appropriately provided to allow the crank handle to be operated when desired. In mesh with the bevel gear 67 is a bevel gear 69 held on the lower end of a vertical shaft 70 which is journaled in bearings 71 and 72 provided on the base-plate 11 and on the upper part of the frame of the machine. On the upper end of the vertical shaft 70 is a bevel gear 73 meshing with a bevel gear 74 held on one end of a threaded rod 75 which is screwed in the treaded sleeve 32 of the slidable block 31 that carries the stud 34 of the movable drum 39. When the crank handle 68 is revolved accordingly, rotation will be imparted to the shaft 65, bevel gears 67, 69, shaft 70, bevel gears 73, 74 which will rotate the rod or shaft 75. The blocks 29 and 31, stud 58, and gears 57, 61 and 62 will then be moved in unison. The studs 33 and 34 will likewise be moved for adjustably moving the drum 39 relative to the drum 35 for stretching and holding the wire 43 taut.

The wire is cut into fibrous portions to provide steel wool by cutters, as 76. I may employ, as occasion requires, a series of the cutters, either singly or in groups, and all of the cutters are preferably of similar formations. When employed in groups machines may be made of sizes adapted to carry a desired number, though in the machine are illustrated two groups, as 77 and 78, are

shown. Each group may include a plurality of series of the cutters, and each series, as 79, may include a number of alined cutters which are used for cutting each convolution of the wire. The groups 77 and 78 of the cutters are each mounted on a single carrier or board or plate 80, and each of these boards or plates is slidably disposed in one of the pairs of grooves 19 and 21, 20 and 22, 20 and 23, 19 and 24 of the vertical bars 17, 17a, 17b and 18, 18a, 18b of the frame of the machine. The cutters of each of the series of each group are carried on spaced corresponding brackets, as 81, 82, 83, Figs. 3 and 4, which are mounted at 84, in spaced rows one above the other on the outer face of each of the slidable boards 80 so that the brackets of each row are in proximity to each convolution of the wire. Each of the brackets 81, 82, 83 has an arm or bar 85 of a length so that it extends beyond the wire, and the outer end of the arm 85 of each bracket terminates with an angularly disposed finger or lug 86. Extending from the outer faces of side walls 87, 88 which are provided on the frame 10 under the upper bars 13, 14 and back of the slidable boards 80 are rows of spaced corresponding bars, as 89, 90, 91, each having on its outer end a groove, as 92. The number of rows of these grooved bars are similar to the number of rows of the cutters, and the grooved bars of each row protrude through openings, as 93, 94, 95, provided in spaced rows through each of the slidable boards 80 so that each grooved bar is adjacent each of the brackets 81, 82, 83, and so that each convolution of the wire when transmitted will move in the grooves of each row of the bars of each of the slidable boards 80. Each of the cutters 76 has a blade 96 which is detachably fastened, as 97, on one end of a block or short bar, as 98. The bar 98 of each of the cutters is pivoted, at 99, intermediate its ends to the lug 86 of the arm 85 of each of the fixed brackets 81, 82, 83 of each of the boards 80 so that all of the cutting edges of all of the blades 96 normally engage the convolutions of the wire which in turn will be cut into fibrous portions when the wire is transmitted from the drum 35 to the drum 39. The drums are simultaneously revolved when the motor 49 is operated for driving the shaft 46 and the gears 51, 52. With the driving of these gears the gear 53, bevel gear 55, stud 54 and bevel gear 56 will be rotated. The gear 57, bevel gear 61, stud 58 and bevel gear 62 will likewise be rotated, and the drums will then be simultaneously revolved by the driving of the shaft 25 and the studs 33, 34. On the lug 86 of the bracket of each of the cutters is a spring, as 100, which presses against the end opposite the blade of the short pivoted bar 98 of each cutter for serving to normally hold the blades 96 yieldingly in engagement with the parts of the wire passing through the grooves 92 of the bars 89, 90, 91. In order to permit the connection 44 when coupling the ends of two strips of the wire to pass the cutters without contacting with the blades 96 the cutters of each series are consecutively operated for causing the blades 96 to be successively swung from engagement with wire by tripping means, as 101. Each of the tripping means 101 of each of the slidable boards 80 may include a bar 102 composed of sections or links, as 103, 104, 105, having their opposed ends pivoted together, as at 106, and the central parts of the sections or links of each of the bars 102 are pivoted, at 108, to brackets, as 109 Figs. 3 and 4, provided on each of the slidable boards 80. On the pivots 106 of the links of each of the bars 102 is pivotally held one of the ends of arms 110 having their other ends pivoted, at 111, 112, 113, to the bars 85 of the brackets 81, 82, 83 of each row of each of the slidable boards 80. Protruding from the pivots 111, 112, 113 of the arms 110 of each of the bars 102 of each of the boards 80 are lugs 114 disposed on angular inclines toward and close to the bars 98 of the cutting blades 96, and each of the lugs 114 has a curved free end for engaging the end parts of the bars 98 opposite to the springs 100. On each of the links 103, 104, 105 of the bars 102 of each of the boards 80 is a protruding curved trip lug, as 115, and these trip lugs are disposed so that they are in the path of movement of the connection 44 when the wire is transmitted. The trip lugs 115 are also spaced at distances from the blades 96 of the cutters as well as being spaced from the pivoted arms 110 of the trip bars 102 so that when the wire is transmitted through the machine and the connection 44 of the wire advances toward each of the blades 96 of the cutters the connection 44 will strike each of the trip lugs 115. The link of the bar 102 provided with the contacted trip lug will be moved toward the frame of the machine for causing to be moved the arm 110 in advance of the approaching wire connection so that the lug 114 of the arm will be swung into engagement with the supporting bar 98 of the contiguous cutting blade. The blade will thereby be swung from the wire, as indicated at 116 Fig. 3, against the tension of its spring 100 for allowing the wire connection 44 to pass without contacting with the blade, and in like manner each of the cutters will be consecutively tripped to permit free passage of the wire connection as well as preventing cutting of the connection by the blades. The openings 93, 94, 95 of each of the slidable boards 80 are considerably larger than the grooved bars 89, 90, 91 to allow the boards 80 to be moved upwardly and downwardly, and the pivots 111 of the arms 110 of the linked bars 102 of each of the boards 80 is in the form of a single rod connecting together one

of the cutters 76 of each series of the group of cutters provided on each of the boards 80 so that when the boards are moved upwardly and downwardly in the grooved bars 17, 17ª, 17ᵇ and 18, 18ª, 18ᵇ the blades 96 of the cutters will also be moved in cutting contact back and forth across the convolutions of the wire.

Serving as means to cause the slidable boards 80 with the cutters 76 to be moved upwardly and downwardly, the rods 116 are of lengths so that their upper ends extend above the upper bars 13 and 14 of the frame 10 of the machine, and the upper end of each rod is threaded, as at 117. The upper end portions of the rods 116 are slidably disposed through sleeves 118 provided on the bars 13 and 14 of the frame 10, and revolvable on the upper ends of each of the sleeves is an interiorly threaded gear 119 so that when all of the gears are rotated they will impart upward and downward movements to the rods 116. In mesh with and between the gears 119 is a rack 120 of substantially a rectangular shape which is mounted in spaced grooved guides, as 121, provided on top of the board 15 of the frame 10 so that the rack may be moved longitudinally back and forth above the frame of the machine. One end of the rack 120 is disposed above the drum 35, and protruding from the central part of this end of the rack is a lug or bolt head 122. The lug 122 is movably seated in an inclined groove, as 123, provided in the exterior of a sleeve 124 rotatable on one end of a short shaft 125 so that the sleeve 124 extends toward the center of the rack 120. As shown, the angle of incline of the groove 123 is such that when the sleeve 124 is rotated the travel of the lug 122 in the groove will cause back and forth longitudinal movement of the rack which in turn will cause alternate right and left rotation of the gears 119 for reciprocably moving the rods 111 upwardly and downwardly. On one end of the grooved sleeve 124 is a fixed gear 126, and in mesh with this gear is a pinion 127 which is held on one end of a short shaft 127ª having held on its other end a second pinion 128. The shaft 127ª is journaled in a bearing 129 provided on one end of a bar or arm, as 130, having on its other end a sleeve 131 to receive the shaft 125, the two being pinned together. The pinion 128 is in mesh with a gear 132 loosely mounted on the shaft 125 adjacent the sleeve 131 of the arm 130, and held from rotation by a pin 132′ projecting from a bracket 133, the gears 126 and 132 being preferably of similar diameters, but having a different number of teeth. The shaft 125 is journaled in a bearing in the bracket 133, extending upwardly from the board 15 of the frame of the machine, and also on the shaft 125 is a bevel gear 134 meshing with a bevel gear 135 held on the vertical shaft 25 of the drum 35.

When the vertical shaft 25 is driven by the operation of the machine, as hereinbefore explained, the bevel gears 135, 134 and the shaft 125 will be driven. The rotation of the shaft 125 will rotate the arm 130, and by reason of the intermeshing of the pinion 128 with its stationary gear 132, rotary movement is imported to the pinion 127 on its own axis as it moves about the gear 132, thus because of the difference in the number of teeth in gears 132 and 126 imparting a slow rotary movement to the gear 126 and to the cam sleeve 124 in a well known way which slowly reciprocates the racks and causes a slow vertical movement of the rods 116 to adjust the cutters with relation to the wire to present new cutting surfaces to the wire.

By the method and apparatus described it is possible to reduce the wire from which the wool is formed to an attenuated condition by a single travel of the wire through the machine. In the making of the finest grade of steel wool an average of about five hundred and fifty cuttings are made upon the wire. In the apparatus of the application five hundred and sixty cutters are employed, two hundred and eighty cutters upon each side of the machine, which is a sufficient number to make all of the cuttings from the wire that the wire will afford. By the employment of the grooved rolls, which not only guide but also feed the wire in the form of a series of convolutions, I am enabled to run the wire through the apparatus in a great number of convolutions and to also employ a great number of cutting devices, as no strain is brought upon the wire by reason of its travel through the apparatus, a continuous feeding action being imparted to all of the convolutions of the wire from the time the wire enters the apparatus until it leaves the apparatus in weakened attenuated condition.

In the foregoing description I have embodied the preferred form of my invention, but I do not wish to be understood as limiting myself thereto, as I am aware that modifications may be made therein without departing from the principle or sacrificing any of the advantages of this invention, therefore, I reserve to myself the right to make such changes as fairly fall within the scope thereof.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:—

1. In an apparatus for making metal wool from a length of wire, a pair of revoluble grooved rolls arranged in parallel but spaced apart relation about which said length of wire passes in a plurality of oblong convolutions, and cutters for simultaneously operating upon both sides of a plurality of such

convolutions of wire at points between the rolls.

2. In an apparatus for making metal wool from a length of wire, a pair of revoluble grooved rolls arranged in parallel but spaced apart relation, means for running the length of wire about said rolls in a plurality of oblong-shaped convolutions, means for supporting the length of wire between said rolls, and a plurality of cutters for operating upon both sides of a plurality of convolutions of said wire at the points of support thereof.

3. In an apparatus for making metal wool, a plurality of spaced apart means supporting a travelling length of wire in the form of a series of oblong-shaped convolutions, and cutters for simultaneously removing shavings of metal from opposite sides of a plurality of such convolutions at points between the supporting means.

4. In an apparatus for making metal wool, a plurality of spaced apart means for supporting and guiding a travelling length of wire in the form of a series of oblong-shaped convolutions and cutters for simultaneously removing shavings of metal from one side only of said wire at a plurality of points on both sides of each of a plurality of such convolutions.

5. In a machine for making steel wool, spaced apart guides for uni-directional travelling wire disposed to hold said travelling wire in a series of oblong convolutions, supports for the convolutions of wire located between the guides, and cutters associated with the supports to cut fibrous shavings of metal from a plurality of the convolutions of wire, the cutters being of sufficient number to gradually reduce the wire to attenuated form during a single continuous travel of the wire through the cutters.

6. In a machine for making steel wool, in combination, a frame, spaced grooved rotary members on the frame for transmitting wire in helical convoluted arrangement and one of the rotary members being movable, means on the frame, operative for driving the rotary members simultaneously, means on the frame, operative for adjusting the movable rotary member toward and from the other rotary member for holding the wire taut on both members, and cutters on the frame, one cutter for engaging part of each convolution of the wire for cutting the wire into fibrous portions during the transmission.

7. In a machine for making steel wool, in combination, spaced grooved rotary members for transmitting wire in helical convoluted arrangement, means on the frame, operative for driving the rotary members simultaneously, movable cutters, one for engaging part of each convolution of the wire for cutting the wire into fibrous portions during its transmission, and means on the frame, operative by the operation of the driving means for causing the cutters to move determined distances across the convolution of the wire when transmitted.

8. In a machine for making steel wool, in combination, a frame, spaced grooved rotary members on the frame for transmitting wire in helical convoluted arrangement and one of the rotary members being movable, means on the frame operative for driving the rotary members simultaneously, means on the frame, operative for adjusting the movable rotary member toward and from the other rotary member for holding the wire movably taut on both members, and cutters on the frame, one cutter for engaging part of each convolution of the wire for cutting the wire into fibrous portions during its transmission, and means on the frame, operative by the operation of the driving means for causing the cutters to move determined distances across the convolution of the wire when transmitted.

9. In a machine for making steel wool, in combination, a frame, spaced grooved rotary members on the frame for transmitting wire in helical convoluted arrangement and one of the rotary members being movable, means on the frame operative for driving the rotary members simultaneously, means on the frame, operative for adjusting the movable rotary member toward and from the other rotary member for holding the wire movably taut on both members, movable cutters on the frame, one cutter for engaging part of each convolution of the wire for cutting the wire into fibrous portions during its transmissions, and means on the frame, operative by the operation of the driving means for causing the cutters to move determined distances across the convolution of the wire when transmitted.

10. In a machine for making steel wool, in combination, a stationary frame, a drive shaft journaled in the frame, two spaced driven shafts journaled in the frame and one of the driven shafts being adjustable, peripherally grooved wheels held on each of the driven shafts for transmitting wire in helical convoluted arrangement, means operative by the operation of the drive shaft for driving in unison the driven shafts and all of the grooved wheels, movable cutters, one for engaging part of each convolution of the wire for cutting the wire into fibrous portions during its transmission, and means operative with the driving of the driven shafts for causing the cutters to move determined distances across the convolutions of the wire when transmitted.

11. In a machine for making steel wool, in combination, a stationary frame, a drive shaft journaled in the frame, two spaced driven shafts journaled in the frame and one of the driven shafts being adjustable, peripherally grooved wheels held on each of the driven shafts for transmitting wire in helical convoluted arrangement, means operative by the operation of the drive shaft

for driving in unison the driven shafts and all of the grooved wheels, movable cutters, one for engaging part of each convolution of the wire for cutting the wire into fibrous portions during its transmission, a movable rack on the frame, means operative with the operation of one of the driven shafts for moving the rack back and forth longitudinally, and means operative with the movement of the rack for causing the cutters to move determined distances across the convolutions of the wire when transmitted.

12. In a machine for making steel wool, in combination, a stationary frame, a drive shaft journaled in the frame, two spaced driven shafts journaled in the frame and one of the driven shafts being adjustable, peripherally grooved wheels held on each of the driven shafts for transmitting wire in helical convoluted arrangement, means operative by the operation of the drive shaft for driving in unison the driven shafts and all of the grooved wheels, a movable frame on the stationary frame, having plates with grooves, each for movably receiving one of the convolutions of the wire, movable cutters, one for engaging part of each convolution of the wire at each groove of said plates for cutting the wire into fibrous portions during its transmission, movable means on the movable frame, pivotally carrying all of the cutters whereby each cutter may be swung to and from engagement with the wire, a movable rack on the frame, means operative with the operation of one of the driven shafts for moving the rack back and forth longitudinally, and means operative with the movement of the rack for causing the cutters to move determined distances across the convolutions of the wire when transmitted.

13. In a machine for making steel wool, in combination, a stationary frame, a drive shaft journaled in the frame, two spaced grooved rotary members on the frame for transmitting wire in helical convoluted arrangement, means operative by the operation of the drive shaft for driving in unison the rotary members, movable cutters, one for engaging part of each convolution of the wire for cutting the wire into fibrous portions during its transmissions, movable means on the frame, pivotally carrying all of the cutters whereby each cutter may be swung to and from engagement with the wire, and means, operative with the operation of the drive shaft for causing the cutters to move determined distances across the convolutions of the wire when transmitted.

14. In a machine for making steel wool, in combination, a frame, means rotatable on the frame for transmitting wire in a unidirectional way through the machine from a point of supply to a point of discharge, means on the frame operative for driving the rotary means, cutters on the frame for cutting the wire into fibrous portions during its transmission, and means on the frame, operative to move said cutters determined distances across the wire to present new cutting surfaces thereto.

15. In a machine for making steel wool, in combination, a frame, adjustable rotary means on the frame for transmitting wire, means on the frame operative for driving the rotary means, means on the frame, operative for adjusting the rotary means for holding the wire movably taut, movable cutters on the frame for cutting the wire into fibrous portions during its transmission, and means on the frame, operative by the operation of the driving means for causing the cutters to move determined distances across the wire when transmitted.

16. In a machine for making steel wool, a plurality of feeding and guiding devices for unidirectional traveling wire disposed to hold said traveling wire in a series of convolutions, and cutters to cut fibrous shavings of metal from a plurality of the convolutions of wire, the cutters being of sufficient number to gradually reduce the wire to attenuated form during a single continuous travel of the wire past the cutters.

17. In a machine for making metal wool, a plurality of feeding and guiding rolls arranged in parallel relation, said rolls acting to feed and guide a wire in a series of convolutions, means other than the wire for rotating said rolls at the same speed, and cutters acting upon said convolutions of wire during their travel about said members to cut fibrous shavings therefrom, said cutters being of sufficient number to gradually reduce the wire to attenuated form during a single continuous travel of the wire past the cutters.

18. In a machine for making steel wool, a pair of rolls arranged in parallel relation, each roll being provided with a plurality of grooves, power operated means for rotating said rolls at the same speed, said rolls acting to feed and guide a length of wire arranged in the grooves of the rolls so as to travel about said rolls in the form of convolutions, and a plurality of cutters to cut fibrous shavings of metal from a plurality of the convolutions of wire.

19. In a machine for making steel wool, a pair of feeding and guiding rolls for unidirectional traveling wire disposed to hold said traveling wire in a series of convolutions, and a plurality of cutters for each of a plurality of said convolutions to cut fibrous shavings of metal therefrom during the travel of the same about said devices.

20. In a machine for making steel wool, means for feeding and guiding a length of wire in a uni-directional way in the form of convolutions through said machine from a point of supply to a point of discharge, and a plurality of cutters, all of the cutters being

disposed in the same relation relatively to the travel of the wire so that all of the cutters may be simultaneously employed to cut fibrous shavings of metal from said wire during the unidirectional travel thereof.

21. In a machine for making steel wool, a pair of feeding and guiding rolls for unidirectional traveling wire disposed to hold said traveling wire in a series of convolutions, and a plurality of cutters for each of a plurality of said convolutions, each cutter acting upon but one convolution, all of said cutters being arranged in the same relation relatively to the travel of the wire so that all of said cutters may be simultaneously employed if desired to cut fibrous shavings from said wire.

22. In a machine for manufacturing steel wool, a table, cutting tools arranged adjacent thereto, means to guide a plurality of parallel strands formed from a single wire adjacent said tools over said table, said means consisting of sheaves over which the strands are looped at either end of said table, and means for driving said sheaves to move said wires independently of the pull of the wire thereon.

23. In a machine for manufacturing steel wool, a table, cutting tools arranged adjacent thereto, means to guide a plurality of parallel strands formed from a single wire in engagement with said tools over said table, and means to drive said guiding means so that each loop of wire will be independently driven by said guiding means whereby the driving strands will be applied to each loop independently against the resistance of the tools engaging the strand of wire of that loop.

24. In a machine for making steel wool, a plurality of spaced apart suporting and feeding devices for unidirectional travelling wire disposed to hold said travelling wire in a series of oblong convolutions, power means for positively driving at least one of said feeding devices, always in the same direction, supports for the convolutions of wire located between said wire supporting and feeding devices, and cutters independent of but associated with the supports to cut fibrous shavings of metal from a plurality of the convolutions of wire, the cutters being of sufficient number to gradually reduce the wire to attenuated form during a single continuous travel of the wire past the cutters.

25. In a machine for making steel wool, means for feeding and guiding a length of wire only in a unidirectional way in the form of convolutions through said machine from a point of supply to a point of discharge, and a plurality of cutters, all of the cutters being disposed in the same relation relatively to the travel of the wire so that all of the cutters may be simultaneously employed to cut fibrous shavings of metal from said wire during the unidirectional travel thereof.

26. In a machine for making steel wool, a plurality of feeding and guiding rolls for wire, motor means for rotating at least one of said rolls always in the same direction, said rolls being disposed to hold said travelling wire in a series of convolutions, and a plurality of cutters for each of a plurality of said convolutions, each cutter acting upon but one convolution, all of said cutters being arranged in the same relation relatively to the travel of the wire so that all of said cutters may be simultaneously employed if desired to cut fibrous shavings from said wire.

27. In a machine for making steel wool, a plurality of spaced apart drums each provided with a plurality of grooves to receive wire which passes about the drums in the form of a plurality of convolutions, power means for rotating at least one of said drums to feed the wire without stretching the same in a unidirectional manner through the machine from a point of supply to a point of discharge, a plurality of cutters arranged in progressive fashion at the outer sides of the convolutions between the drums whereby each cutter operates upon one side only of the wire and supports for the wire on the inner sides of the wire convolution adjacent the cutters.

28. In a machine for making steel wool, a plurality of sheaves about which a plurality of parallel strands formed from a single wire pass, power-operated means for driving at least one of said sheaves whereby the driving strains will be applied independently to each loop of wire, and a plurality of cutting tools to engage the loops of wire.

29. In a machine for manufacturing steel wool, a support, cutting tools arranged adjacent thereto, means about which a plurality of parallel strands of wire formed from a single wire pass, power-operated means for driving at least a part of said means whereby the driving strains will be applied independently to each loop of wire, and a plurality of cutting tools to engage the loops of wire.

30. In a machine for manufacturing steel wool, a support, cutting tools arranged adjacent thereto, means to guide a plurality of parallel strands formed from a single wire adjacent said tools over said support, said means consisting of sheaves over which the strands are looped, and means for driving at least one of said sheaves to move said wires independently of any pull of the wire thereon.

31. In a machine for manufacturing steel wool, a support, cutting tools arranged adjacent thereto, means to guide a plurality of parallel strands formed from a single wire in engagement with said tools over said table, and means to drive at least a part of said guiding means so that each loop of wire will be independently driven thereby whereby the driving strains will be applied to each loop independently against the resistance of

the tools engaging the strand of wire of that loop.

32. The method of making metal wool from a length of wire consisting in passing the length of metal at all times in a unidirectional way in a series of oblong-shaped convolutions and cutting filaments of metal from opposite sides of a plurality of such convolutions.

33. The method of making metal wool from wire consisting in passing the wire at all times in a unidirectional way in a series of oblong-shaped convolutions, supporting the wire, and cutting shavings simultaneously from both sides of a plurality of convolutions at the points where they are supported.

34. The method of making metal wool consisting in causing a length of wire to travel at all times in a unidirectional way from a point of supply to a point of discharge in the form of a series of convolutions by applying a feeding action directly to the convolutions, and applying to the convolutions a series of cutting operations sufficient to reduce the wire to an attenuated condition by a single unidirectional travel of the wire.

35. The method of making steel wool from wire by feeding the metal progressively and continuously in the same direction from a point of supply to a point of discharge and subjecting same to cutting operations during its travel whereby steel wool will be removed from said wire in continuous progressive steps substantially up to the point where the wire is reduced to scrap.

36. The method of making metal wool consisting in causing a length of wire to travel at all times in the same direction in the form of a series of convolutions and applying to the convolutions of wire a series of cutting operations sufficient to reduce the wire to an attenuated condition by a single unidirectional travel of the wire.

37. The method of making metal wool from a length of wire consisting in passing the length of wire in a unidirectional way from a point of supply to a point of discharge and subjecting any given portion of the length of wire to each of a plurality of said cutters, making successive cuts upon the same side of the wire.

38. The method of making metal wool from a length of wire consisting in passing the length of wire in the form of a plurality of convolutions in a unidirectional way from a point of supply to a point of discharge and subjecting any given portion of the length of wire to each of a plurality of cutting operations.

This specification signed and witnessed this 26 day of November A. D. 1923.

WILLIAM A. STEINBART.

CERTIFICATE OF CORRECTION.

Patent No. 1,907,453. May 9, 1933.

WILLIAM A. STEINBART.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 7, first column, line 34, claim 23, for the word "strands" read --strains--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 2nd day of July, A. D. 1940.

(Seal)

Henry Van Arsdale,
Acting Commissioner of Patents.