June 6, 1933. R. F. BOEHLER, JR 1,912,964

STEEL WOOL MACHINE

Filed March 17, 1930 9 Sheets-Sheet 1

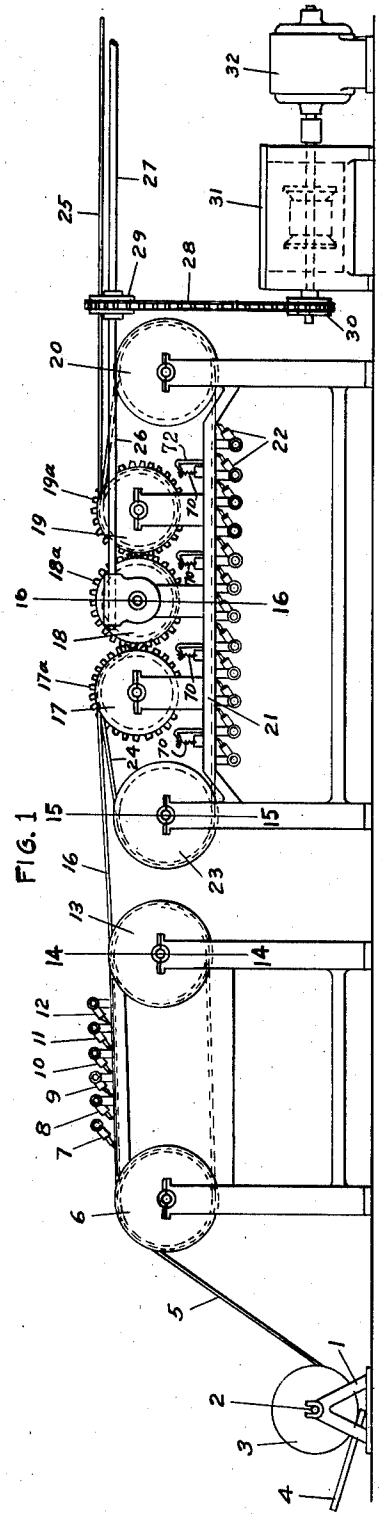


FIG. 1

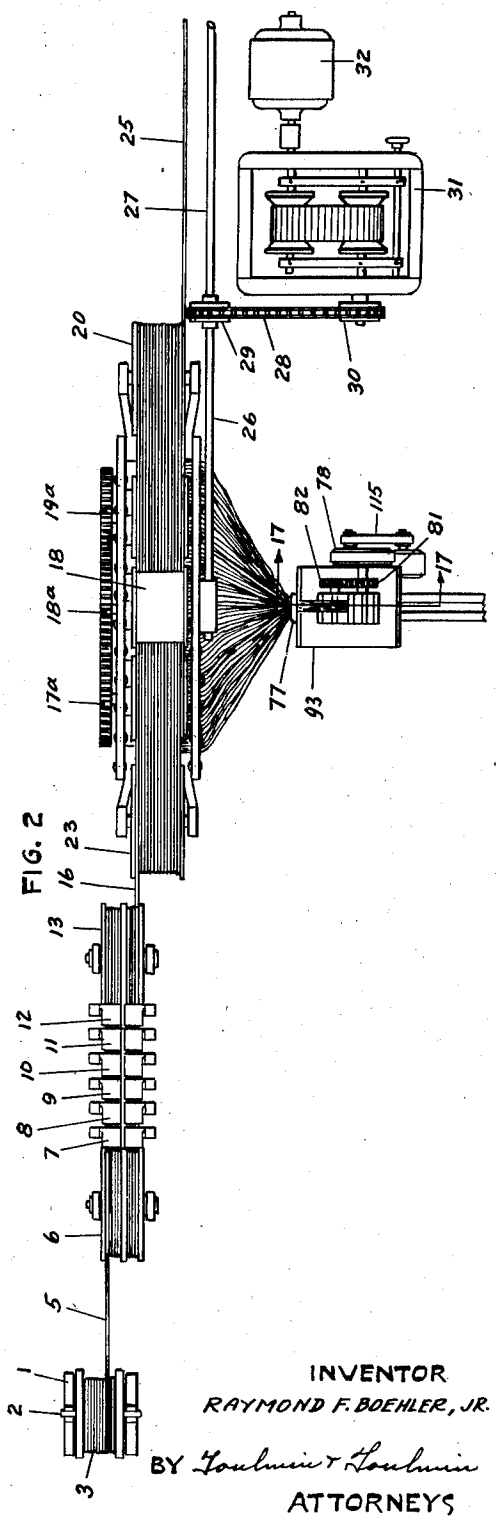


FIG. 2

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STEEL WOOL MACHINE

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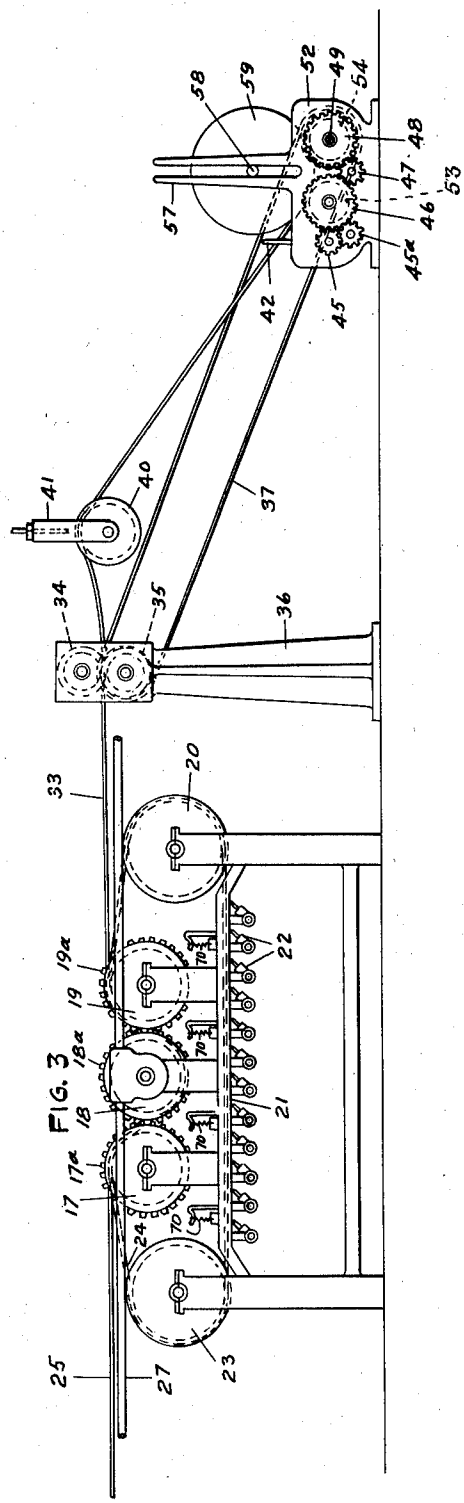


FIG. 3

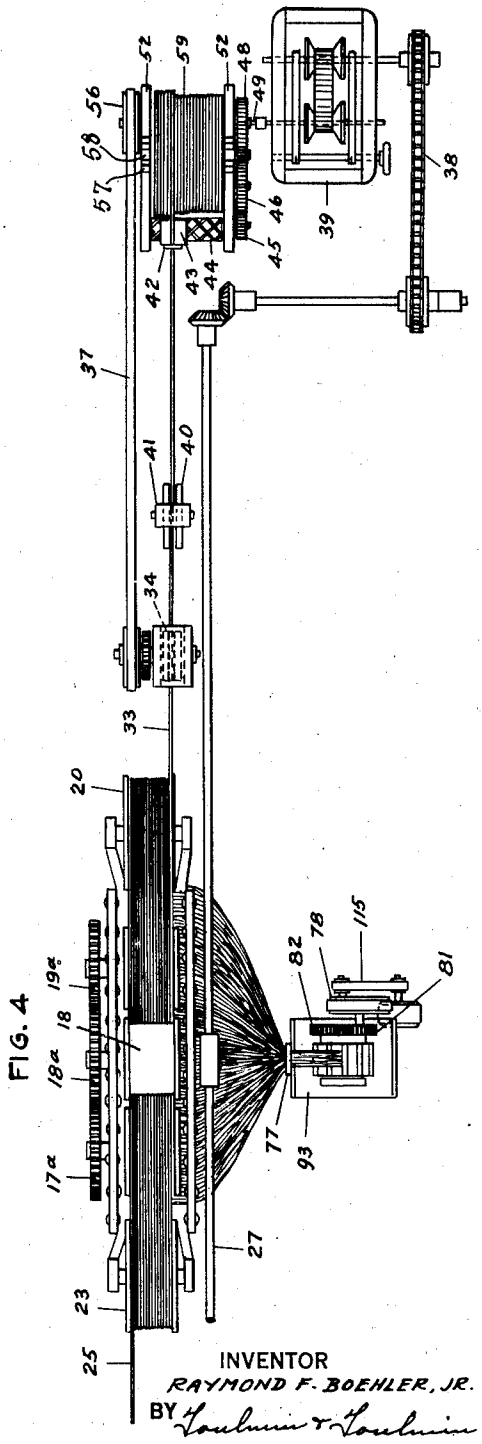


FIG. 4

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STEEL WOOL MACHINE

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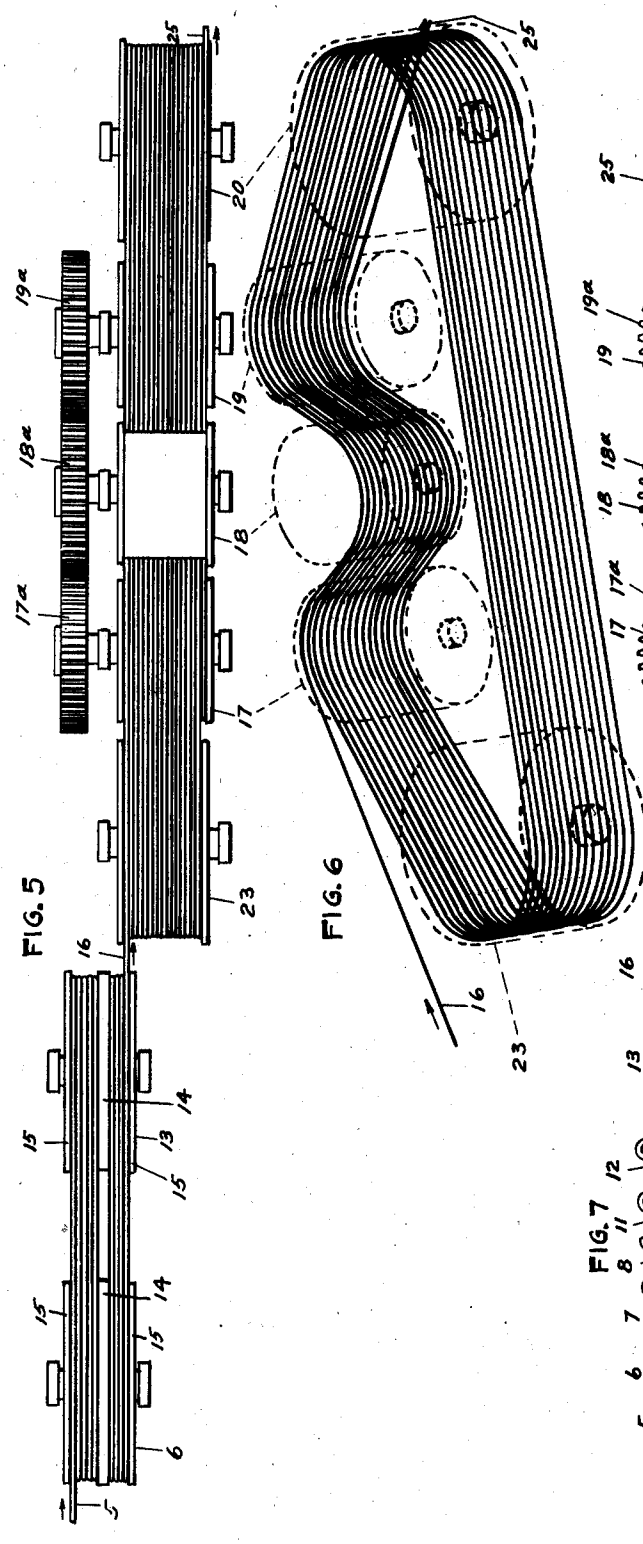


FIG. 5

FIG. 6

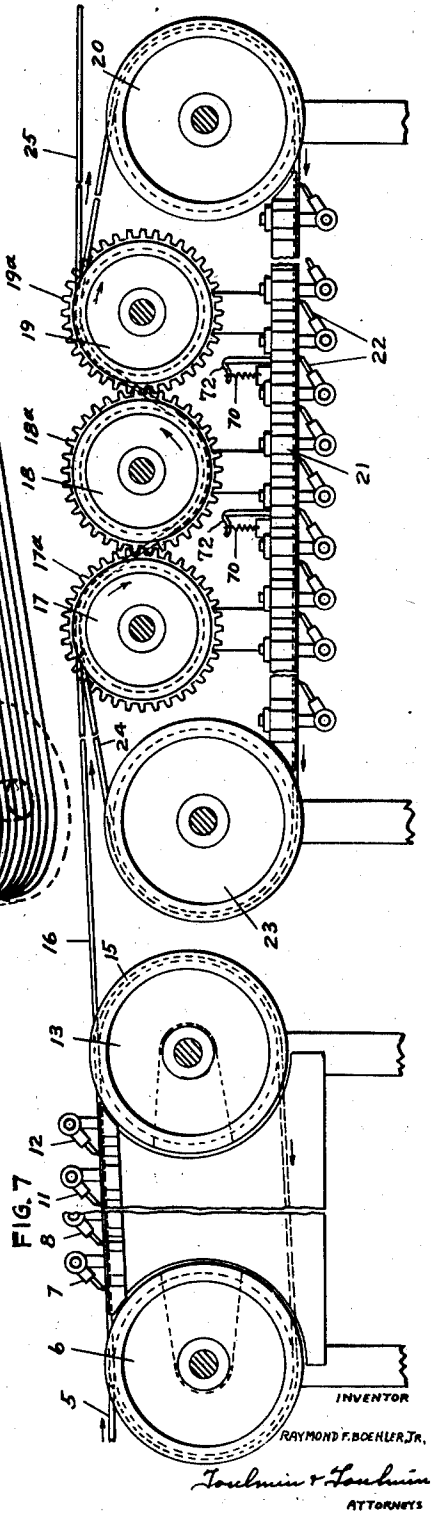


FIG. 7

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STEEL WOOL MACHINE

Filed March 17, 1930 9 Sheets-Sheet 4

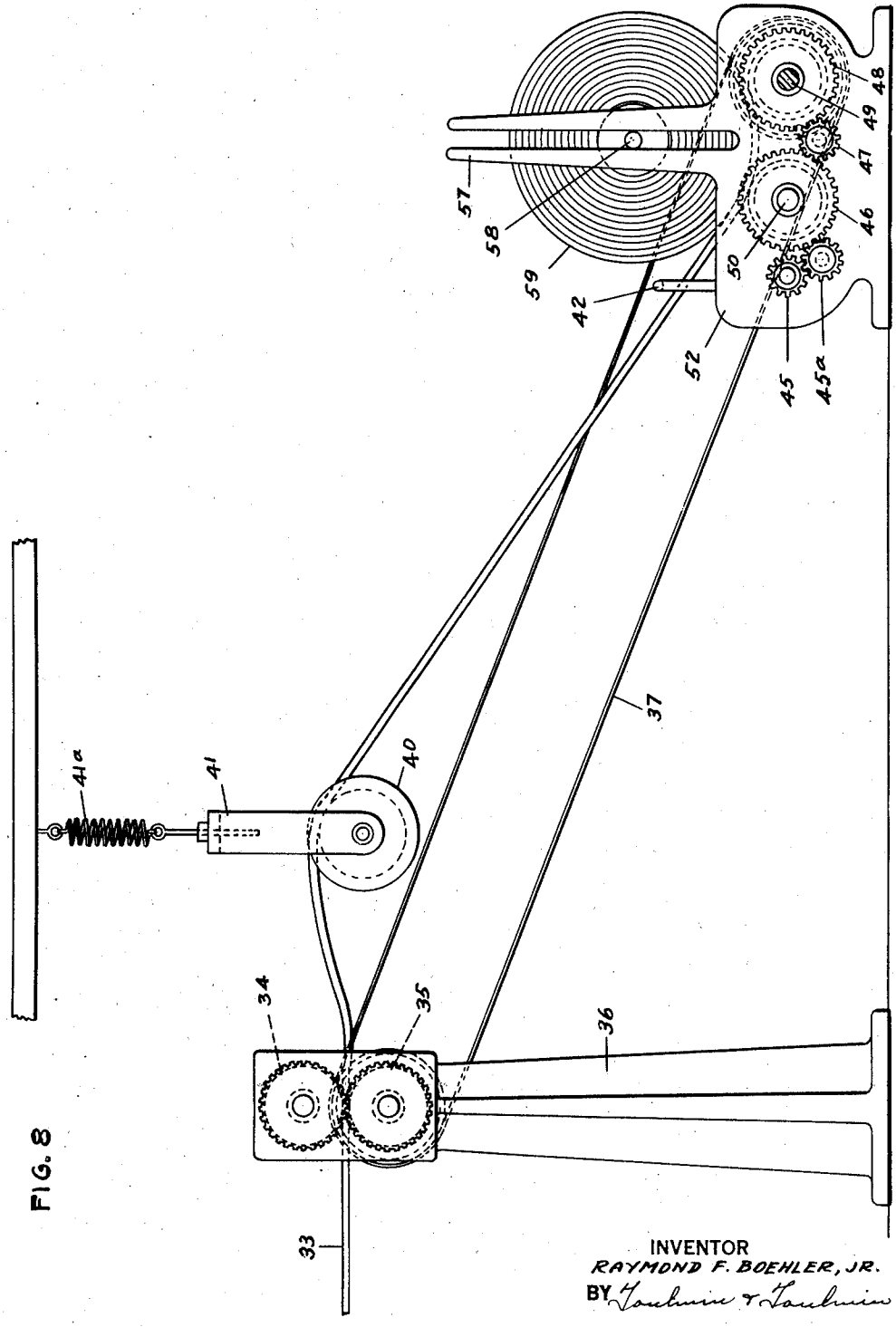


FIG. 8

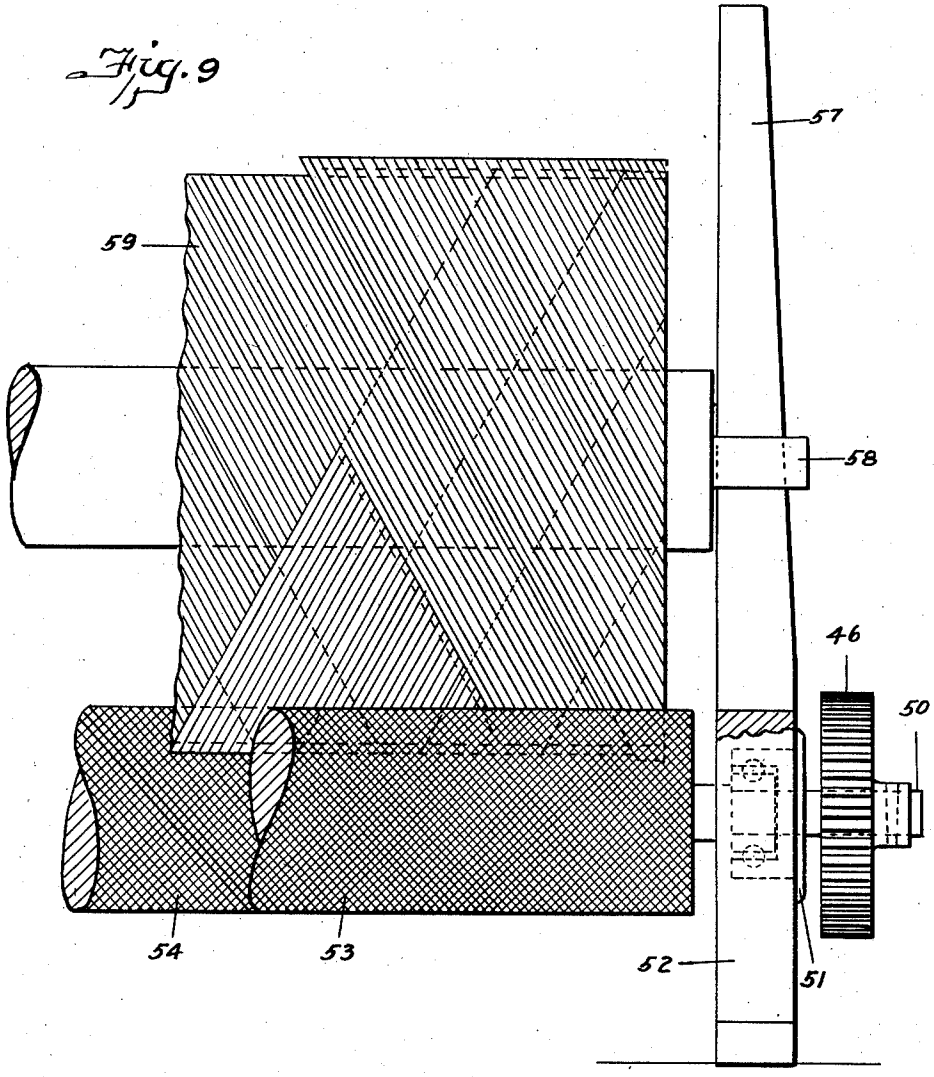
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June 6, 1933. R. F. BOEHLER, JR 1,912,964

STEEL WOOL MACHINE

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Fig. 9



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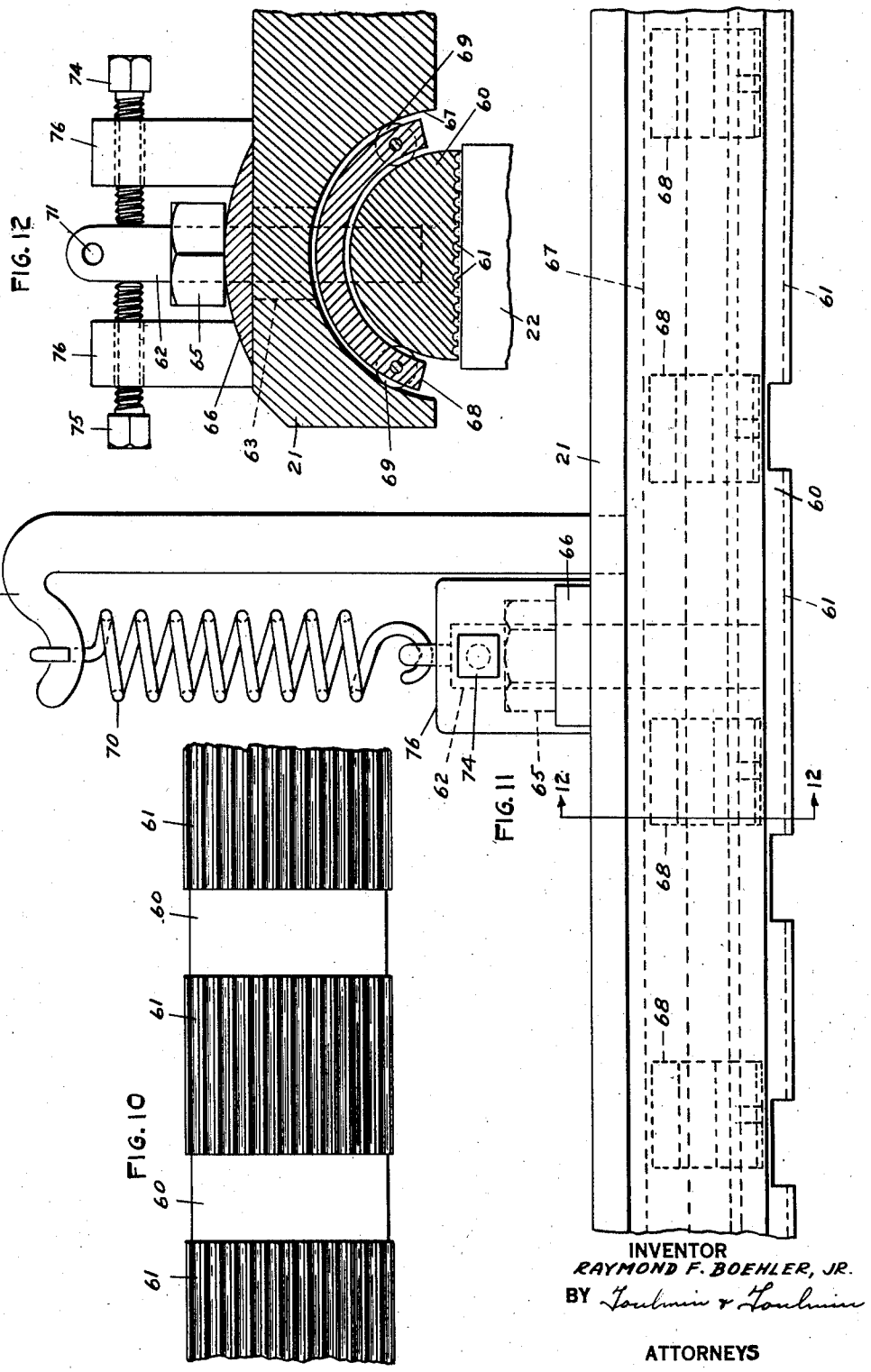
BY Toulmin & Toulmin

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STEEL WOOL MACHINE

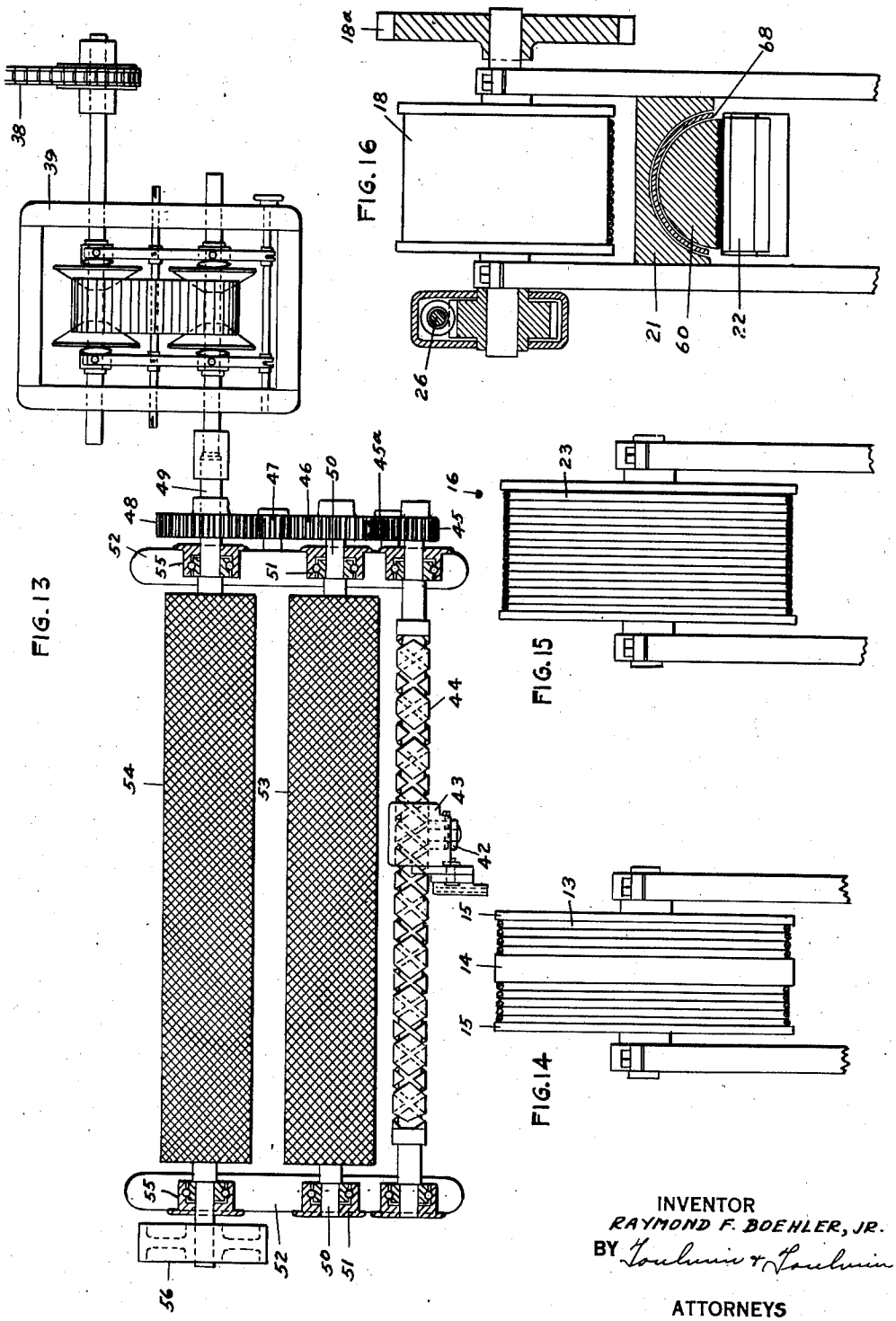
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STEEL WOOL MACHINE

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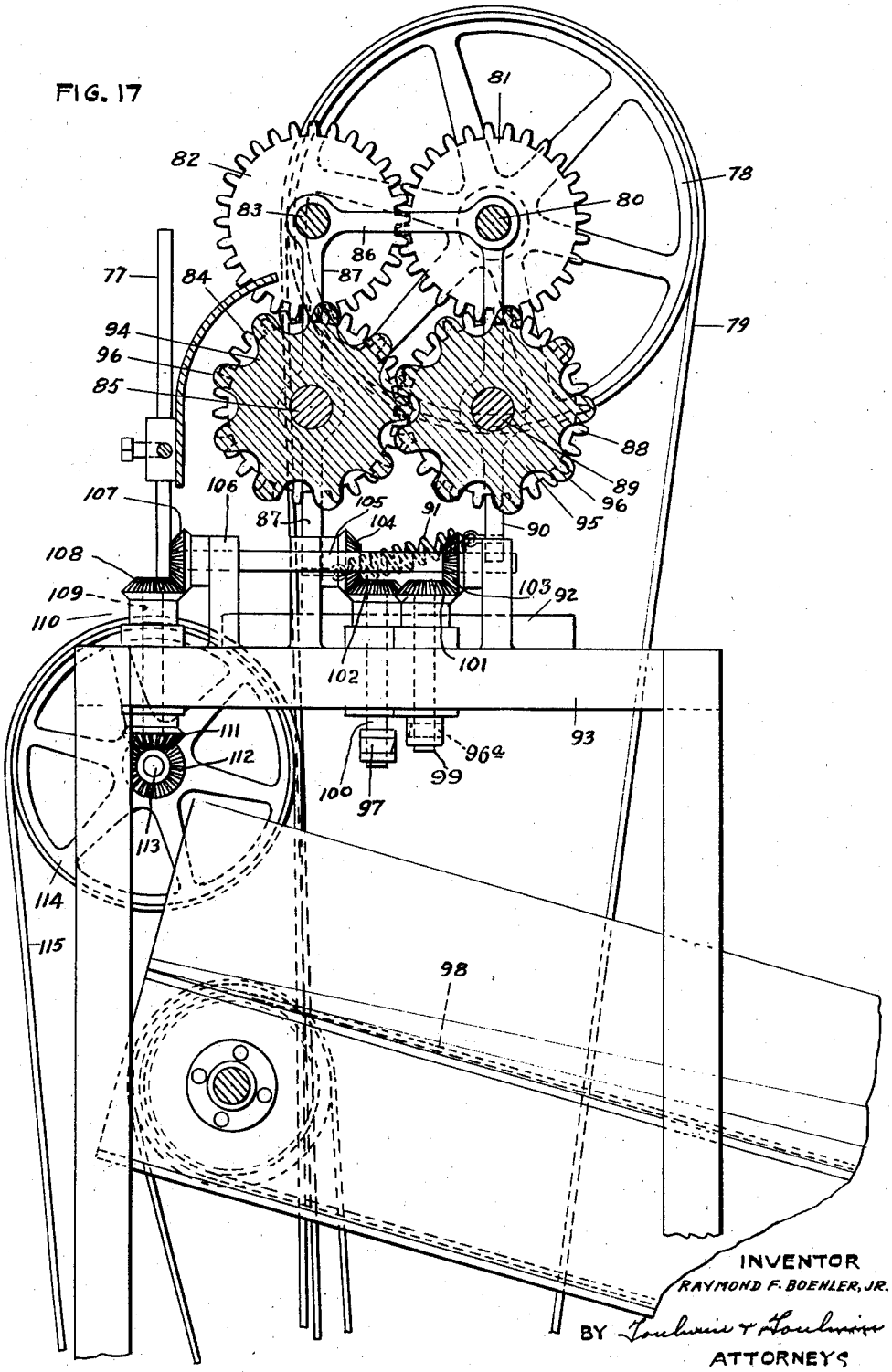
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STEEL WOOL MACHINE

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FIG. 17



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STEEL WOOL MACHINE

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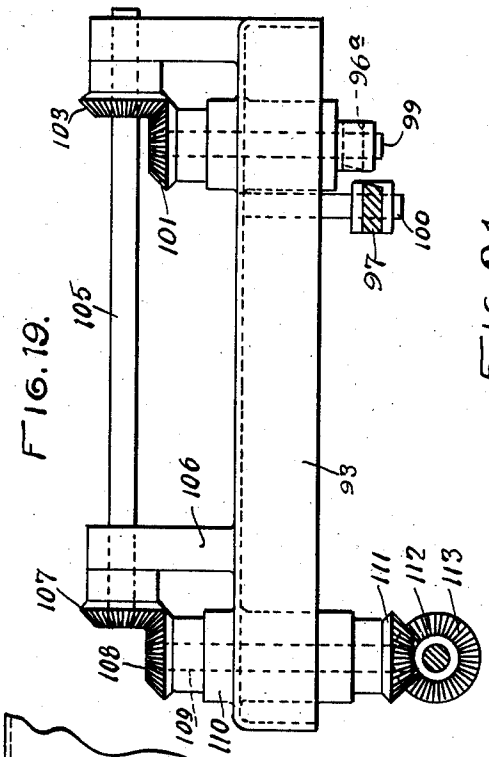


FIG. 19.

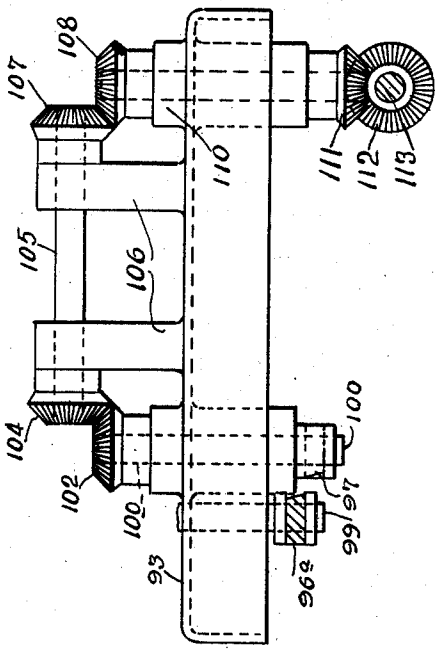


FIG. 21.

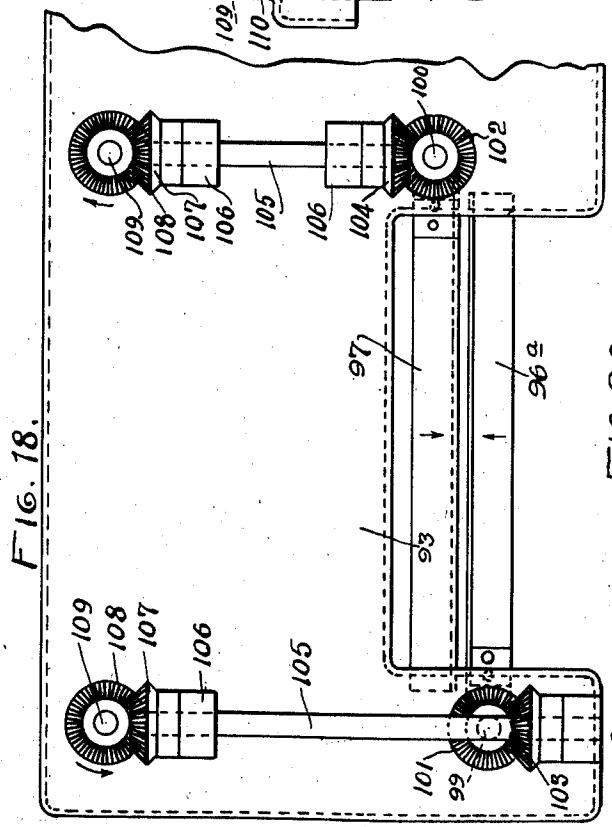


FIG. 18.

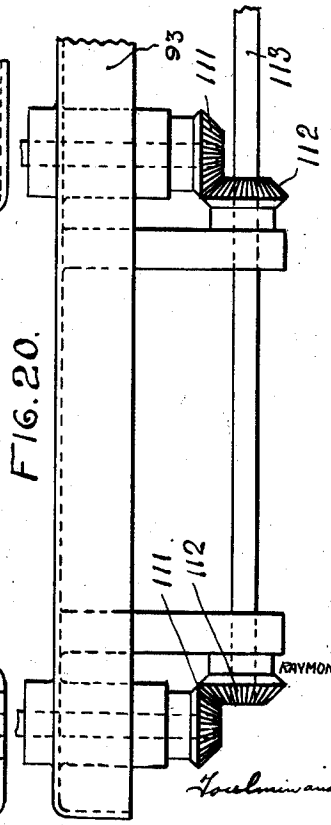


FIG. 20.

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Patented June 6, 1933 1,912,964

UNITED STATES PATENT OFFICE

RAYMOND F. BOEHLER, JR., OF SPRINGFIELD, OHIO, ASSIGNOR TO THE WILLIAMS COMPANY, OF LONDON, OHIO, A CORPORATION OF OHIO

STEEL WOOL MACHINE

Application filed March 17, 1930. Serial No. 436,306.

My invention relates to machines for manufacturing steel wool.

It is the object of my invention to provide a machine for the manufacture of steel wool in which the wire is first preliminarily straightened and preliminarily cut to give one side thereof a flat face; and in which thereafter the wire is looped over a predetermined number of idle pulleys with a predetermined number of loops and driven to and from such pulleys by intermediate driving drums frictionally engaging therewith.

It is a further object to provide a series of such intermediate cutting units driven from a common source of power and operating on a common wire which is continuously looped over each of the units and then passes to the next succeeding unit.

It is a further object to provide a common variable speed means for the common driving means.

It is a further object to provide a wire take-off mechanism which will evenly wind the wire at a predetermined rate into a bundle, such winding mechanism being suitably driven from the same common source of power as desired.

It is a further object to provide in combination with the foregoing, means of removing, collecting and forming into a ribbon the steel wool strands as cut from the wire as it progresses through the machine.

Referring to the drawings in detail, Figure 1 is a side elevation of the end of the machine into which the wire enters;

Figure 2 is a top plan view thereof;

Figure 3 is the take-off end of the machine;

Figure 4 is a top plan view thereof;

Figure 5 is a detail top plan view of the wire straightening mechanism and the first unit of the steel wool cutting mechanism;

Figure 6 is an isometric perspective showing the arrangement of the wire and how it is looped on each one of the cutting units;

Figure 7 is a detail side elevation of the straightening mechanism with its preliminary cutters and one of the units for cutting the wool;

Figure 8 is a detailed side elevation of the take-off end of the machine with the refuse wire winding machine in elevation;

Figure 9 is an end elevation of one side of the wire take-off machine and winding mechanism;

Figure 10 is a bottom plan view of the tilting wire guide;

Figure 11 is a side elevation thereof.

Figure 12 is a section on the line 12—12 of Figure 11;

Figure 13 is a top plan view of the wire take-up mechanism.

Figure 14 is a section on the line 14—14 of Figure 1.

Figure 15 is a section on the line 15—15 of Figure 1.

Figure 16 is a section on the line 16—16 of Figure 1;

Figure 17 is a section on the line 17—17 of Figure 2 showing in detail the mechanism for forming the steel wool strands into a ribbon, for severing the ribbons into lengths and conveying away from the machine to be rolled or packed;

Figure 18 is a plan view of the cutting mechanism;

Figure 19 is a side elevation thereof;

Figure 20 is a side elevation of the drive shaft beneath the table;

Figure 21 is an end elevation of the driving means for the knives.

Referring to the drawings, 1 is a bracket carrying the axle 2 supporting a roll of wire 3, the unwinding of which is braked by the brake lever 4. As this wire comes on a tightly wound roll, it is desirable to straighten it out prior to introducing it into the main cutting machine and the unit thereof, and it is desirable to impart to one side of the round wire a cut to flatten it to facilitate its handling, as will be hereinafter described.

Accordingly, the wire 5 passes from the roll 3 upwardly over the idler drum 6, thence beneath the cutters 7, 8, 9, 10, 11 and 12, downwardly over the drum 13 and thence back over the drum 6 in a plurality of loops, of which there are some nine, as will be seen in section in Figure 14. Each of the drums 6 and 13 carry spacer rings 14 while the outside of the drums are provided with shoulders 15.

After the wire 5 has thus been provided with a flattened side and been straightened, it proceeds as at 16 over the top of the geared drum 17 beneath the geared drum 18, over the geared drum 19, and thence over the idler drum 20, beneath the cutting table 21, under the cutting tools 22, beneath the idler drum 23 and over that drum as at 24 and thence over the drum 17, beneath the drum 18 over the drum 19 in a plurality of loops, preferably some fifteen in number, whence it passes outwardly at 25 to the next unit. The peripheral surface of each drum 17 and 19 is grooved while the peripheral surface of the drum 18 is smooth.

The drums 17, 18 and 19 are provided with teeth 17*a*, 18*a* and 19*a*. Consequently these drums turn together. They are driven through the shaft 26 which is part of the line shaft 27. There is, therefore, only a single driven drum which drives its companion drums, and the wire is not completely looped around these drums. It has been found highly desirable to provide such a drive that maintains the loops taut and which drives the wire on alternate sides, thereby reducing slippage.

The line shaft 27 is driven by the chain 28 through sprockets 29 and 30, one of which is on the line shaft 27 and the other of which is mounted on the speed reducing mechanism 31 of conventional character. This mechanism is driven by the motor 32.

On the other side of this speed reducing mechanism is another cutting unit of similar character, similarly driven. The wire, which has thus been cut down as far as practicable, is led out at 33 between the pulling rollers 34 and 35 mounted on the standard 36. These rollers are driven from the winding mechanism hereinafter described through the belt 37. This winding mechanism is driven preferably from the same line shaft 27 through the chain 38, speed reducing mechanism 39. The wire 33 is carried over a pulley 40 supported by the bail 41 carried on the spring 41*a*, whence the wire passes through the winding loop 42 which reciprocates back and forth with its block 43 on the reversing screw 44 which is driven by the gear 45. The gear 45 meshes with the pinion 45*a*, 45*a* meshes with the gear 46, which in turn meshes with the pinion 47 that meshes with the gear 48. The gear 48 is on the driven shaft 49 that is connected to the speed control mechanism 39. The shaft 50 is journalled in the bearings 51 and the side frame members 52 of the wire winding mechanism. This shaft 50 carries the gear 46 at one end and carries the knurled roll 53.

A similar knurled roll 54 is carried on the shaft 49, which is journalled in the bearings 55 in the frame 52. The other end of this shaft 49 carries the pulley 56 which drives the belt 37 that operates the pulling rolls.

The side frames 52 have a pair of jaws 57 on either side, between which jaws reciprocates the axle 58 of the drum 59 holding the roll of refuse wire which is being rotated as it rests upon the rolls 53 and 54.

The loops of the wire from which the wool is being cut are guided in the semicircular grooved guides 60 having the groove 61.

These guides are formed of continuous strips of metal that are supported at intervals by the bolts 62 which pass through the slots 63 in the table 21. A nut 65 on the bolt serves to support it on the arcuate surface 66 and to retain between the guide 60 and the arcuate cutaway surface 67 of the table 21 the roller blades, which are arcuate blades 68 having rollers 69 engaging the arcuate surface 67 of the table on one side and the semicircular outside surface of the guide 60 on the other side. These arcuate members 68 are located at spaced intervals as indicated in Figure 11. The bolt 62 is yieldingly held in position by the spring 70 which fits in the eye 71 at one end and is supported at the other end by the bracket 72. The rocking of the guide 60 to move it about its longitudinal axis to a suitable position for guiding to accommodate the different thicknesses of wire with respect to the tool which is shown at 22 is effected by the set screws 74 and 75, which serve to rock the guide 60. These screws are carried in standards 76 on the table 21.

When the steel wool is cut from the wire, it is conveyed in independent continuous strands beneath a hook 77 to a gathering machine shown in Figure 17.

This gathering machine consists of a pulley 78 driven by the belt 79 from any suitable source of power. The pulley 78 is mounted on the shaft 80. It carries on the shaft 80 a gear 81 that drives the companion gear 82. This gear 82 is carried on a shaft 83 and meshes with the gear 84 mounted on the shaft 85. All three shafts, 80, 83 and 85, are carried in an angular bracket having a horizontal portion 86 and a vertical portion 87. The gear 81 meshes with the gear 88 mounted on the shaft 89, which shaft 89 is carried in the swinging arm carrier 90 that it pivoted on the shaft 80. The lower end of this arm carrier is yieldingly drawn towards the vertical portion 87 of the stationary bracket by the spring 91, such spring

being attached at one end to the swinging bracket 90 and the other end to the stationary bracket 87. This right angle bracket composed of the parts 86 and 87 is mounted upon a foot 92 that rests on the framework 93.

The shafts 85 and 89 respectively carry coarse toothed steel wool assembling members 94 and 95 that have teeth 96 that intermesh but do not touch one another. The steel wool strands gathered by the hook 77 pass loosely parallel to one another between these rotating members, one of which is yieldingly drawn towards the other and which turns synchronously without touching, thereby forming the loose strands into a compact ribbon that proceeds vertically between the knives 96a and 97, which rotate, and as they pass each other, cut the ribbon of steel wool strands that is passing between them into a predetermined length, whereupon this ribbon falls upon the belt 98.

These knives are mounted upon the shafts 99 and 100. Each of them carries beveled pinions 101 and 102 which respectively engage beveled pinions 103 and 104 on the shafts 105, which are carried in the sleeves 106 on the platform 93. The one end of each shaft 105 carries the pinion 107 that meshes with the pinion 108 on the shaft 109 mounted in the sleeve 110 on the platform 93. The lower end of each shaft 109 carries a beveled pinion 111 which is driven from the pinion 112 on the shaft 113, which in turn is driven by the pulley 114 and the belt 115 from a suitable source of power.

The thickness of the ribbon of steel wool that passes between the gatherers and ribbon formers 94 and 95 is accommodated by the swinging bracket 90 and the spring 91.

I desire to comprehend within my invention such modifications as may be clearly impressed within my claims and the scope of my invention.

Having thus fully described my invention, what I claim is new and desire to secure by Letters Patent, is:

1. In a steel wool machine, a frame and table, a plurality of knives adjacent thereto, idler drums on either end of said frame adapted to have a single wire looped thereover and pass over the said frame along the knives, and power driven means intermediate said drums engaging said loops of wire and adapted to drive them through the machine, said power driven means consisting of a plurality of grooved drums and a smooth surface drum between two adjacent grooved drums, said smooth surface drum being located in close proximity to said grooved drums, the lower peripheral surface of which is below the upper peripheral surfaces of said grooved drums, whereby the wire is forced to engage frictionally a large surface of said driven means.

2. In a steel wool machine, a frame and table, a plurality of knives adjacent thereto, idler drums on either end of said frame adapted to have a single wire looped thereover and passed over the said frame along the knives, and a plurality of power driven drums intermediate said idler drums, said driven drums engaging said loops of wire looped between them, said power driven drums consisting of a plurality of spaced drums over which the wire moves, and an intermediate drum under which the wire moves, said last mentioned drum being located in close proximity to said first mentioned drums and having its lower peripheral surface located below the upper peripheral surfaces of the first mentioned drums whereby the wire is forced to engage frictionally a large surface of said driving means.

3. In a steel wool machine, a frame and table, a plurality of knives adjacent thereto, idler drums on either end of said frame adapted to have a single wire looped thereover and passed over the said frame along the knives, power driven means intermediate said drums engaging said loops of wire and adapted to drive them through the machine, and means for driving said last mentioned means synchronously with the power driven means, said power driven drums consisting of a plurality of spaced drums over which the wire moves, and an intermediate drum under which the wire moves, said last mentioned drum being located in close proximity to said first mentioned drums and having its lower peripheral surface located below the upper peripheral surfaces of the first mentioned drums whereby the wire is forced to engage frictionally a large surface of said driving means.

4. In a steel wool machine, cutting means, idlers at either end of the machine for supporting a single wire in loops adjacent the cutting means, and driving means consisting of a plurality of horizontally aligned drums intermediate the idlers engaging the loops over and under which the loops pass for driving the loops, and means for actuating said means, said drums being located in close proximity to each other whereby when the wire is passed over and under alternate drums the wire is forced to engage frictionally a large surface of said driving means.

5. In a steel wool machine, idlers mounted on said machine adapted to have a single wire looped thereon a plurality of times and means intermediate said idlers comprising adjacent drums over which said loops of wire pass on top of one of the drums, thence beneath the next drum and thence over the next drum, and means for driving said drums synchronously, and means to cut wool from said loops so driven, said adjacent drums being located in close proximity to each other whereby the wire is passed over the top of one of the drums and underneath the next

drum, and thence over the next drum and is forced to engage frictionally a large surface of said driving drums.

6. In a steel wool machine, a frame, a table, a plurality of knives suspended beneath said table, idlers at either end of the frame adjacent the table, a plurality of geared driving rolls mounted on the table so arranged that a single wire entering over one geared roll, passing beneath the next geared roll and over the third geared roll, will thence pass over one idler, over the table, beneath the cutting knives to the next idler, and thence back again through the geared rolls in a plurality of loops, each geared roll engaging each loop, said geared driving rolls being located in close proximity to each other whereby the wire is forced to engage frictionally the upper surface of a plurality of said rolls and the lower surface of one of said rolls.

7. In a steel wool machine, a frame, a table, a plurality of knives suspended beneath said table, idlers at either end of the frame adjacent the table, a plurality of geared driving rolls mounted on the table so arranged that a single wire entering over one geared roll, passing beneath the next geared roll and over the third geared roll, will thence pass over one idler, over the table, beneath the cutting knives to the next idler, and thence back again through the geared rolls in a plurality of loops, each geared roll engaging such loop, and each of said cutting knives engaging all of said loops, said geared driving rolls being located in close proximity to each other whereby the wire is forced to engage frictionally the upper surface of a plurality of said rolls and the lower surface of one of said rolls.

8. In a steel wool machine, a frame, grooved idlers at either end of said frame, cutting means therebetween for engaging the exterior of a wire looped on said idlers, driving drums between said idlers comprising a grooved drum, a flat drum, and a second grooved drum, and means of driving said drums, said looped wires being so arranged that the cut, flat side thereof engages the flat surface of the flat driving drum and the round sides thereof engage the rounded grooved sides of the grooved driving drums, said flat drum being located in close proximity to said grooved drums whereby the wire engages a large peripheral surface of the upper portion of the grooved drums and an extended surface of the under portion of the flat drum.

9. In combination, in a steel wool machine, a table, a guide having grooves for guiding a plurality of loops in parallelism, means supporting said guide with respect to the table at intervals, adapted to twist the guide on is own axis, and anti-friction means for said guide and the table, and means for locking said guide in adjusted positions consisting of a plurality of adjustable members mounted in fixed supports and bearing upon opposite sides of said guide supporting means whereby said guides may be movable in a plane at right angles to the line of feed of the loops.

10. In combination, in a steel wool machine, a table, a guide having grooves for guiding a plurality of loops in parallelism, means supporting said guide with respect to the table at intervals, adapted to twist the guide on is own axis, and anti-friction means for said guide and the table, and means for yieldingly supporting the guide in engagement with said anti-friction means and said table.

11. In combination, in a steel wool machine, a table, a guide having grooves for guiding a plurality of loops in parallelism, means supporting said guide with respect to the table at intervals, adapted to twist the guide on is own axis, and anti-friction means for said guide and the table, means for yieldingly supporting the guide in engagement with said anti-friction means and said table, and means for locking said guide at intervals in its adjusted position.

12. In combination, a table with an arcuate slot, a continuous guide member having an arcuate face on one side and a grooved face on the other, arcuate spacers with anti-friction rollers interposed between guide member and table at intervals, spaced supporting bolts connected to the guide and resting on the table, means for guiding said bolts in an arcuate rocking path on the table, means of locking said bolts in any predetermined rocked position and yielding means of supporting said bolts and guide with respect to the table.

13. In combination, a table having an arcuate slot, a grooved guiding means in said slot, spaced anti-friction means locked therebetween and means to rock said guide means in said table to different degrees at intervals, whereby said guide may be caused to assume a different angular position with respect to the table at different points throughout the length of the guide, and means for adjusting said guide means consisting of a plurality of members mounted in fixed position whereby said guide means may be adjustably movable in a plane at right angles to the line of feed of the loops of wire fed past said grooved guiding means.

14. In combination, a table having an arcuate slot, a grooved guiding means in said slot, spaced anti-friction means locked therebetween and means to rock said guide means in said table to different degrees at intervals, whereby said guide may be caused to assume a different angular position with respect to the table at different points

throughout the length of the guide, and means to guide the rocking of the guide in an arcuate path at said intervals, and means to yieldingly support the guide at intervals with respect to the table.

In testimony whereof, I affix my signature.

RAYMOND F. BOEHLER, JR.