Oct. 31, 1950

R. L. STEVENS

2,527,662

COILING MACHINE

Filed Nov. 30, 1948

3 Sheets-Sheet 1

Fig. 1.

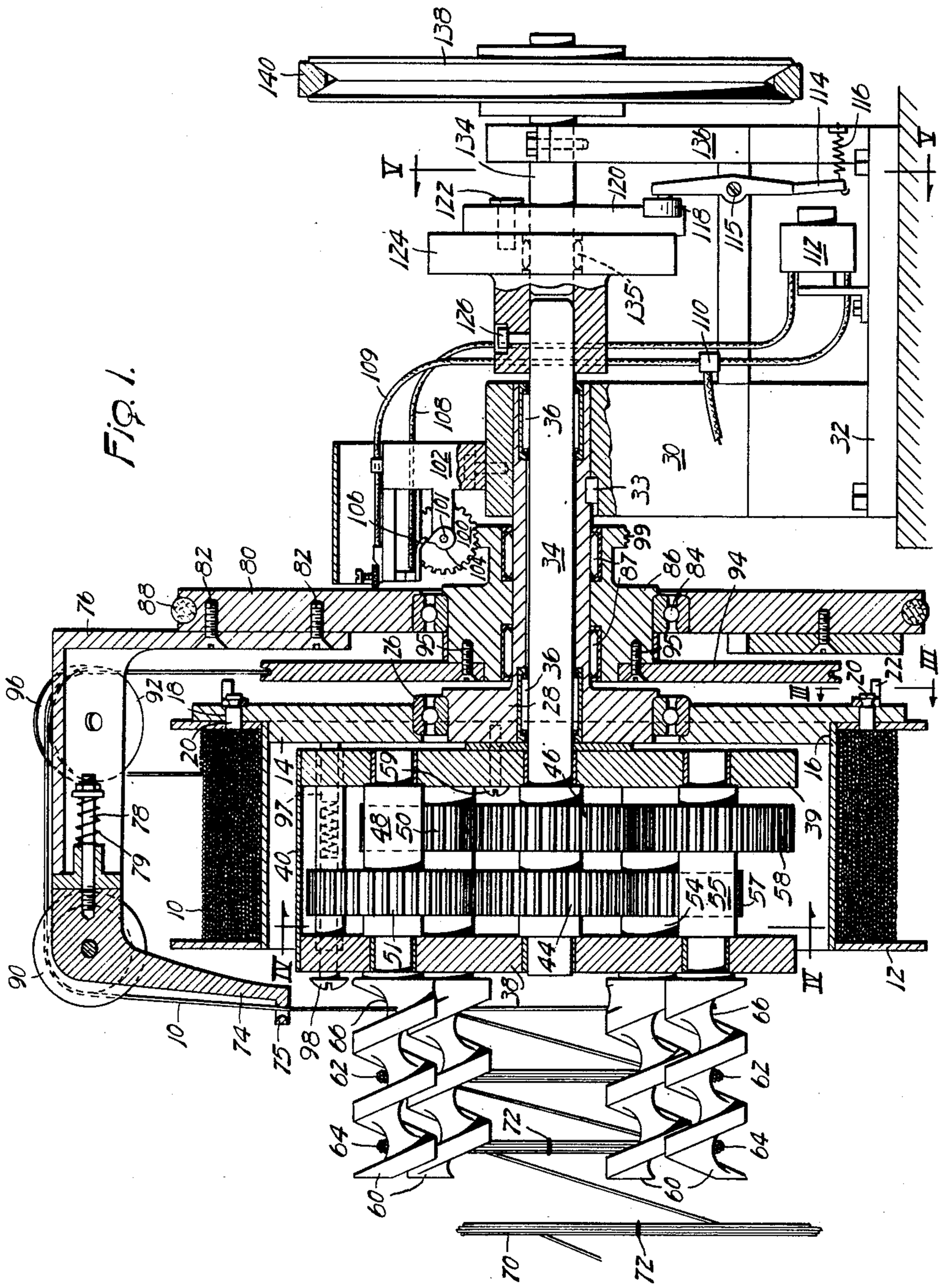

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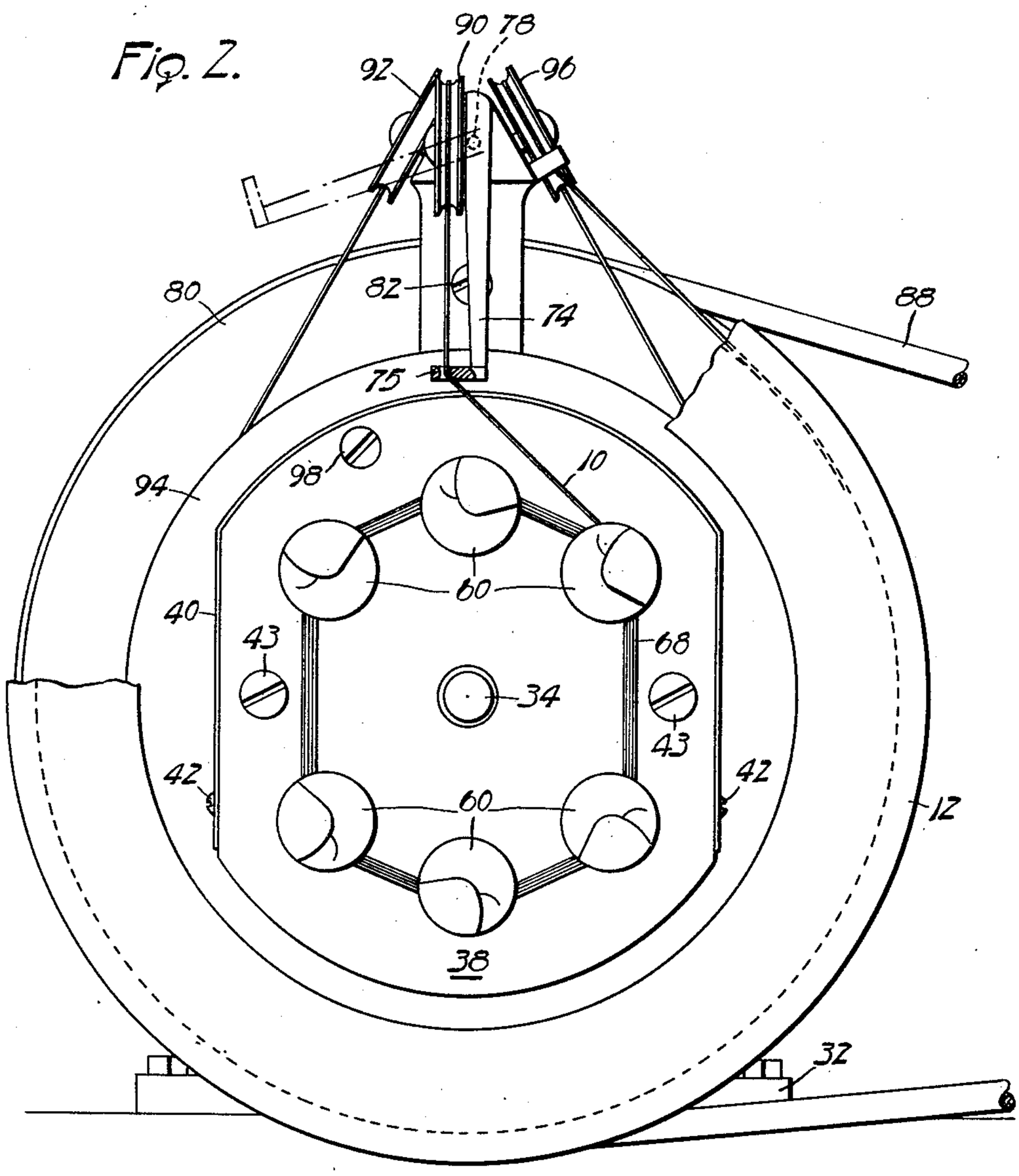
Fig. 2.



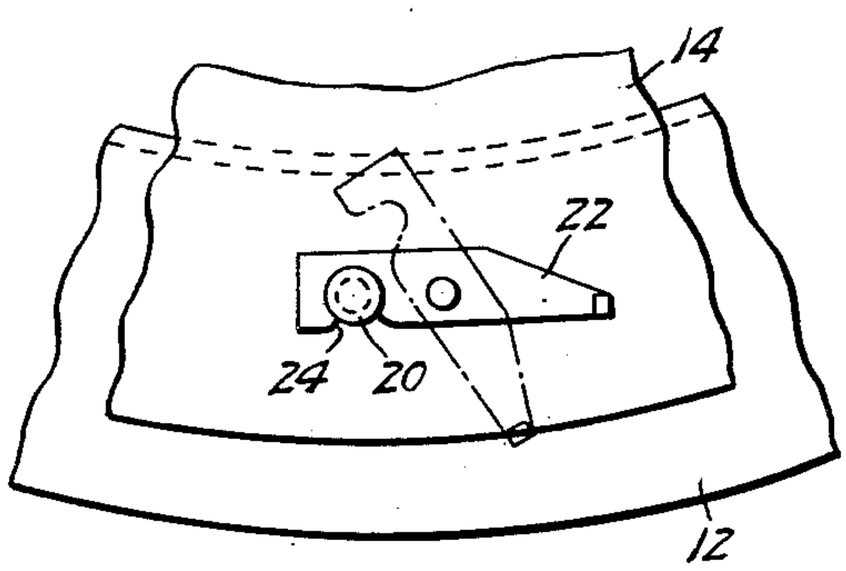


Fig. 3.

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Fig. 4.

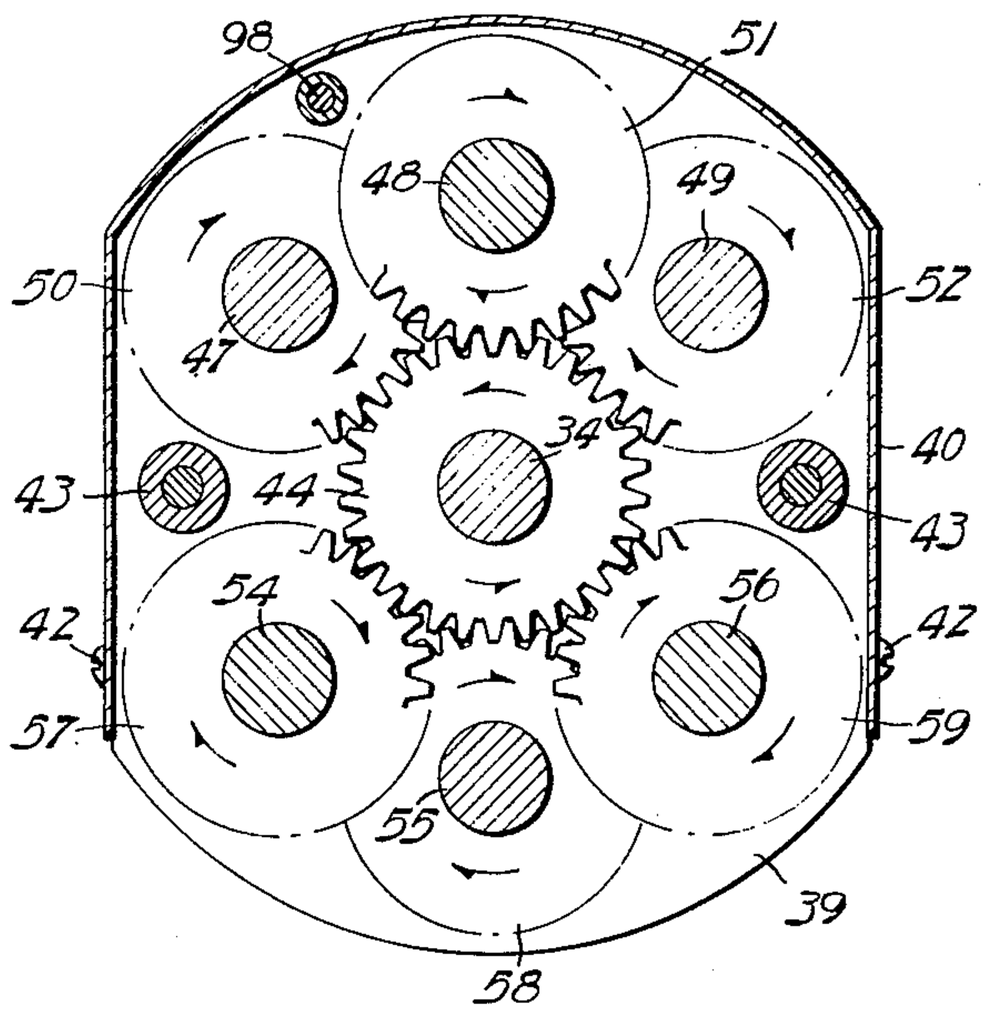
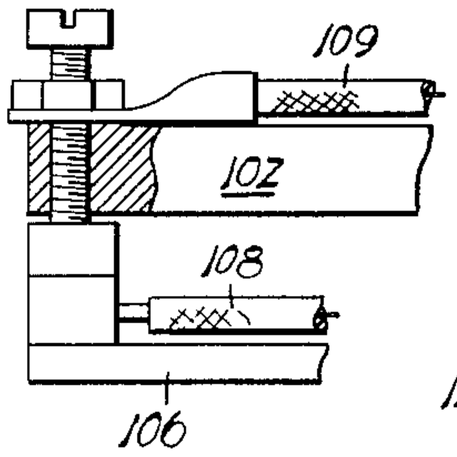


Fig. 6.



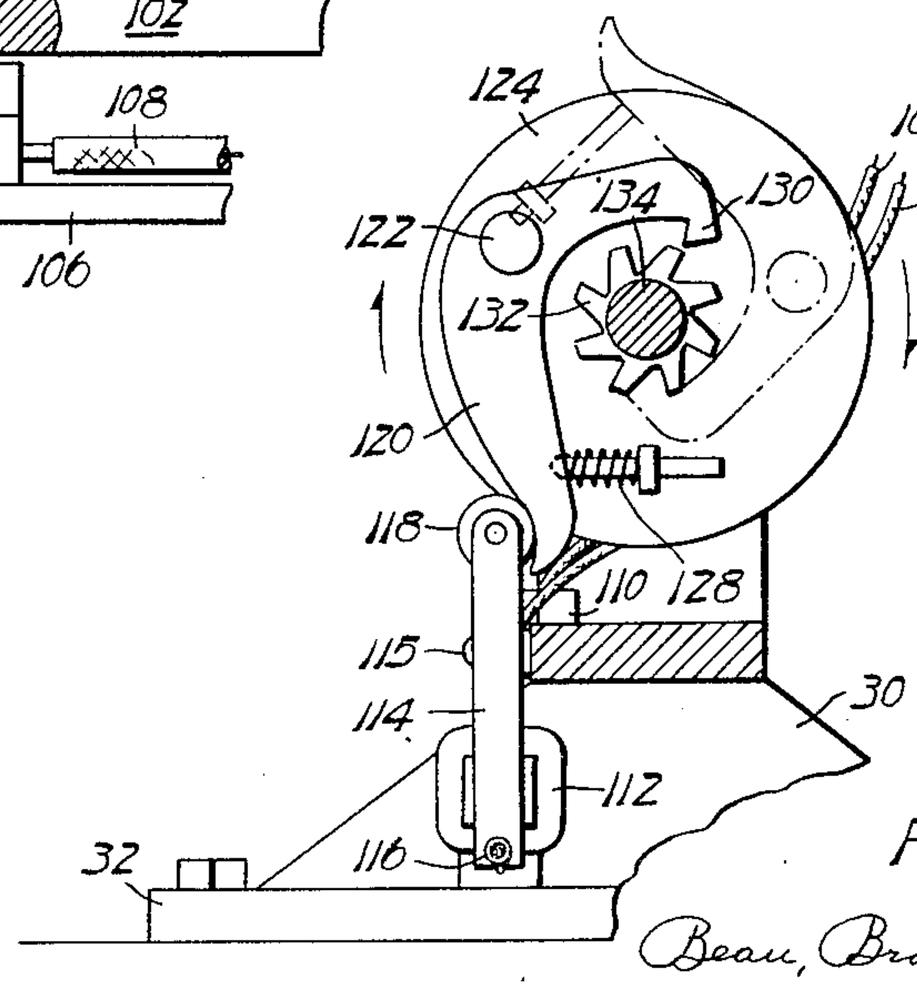


Fig. 5.

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COILING MACHINE

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8 Claims. (Cl. 28—21)

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This invention relates to improvements in devices for coiling strand material, and more particularly to an improved apparatus for winding thread, cord, wire, or other stranded materials of the plastic or textile or metallic arts; whereby the material is formed into coils of the prescribed dimensions which are progressively discharged from the machine.

One of the objects of the invention is to provide a machine of the character aforesaid, which is of structurally compact and mechanically rugged form, and adapted to rapidly coil strand material in improved manner.

Another object of the invention is to provide a machine for the purpose aforesaid which is of improved smoothness in operation.

Other objects and advantages will appear in the specification hereinafter.

In the drawings:

Fig. 1 is an elevation, partly in section, of a machine of the invention;

Fig. 2 is an end view of the discharge end portion thereof;

Fig. 3 is a detail, on an enlarged scale, taken along line III—III of Fig. 1;

Fig. 4 is a section taken along line IV—IV of Fig. 1;

Fig. 5 is a section taken along line V—V of Fig. 1; and

Fig. 6 is an enlarged detail of the control mechanism of the machine.

In the drawing the invention is illustrated in the form of a machine designed specifically to coil cordage or similar stranded material, such as plastic fishing line cords or the like; although it is to be understood that the invention is also applicable to the coiling of metal wire or other stranded fabrications.

In the drawing, the stock material to be processed into measured coils by the machine of the invention is shown at **10** as being previously wound upon a reel **12** such as in the form the material might be furnished by the manufacturer thereof. To receive the reel **12**, my machine includes an annular back plate **14** which is shouldered as indicated at **16** so as to provide both a supporting back wall for the rear flange of the reel and a ledge for the bottom wall of the reel, whereby the reel is automatically centered relative to the back plate when slip-fitted thereon. To detachably lock the reel on the back plate the latter is bored as indicated at **18** at intervals therearound to receive corresponding headed pins **20** which are furnished to extend integrally from the reel; and the back

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plate **14** carries pivotable latches **22** (Fig. 3) having open jaw portions **24** which are adapted to engage the necks of the pins **20** for locking the reel upon the back plate. The back plate **14** is carried by a central roller bearing **26** upon a hub **28** which is supported to extend in cantilever mounted relation from a pedestal **30** on the base plate **32** of the machine. The hub **28** is keyed to the pedestal **30** as indicated at **33**, and thus the reel **12** is mounted upon the hub **28** so as to be freely rotatable thereon relative to the machine.

The strand coiling mechanism of the machine comprises a central shaft **34** which extends through the hub **28** and is rotatably mounted therein as by means of needle bearings **36—36**. Adjacent one of its ends the shaft **34** mounts a pair of plates **38—39** which are arranged in parallel and longitudinally spaced relation on the shaft **34**. A sheet metal cover **40** embraces the side and top edges of the plates **39—40** and is fixed thereto as by means of screws **42** so as to keep debris out of the gear enclosure. Spacer bolts **43** (Figs. 2 and 4) maintain the plates **38—39** in spaced relation, and between the plates **38—39** the shaft **34** mounts a pair of equal diameter spur gears **44—46** in parallel relation. The upper portions of the plates **38—39** are bored to journal therebetween three stub shafts **47—48—49** which carry corresponding gears **50—51—52**; the stub shafts being mounted upon the plates so that the gears **50** and **52** mesh with the spur gear **46**, while the gear **51** meshes with the spur gear **44**. Similarly, the lower portions of the plates **38—39** are bored to journal therebetween three stub shafts **54—55—56**, and these stub shafts carry corresponding gears **57, 58, 59**; the gears being arranged on the shafts so that the gears **57—59** mesh with the spur gear **44** and the gear **58** meshes with the spur gear **46**. This arrangement permits the shafts **47, 48, 49** to be arranged more closely together than would be the case if similar diameter gears were employed and if all of the gears were arranged to mesh with only one spur gear.

The gear case defined by the plates **38—39** and the cover **40** is keyed to the stationary hub **28** as by means of a screw **59** (Fig. 1) and thus it will be seen that upon rotation of the shaft **34** the stub shafts **47, 48, 49, 54, 55, 56** will all be driven to rotate in the same direction, as indicated by the arrows in Fig. 4. Externally of the plate **38** the stub shafts mount augers **60** to rotate therewith; the thread shape of the augers being adapted to accommodate the prescribed

volume of coiled strands, as indicated at 62—64 (Fig. 1). As indicated at 66 (Fig. 1) the inner end portions of the augers are adapted to receive the stranded material 10 and to permit the latter to be wound therearound as in the manner indicated at 68 in Fig. 2. Subsequent to winding of the prescribed quantity of strand material in coil form about the auger end portions 66 the augers are rotated by means of the gearing referred to hereinabove so that the coiled strand will be displaced longitudinally of the augers progressively from the position indicated at 66 to the positions indicated at 62—64 to be finally discharged from the auger mechanism so as to fall away from the end thereof as indicated at 70 in Fig. 1. By providing the augers 60 to be of such length as indicated in Fig. 1, the coils formed thereon will be maintained upon the augers for sufficient time to permit the machine attendant to manually affix a tie upon each coil as indicated at 72 (Fig. 1) before the coil drops off the machine.

To wind the strand material about the inner end portions 66 of the augers, I provide a winding arm 74 having an eye 75 through which threads the stranded material 10. The arm 74 pivotally mounts upon the outer end of a bell arm 76, and is positionally biased thereon by means of a pin and spring arrangement 78 which operates to maintain the arm 74 to extend radially of the reel 12 as shown in solid lines in Fig. 2. However, in order to permit an emptied reel to be replaced by a fully loaded reel the arm 74 may be simply pulled outwardly and then rotated 90° or more upon the pin 78 as to the broken line position thereof in Fig. 2, so that the arm will not interfere with the reel replacement operations. Then, the arm may be simply swung back into operative position as shown in Figs. 1 and 2, whereupon the spring 79 acts to maintain the arm in its operative position.

The bell arm 76 is rigidly mounted upon a pulley 80, as by means of screws 82; and the pulley 80 is rotatably mounted by means of a ballbearing 84 upon a second hub piece 86 which rides freely upon the first mentioned hub 28 as by means of anti-friction bearings 87 therebetween. The pulley 80 is driven to rotate continuously as long as the machine is operating by means of a drive belt 88, which it will be understood may engage any suitable electric motor drive pulley or the like (not shown). The arm 74 mounts a pulley 90 over which runs the feeding strand 10, and the arm 76 also mounts an aligned pulley 92 so as to guide the strand 10 to feed away from a metering pulley 94 which is fixed to the hub 86, by screws 95. The metering pulley 94 in turn receives the strand from another pulley 96 carried by the arm 76 at a position over-riding the reel 12.

Thus, it will be appreciated that the belt 88 drives the feed arms 74—76 to revolve about the reel 12 while the feed eye portion 75 causes the strand to wrap about the inner end portions of the augers 60 so as to build up a coil of material thereon; the strand material being fed into the eye 75 from across the pulleys 90—92 and from the metering pulley 94 which in turn is fed by revolution of the pick-up pulley 96 around the reel 12. Thus, the pick-up pulley 96 unwraps the strand material from the reel and feeds it over the metering pulley 94 onto the transfer pulleys 92—90 from whence it is delivered to the feed eye 75 and wrapped thereby around the augers 60. A spring-pressed brake shoe 97 is

carried by the stationary plate 39 to frictionally bear against the reel plate 14 so as to snub relative rotation therebetween; the pressure of the brake shoe being regulated by adjustment of a screw 98 (Fig 1).

This feeding of the material around the metering pulley 94 causes the latter to be dragged upon to rotate the hub 86. As indicated at 99 in Fig. 1 a portion of the hub 86 is threaded in the form of a worm, and a gear 100 is mounted by means of a shaft 101 upon a bracket 102 extending from the pedestal portion 30. The shaft 101 carries a cam 104 for engagement with the movable member 106 of a contact switch. A conductor 108 is connected to the movable member of the switch and another conductor 109 connects to the stationary contact of the switch, thereby providing an electric circuit whenever the switch member 106 is biased by the cam 104 into closed position. Power supply conductors connect into the circuit as indicated at 110, and the circuit is completed in the windings of a solenoid or electromagnet as indicated at 112. Thus, whenever the metering pulley 94 has revolved a prescribed number of turns, the cam 104 will close the electric control circuit to energize the magnet 112.

A rocker arm 114 is pivotally mounted at 115 upon the pedestal 30 within range of the magnet 112 so that upon energization of the latter the lower end of the rocker is drawn toward the magnet. A tension spring 116 biases the rocker in opposite direction. The upper end of the rocker carries a roller 118 which is adapted to engage one end of a ratchet pawl 120 which is pivotally mounted at 122 upon a face plate 124 having its hub keyed to the shaft 34 as indicated at 126. A compression spring 128 (Fig. 5) is mounted upon the face plate 124 so as to bias the ratchet lever 120 in such manner that its opposite extending finger portion 130 moves into engagement with a ratchet wheel 132 carried by a stub shaft 134. The shaft 134 is journaled within the face plate 124 as by bearings 135 and upon a pedestal 136 extending from the base plate 32, and the shaft 134 mounts a driving pulley 138 (Fig. 1) which is arranged to be driven by a belt 140 running to any suitable driving motor pulley (not shown). Thus, although the pulley 138 is driven to rotate continuously, it is only upon closing of the control switch 106 (at the end of a prescribed strand metering operation) that the ratchet pawl mechanism 120—132 operates to cause the power from the pulley 138 to be transmitted into the shaft 34. Then, at that time the gear mechanism is driven to rotate the augers 60 through one complete revolution thereof, thereby laterally displacing the previously formed coil of strand material from the screw portion 66 into the position indicated at 62, while at the same time shifting the coil previously disposed at 62 into the position indicated at 64, while discharging the coil previously occupying the position 64. Thus, the quantity of material comprising each coil produced by the machine may be readily regulated by appropriate selection of the diameter of the metering pulley 94.

Thus, there is provided a machine adapted to receive stranded material in its customarily finished form; said machine comprising a strand unwrapping arm arranged to revolve about the reel to lift the strand therefrom and to pass it over a metering reel, thence back through the lifting arm mechanism for delivery through a feeding eye which revolves around a plurality of circularly disposed augers. The augers are in

the form of screws, and the metering reel operates to cause periodic actuation of the auger rotation means so as to automatically displace each coil product of the machine when it is completed, through successive holding positions so as to enable the machine attendant to place suitable ties upon the coils before they are discharged from the machine. The coils may then be separated into groups of any desired number of coils by snipping the appropriate strand portion between coils.

It will be appreciated that it is a particular feature and advantage of the machine of the invention that the above recited strand unwinding and recoiling operation is performed throughout all phases thereof with maximum smoothness in the strand handling operations, without imposing jerks upon the strand despite the intermittent nature of the coil delivery operation at the discharge end of the machine. Also, it will be appreciated that although one specific form of the invention has been shown and described in detail, it will be apparent to those skilled in the art that the invention is not so limited but that various changes may be made therein without departing from the spirit of the invention or the scope of the appended claims.

I claim:

1. In a coil forming machine, a plurality of spaced strand guide augers, a reel having strand material wound thereon, a metering pulley, means revolving relative to said reel including a strand pick-up member arranged to lift the strand from said reel and to wind it upon said metering pulley, and strand delivery means arranged to feed said strand from said metering pulley and to revolve around said augers at the base portions thereof to lay said strand therearound in coiled condition, said augers being externally threaded for displacing the coiled strand axially of said augers upon rotation thereof, means for rotating said augers, and means controlling the rotation of said augers comprising a mechanism actuated periodically by said metering pulley upon passage of a predetermined quantity of strand thereover to cause said augers to rotate to segregate said strand progressively into separate coils of predetermined quantities of strand.

2. In a progressive coil forming machine, a plurality of spaced strand guide augers, a reel having strand material wound thereon, a metering pulley, means revolving relative to said reel and said pulley including a strand pick-up member arranged to feed the strand from said reel around said metering pulley, and to revolve around said augers at the base portions thereof to lay said strand therearound in coiled condition, said augers being externally threaded for displacing the coiled strand axially of said augers upon rotation thereof, and means controlling the rotation of said augers comprising a mechanism actuated periodically by said metering pulley upon passage of a predetermined quantity of strand thereover to cause said augers to rotate to segregate said strand progressively into separate coils of predetermined quantities of strand.

3. In a coil forming machine, an auger, a reel having strand material wound thereon, a metering pulley, means revolving relative to said reel and pulley including a strand pick-up member arranged to feed the strand from said reel on to said metering pulley and to revolve around said auger at the base portion thereof to lay said strand therearound in coiled condition, said auger being externally threaded for displacing the coiled strand axially of said auger upon rotation thereof, and means controlling the rotation of said auger comprising a mechanism actuated periodically by said metering pulley upon passage of a predetermined quantity of strand thereover to cause said auger to rotate to segregate said strand progressively into separate coils of predetermined quantities of strand.

4. In a coil forming machine, a plurality of spaced strand guide augers, a reel having strand material wound thereon, a metering device, means revolving relative to said reel including a strand pick-up member arranged to feed the strand from said reel on to said metering device, means arranged to pick up said strand from said metering device and to revolve around said augers at the base portions thereof to lay said strand therearound in coiled condition, said augers being externally threaded for displacing the coiled strand axially of said augers upon rotation thereof, means for rotating said augers, means controlling the rotation of said augers comprising a mechanism actuated periodically by said metering device upon passage of a predetermined quantity of strand thereover to cause said augers to rotate to segregate said strand progressively into separate coils of predetermined quantities of strand.

5. In a coil forming machine, strand receiving auger means, a reel having strand material wound thereon, a metering pulley, means revolving relative to said reel including a strand pick-up member arranged to lift the strand from said reel and to wind it upon said metering pulley, and strand delivery means arranged to feed said strand from said metering pulley and to revolve around said auger means at the base portion thereof to lay said strand therearound in coiled condition, said auger means being externally threaded for displacing the coiled strand axially upon rotation thereof, means for rotating said auger means, and means controlling the rotation of said auger means comprising a mechanism actuated periodically by said metering pulley upon passage of a predetermined quantity of strand thereover to cause said auger means to rotate to segregate said strand progressively into separate coils of predetermined quantities of strand.

6. In a progressive coil forming machine, strand receiving auger means, a strand material supply device, a metering pulley, means revolving relative to said supply device and said pulley including a strand pick-up member arranged to feed the strand from said pulley device around said metering pulley and to revolve around said auger means at the base portion thereof to lay said strand therearound in coiled condition, said auger means being externally threaded for displacing the coiled strand axially of said auger means upon rotation thereof, and means controlling the rotation of said auger means comprising a mechanism actuated periodically by said metering pulley upon passage of a predetermined quantity of strand thereover to cause said auger means to rotate to segregate said strand progressively into separate coils of predetermined quantities of strand.

7. In a coil forming machine, a form, strand material supply means, a metering device, means revolving relative to said supply means and metering device including a strand pick-up member arranged to feed the strand from said supply means to said metering device and then to said form at the base portion thereof to lay said strand therearound in coiled condition, said form being arranged for displacing the coiled strand

axially of said form upon motivation thereof, and means controlling the motivation of said form comprising a mechanism actuated periodically by said metering device upon passage of a predetermined quantity of strand thereby to cause said form to move to segregate said strand progressively into separate coils of predetermined quantities of strand.

8. In a coil forming machine, a coil receiving frame, a reel having strand material wound thereon, a metering device, means revolving relative to said reel including a strand pick-up member arranged to feed the strand from said reel on to said metering device, means arranged to pick-up said strand from said metering device and to revolve around said frame to lay said strand therearound in coiled condition, said frame having means for displacing the coiled strand axially of said frame, and means controlling the

displacement of said strand from said frame comprising a mechanism actuated periodically by said metering device upon passage of a predetermined quantity of strand thereover.

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