No. 801,287. PATENTED OCT. 10, 1905.

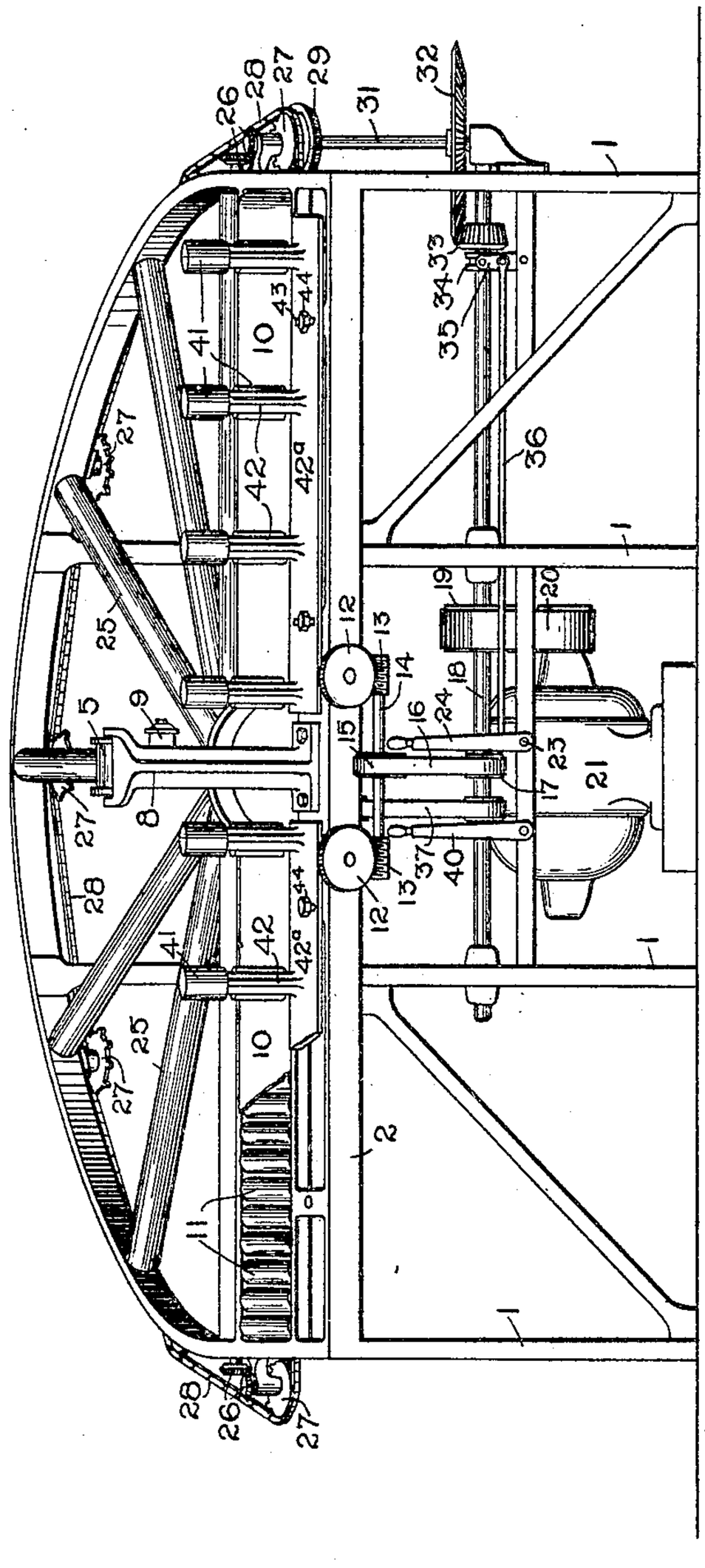
G. P. WHITTLESEY.

MACHINE FOR TAPING COILS.

APPLICATION FILED APR. 16, 1902.

4 SHEETS—SHEET 1.

Fig. 1.



Witnesses.

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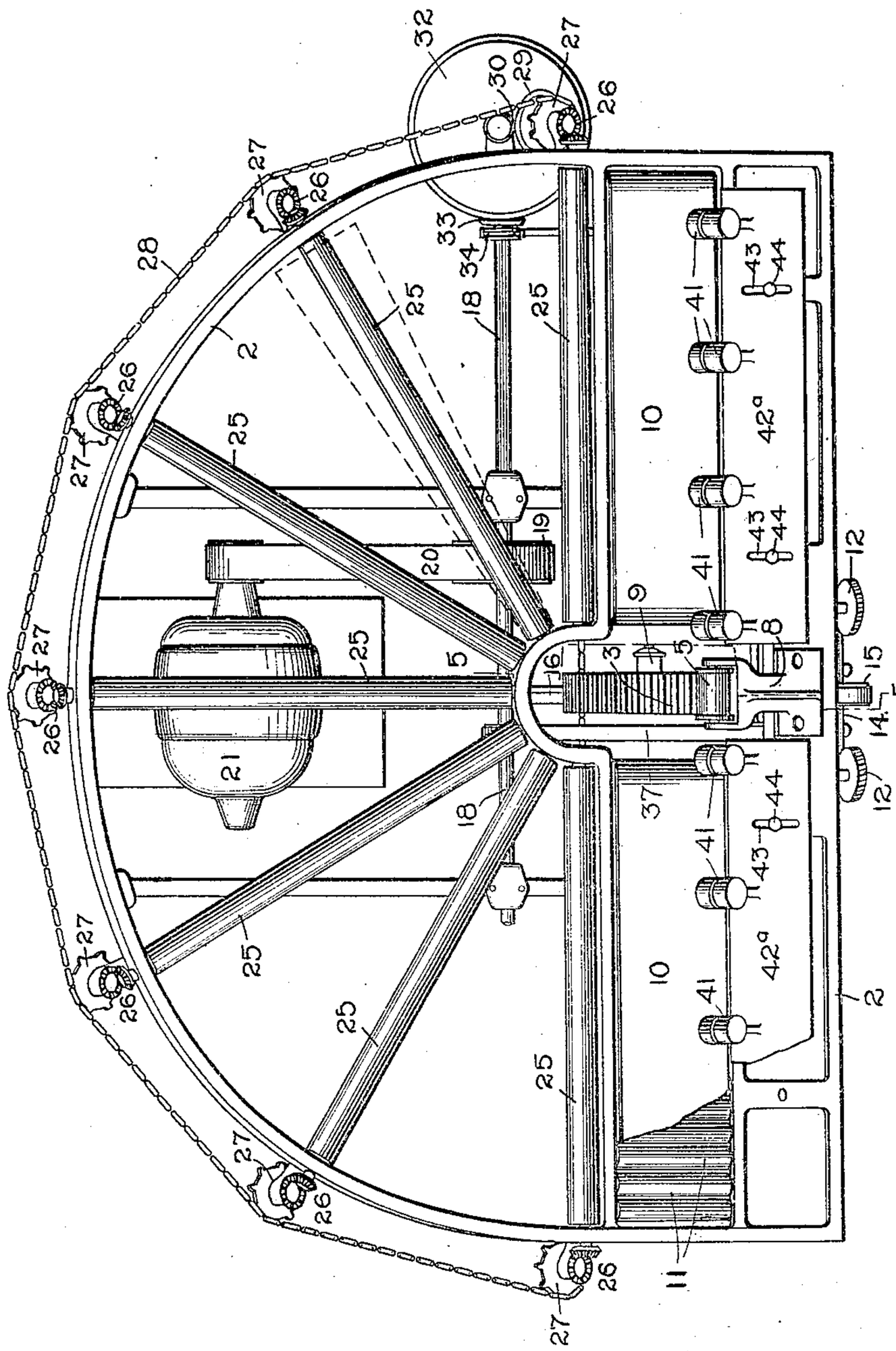
4 SHEETS—SHEET 2.

Fig. 2.



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4 SHEETS—SHEET 3.

Fig. 3.

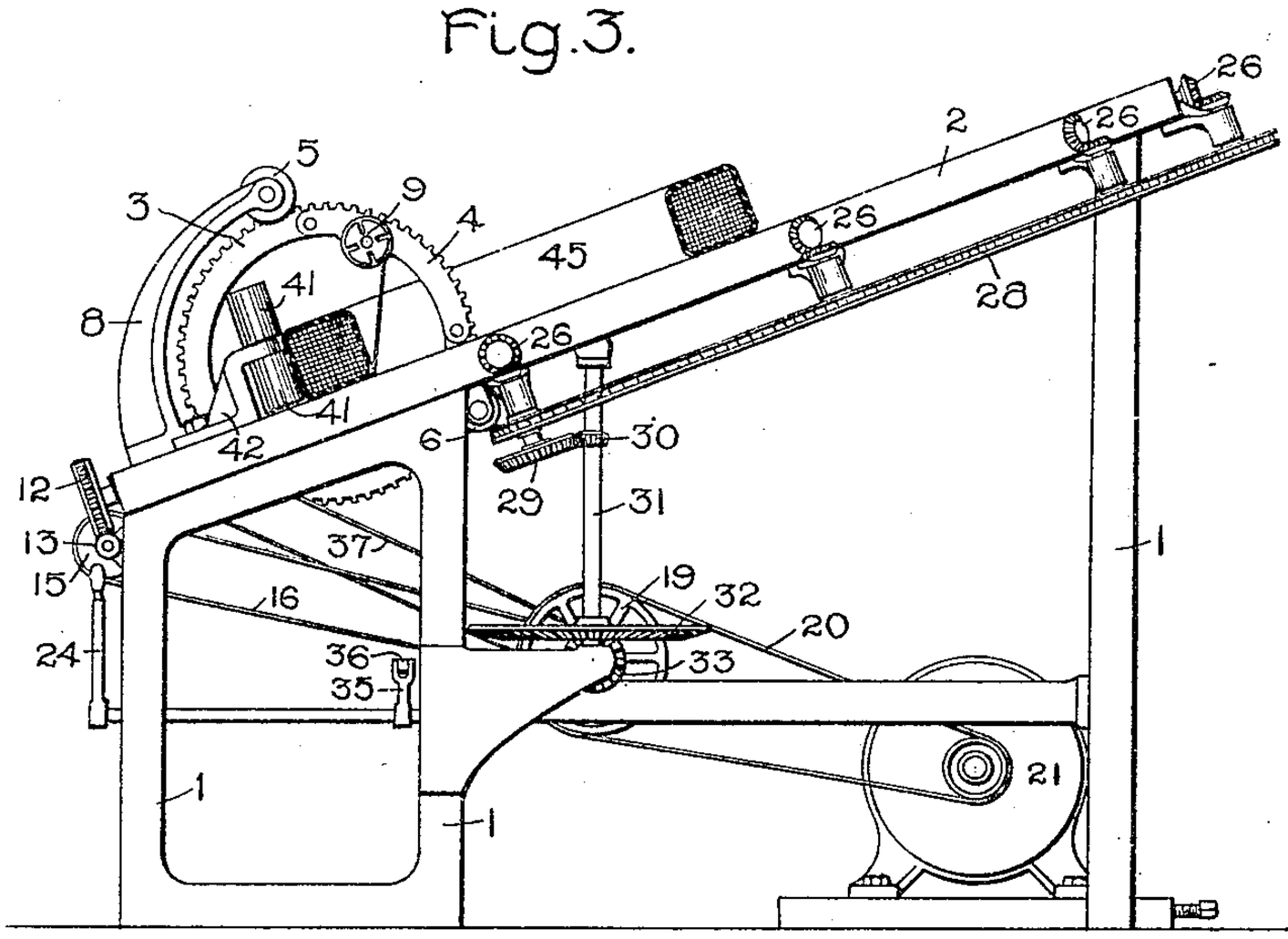
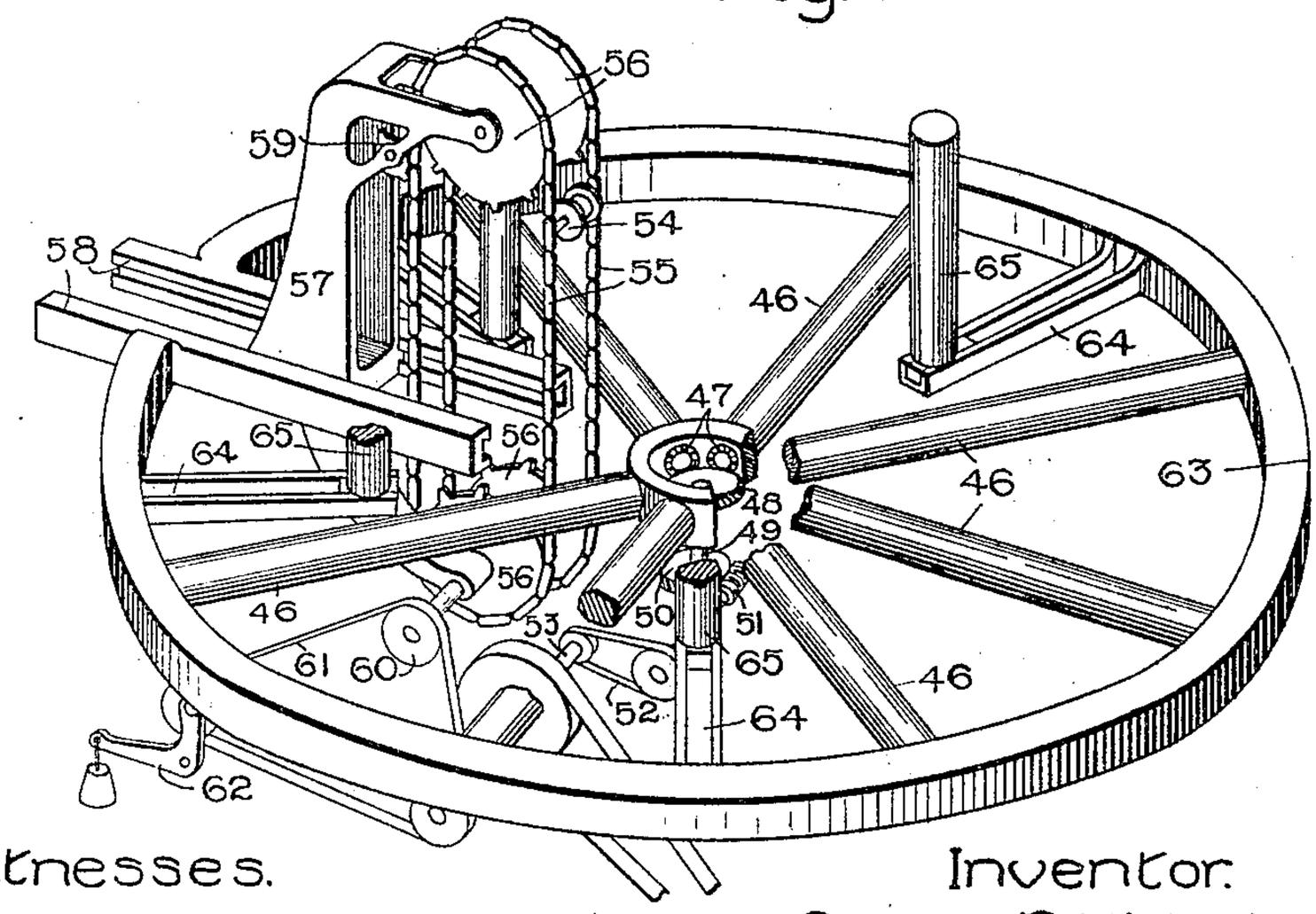


Fig. 4.



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No. 801,287. PATENTED OCT. 10, 1905.

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MACHINE FOR TAPING COILS.

APPLICATION FILED APR. 16, 1902.

4 SHEETS—SHEET 4.

Fig. 5.

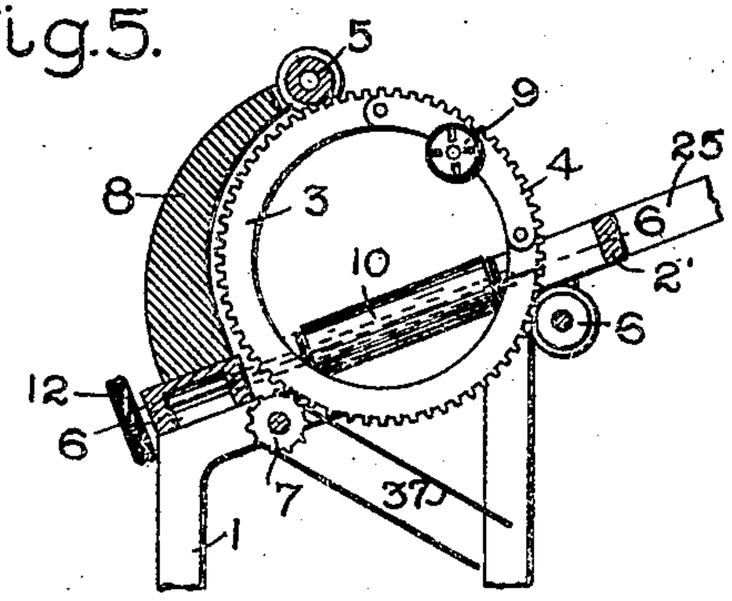


Fig. 6.

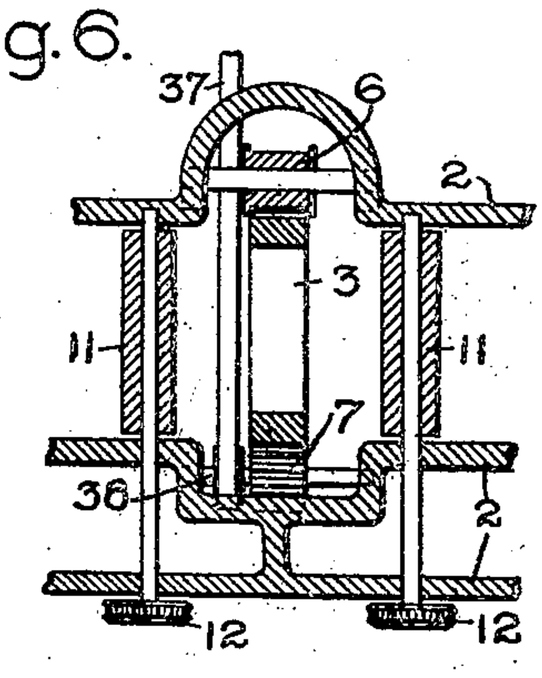


Fig. 7.

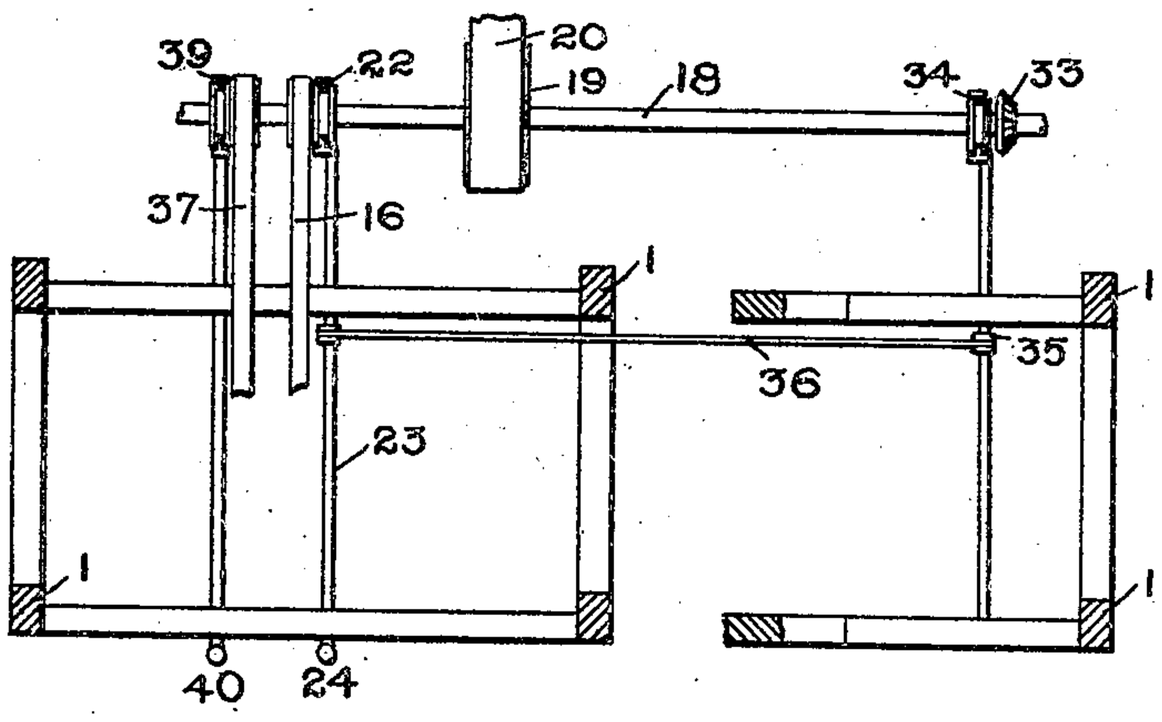
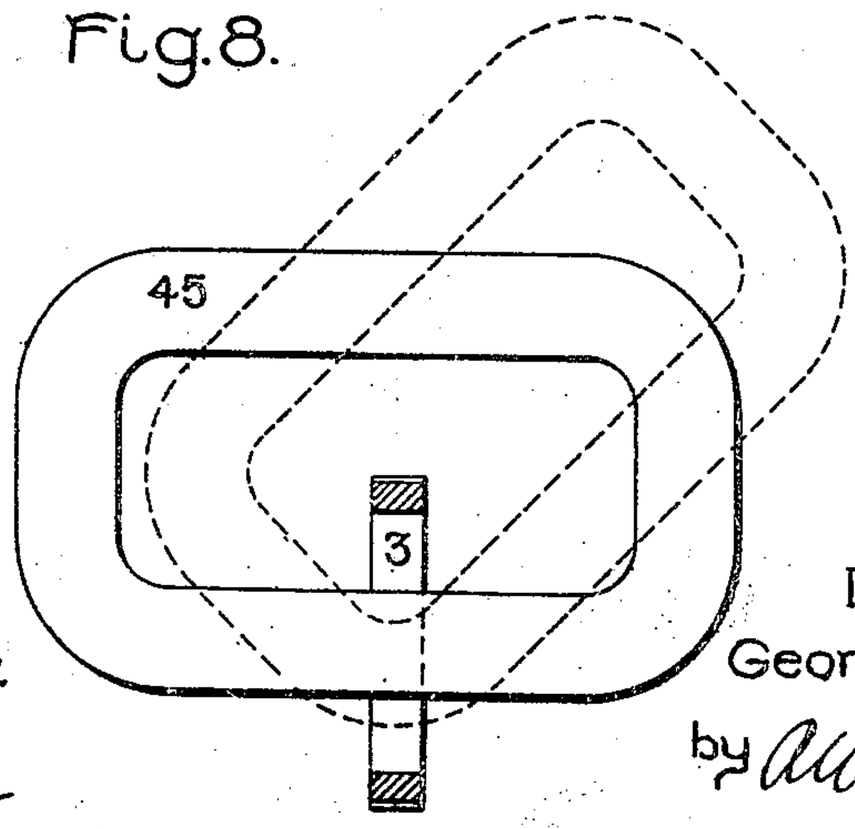


Fig. 8.



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UNITED STATES PATENT OFFICE.

GEORGE P. WHITTLESEY, OF WASHINGTON, DISTRICT OF COLUMBIA, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

MACHINE FOR TAPING COILS.

No. 801,287. Specification of Letters Patent. Patented Oct. 10, 1905.

Application filed April 16, 1902. Serial No. 103,164.

To all whom it may concern:

Be it known that I, GEORGE P. WHITTLESEY, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Machines for Taping Coils, of which the following is a specification.

This invention relates to mechanism for winding insulating-tape on the coils of electrical apparatus, such as transformers and generators. Its object is to accomplish by automatic machinery what has heretofore been done generally by hand. In making coils of the kind mentioned it is customary to wind an insulated conductor of either round or rectangular cross-section into the desired shape of coil, such as a cylinder or a rectangle with rounded corners. This coil is then carefully wound with tape, each turn partly overlapping the previous one. After winding, a coating of shellac or other insulation is applied and then another layer of tape is wound on. This operation is repeated as often as may be thought necessary to thoroughly insulate the coil.

My invention consists of a table or frame for supporting the coil, a tape-winder or bobbin-carrier arranged at a certain point in said frame, and means for carrying the coil past the winder. For rectangular coils provision is made for turning them at the corners. For cylindrical coils the winder is made radially adjustable to adapt the machine to different sizes of coils. The winder and the coil-carrier are independently controllable by clutches or otherwise, so that either can be stopped and started at will without interfering with the other.

In the accompanying drawings, Figure 1 is a front elevation of a machine for taping rectangular coils. Fig. 2 is a top plan view of the same. Fig. 3 is an end elevation of the same, showing a coil in section. Fig. 4 is a perspective view of a machine for winding cylindrical coils. Fig. 5 is a sectional elevation on the line 5 5, Fig. 2. Fig. 6 is a section on the line 6 6, Fig. 5. Fig. 7 is a plan view of the controlling-clutches and their operating devices. Fig. 8 is a diagram showing the operation of the machine.

Referring first to Figs. 1, 2, and 3, it will be seen that on suitable standards or legs 1 is supported a frame 2, having a straight front edge and a semicircular rear edge. This frame is preferably inclined downwardly from back to front at an angle of about twenty degrees, more or less, to the horizontal, for a purpose hereinafter explained. At the center of the front is supported a rotatable annular bobbin-carrier consisting of a ring 3, standing in a vertical plane and having a hinged or removable segment 4. The bobbin-carrier is held upright by three rollers 5 6 7, the first journaled in an arm 8, fastened to the front of the frame and overhanging the bobbin-carrier, while the others are journaled in bearings secured to the under side of the frame 2. The edge of the bobbin-carrier is toothed, and one of the rollers, as 7, is also toothed, this constituting a pinion by means of which the bobbin-carrier can be revolved in its own plane. On one side of the bobbin-carrier is a reel or bobbin 9, on which the supply of tape is wound.

Along the front part of the machine extend two rectilinearly-movable coil-carriers, each terminating near the bobbin-carrier. The coil-carriers consist, preferably, of endless belts 10, running over a series of idle supporting-rollers 11 and driven by one of the end rollers, over which the belt passes, both belts running in the same direction—say to the right in Figs. 1 and 2. Suitable mechanism is provided for driving each belt, preferably comprising a worm-gear 12 on the shaft of one of the driving-rollers meshing with a worm 13 on a shaft 14, on which is a pulley 15, connected by a belt 16 with a driving-pulley 17 on the main shaft 18, which runs parallel with the front of the machine in suitable bearings secured to the standards 1. Power is conveyed to the main shaft by a pulley 19 and belt 20 from any convenient source, such as an electric motor 21. A clutch 22, operated by a rock-shaft 23 and lever 24, enables the operator to start and stop the coil-carrying belts at will.

In the semicircular rear portion of the frame are journaled a plurality of rollers 25, arranged radially to that point of the machine where the bobbin-carrier is located. These rollers are for the purpose of turning a rectangular coil when a corner is reached. The rollers are shown as cylindrical; but they may be coned, if desired, as indicated by the dotted lines in Fig. 2. Each roller is geared by bevel-gears 26 at

its outer end to a short upright shaft carrying a sprocket-wheel 27 at its lower end. A chain belt 28 runs over all the sprockets, so that all the rollers move simultaneously. On the shaft of one of the sprockets is a bevel-gear 29, meshing with a pinion 30 on an upright shaft 31, which has a large bevel gear-wheel 32, meshing with a pinion 33, loose on the main shaft 18. A clutch 34 connects and disconnects the pinion and shaft and is operated by the lever 24, being connected with the rock-shaft 23 by a rock-arm 35 and rod 36. The two clutches 22 and 34 are so arranged that each one will be thrown out when the other is thrown in, so that the carrier-belts 10 will not be operated when the radial rollers are rotating, and vice versa.

The main shaft may be connected with the bobbin-carrier by means of a belt 37, running over a pulley 38 on the same shaft as the pinion 7. A clutch 39 and lever 40 control this belt and the operation of the bobbin-carrier independently of the movements of the coil-carriers.

Adjacent to each coil-carrier belt 10 is a set of guide-rolls 41, journaled in arms 42, projecting from plates 42ª, which are adjustable on the frame 2 transverse to the line of movement of the belts 10, as by means of slots 43 and clamping-bolts 44.

When a coil 45 is placed on the machine, its weight causes it to slide down against the guide-rolls, which are so adjusted that the coils passes centrally through the bobbin-carrier, the removable segment 4 permitting the coil to be inserted edgewise into said bobbin-carrier. On starting the machine the bobbin-carrier revolves, winding the tape from the bobbin onto the coil as the latter is carried slowly along by the carrier-belts 10. The machine must be so timed that each turn of tape will properly overlap the edge of the preceding turn. When the rounded corner of the rectangular coil is reached, the carrier-belts are stopped and the radial rollers are set in operation and act to swing the coil in its own plane, turning on the corner as a center, the taping still going on as the coil swings, Fig. 8. When the corner has been turned and the next straight side of the coil comes against the guide-rolls, the radial rollers are stopped and the carrier-belts started again.

It will be seen that the diameter of the bobbin-carrier can readily be made sufficient to permit it to work on the largest coils which the machine is capable of handling.

In the modified machine shown in Fig. 4 the coil-carrier is composed entirely of radial rollers 46, whose inner ends are provided with bevel-pinions 47, meshing with a common bevel-gear 48 on an upright shaft 49, driven by a worm-gear 50 and worm 51, which receives motion by belt 52 from the main shaft 53. The bobbin 54 is carried on two parallel endless upright chain belts 55, running over sprocket-wheels 56, journaled in a carriage 57, which slides in ways 58 radial to the central driving-shaft 49. Small star-wheels 59 on a transverse shaft engage with the chains and cause them to run at the same speed. One of the lower sprocket-wheels has its shaft extended to carry a belt-pulley 60, over which runs a belt 61, driven by the main shaft. A belt-tightener 62 keeps the belt taut and permits the carriage to be moved back and forth in its ways without disengaging the belt. On the frame 63 are radial guides 64, in which are adjustably mounted upright guide-rolls 65. In operation the cylindrical coil is placed on the rollers with its axis upright and concentric with the central shaft, and the guide-rolls are adjusted to keep it in this position. A link in each chain belt is then opened and both chains are passed through the coil and the ends reconnected, the carriage having been properly moved along the ways to bring the coil midway between the two sides of each chain. The machine is then started and the radial rolls rotate the coil at the proper speed to insure the lapping of the tape as it is laid on by the bobbin in its travel up and down outside and inside the coil.

In both modifications it may not be possible always to tape the entire coil, since at the end or place where the leads come out from the coil the tape must be carried under them, because as a rule they must not be bent aside for fear of injuring the insulation. This part of the coil, therefore, must frequently be wound by hand; but all other parts can be more quickly and evenly wound by the machine.

It is evident that endless chain belts might be substituted for the annular bobbin-carrier shown in Figs. 1, 2, and 3 and that either this or the annular one might be mounted on an adjustable carriage, as in Fig. 4.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. A coil-taping machine, comprising a bobbin-carrier, an inclined support for the coil, whereby the latter tends to move sidewise under the action of gravity, and means for engaging said coil at the lower side and moving it past said bobbin-carrier.

2. A coil-taping machine, comprising an endless bobbin-carrier, means for engaging one side of said coil and moving it past said bobbin-carrier, and means for independently controlling the movements of the bobbin-carrier and coil.

3. A coil-taping machine, comprising an endless bobbin-carrier, means for engaging one side of said coil and moving it through said carrier, and guide-rolls for determining the position of the coil with reference to said carrier.

4. A coil-taping machine, comprising an endless bobbin-carrier, and coil-carrying rollers radial to said bobbin-carrier.

5. A coil-taping machine, comprising an endless bobbin-carrier, coil-carrying rollers radial to said bobbin-carrier, and means for driving said rollers simultaneously.

6. A coil-taping machine, comprising an annular bobbin-carrier, means for revolving it in a given plane, and coil-carriers moving rectilinearly and transversely to said plane.

7. A coil-taping machine, comprising an endless bobbin-carrier, means for feeding a rectangular coil through said carrier in a rectilinear direction, and means for turning the coil at the corners.

8. A coil-taping machine, comprising an annular bobbin-carrier, means for revolving it in a given upright plane, rectilinearly-moving coil-carriers operating transverse to said plane, and radial coil-carriers operating in lines concentric with the point of taping.

9. A coil-taping machine, comprising an endless bobbin-carrier, means for feeding a rectangular coil through said carrier in a rectilinear direction, means for turning the coil at the corners, and means for operating said two kinds of coil-carriers at different times.

10. A coil-taping machine, comprising an endless bobbin-carrier, an inclined table for supporting the coil, and guide-rolls against which the coil rests.

11. A coil-taping machine, comprising an endless bobbin-carrier, coil-carrying devices adjacent to said bobbin-carrier, and guide-rolls adjustable transversely to the line of travel of the coil.

12. A coil-taping machine, comprising an endless bobbin-carrier, an inclined table, coil-carrying belts adjacent to said bobbin-carrier, radial coil-carrying rolls, sprocket-wheels geared to said rolls, and a chain connecting said sprocket-wheels.

In witness whereof I have hereunto set my hand this 15th day of April, 1902.

GEO. P. WHITTLESEY.

Witnesses:

BENJAMIN B. HULL,

HELEN ORFORD.