Dec. 23, 1941. C. P. DEAL ET AL 2,267,678

BOBBIN STRIPPER

Filed Dec. 22, 1938 7 Sheets-Sheet 1

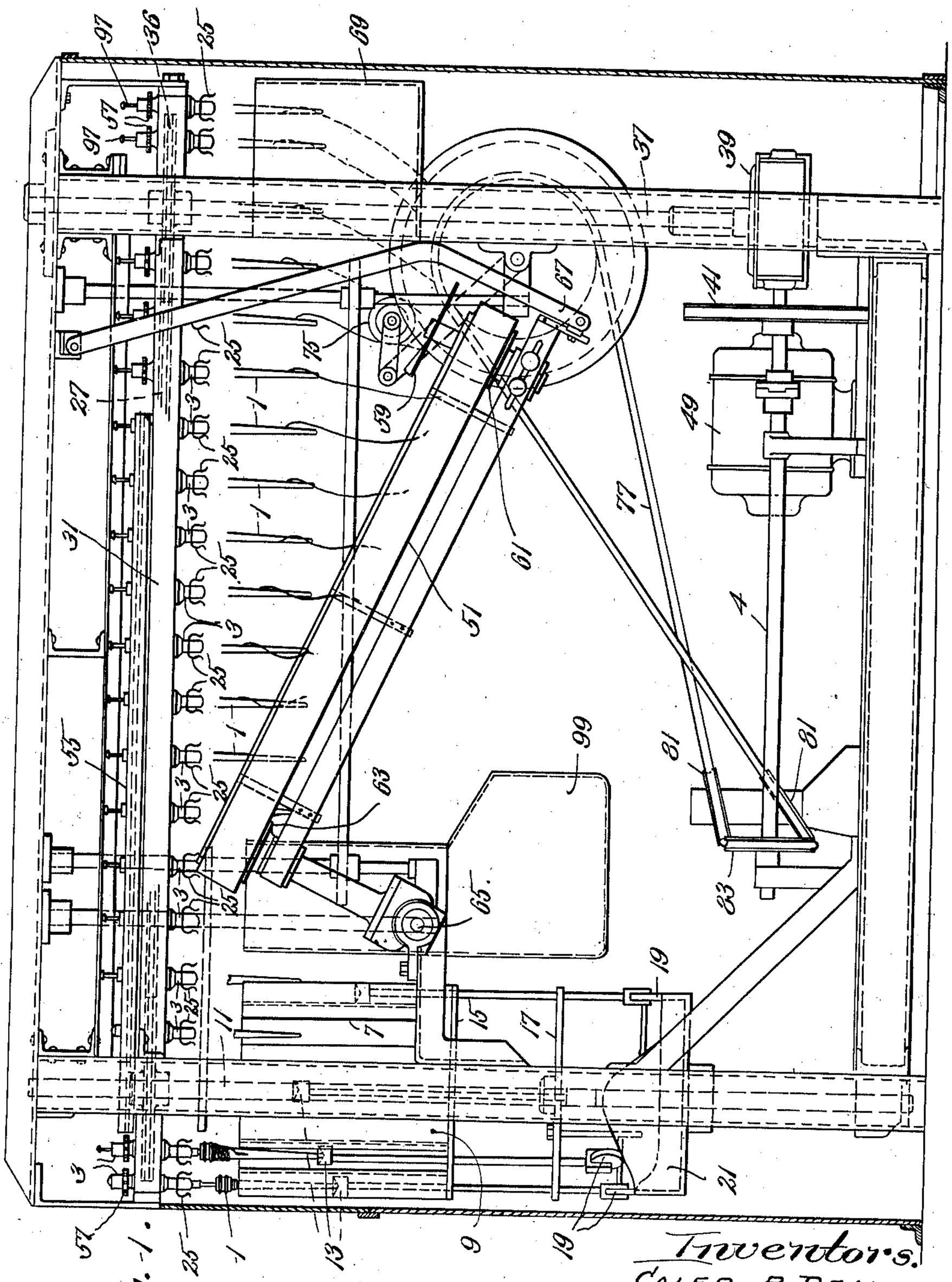

Fig. 1.

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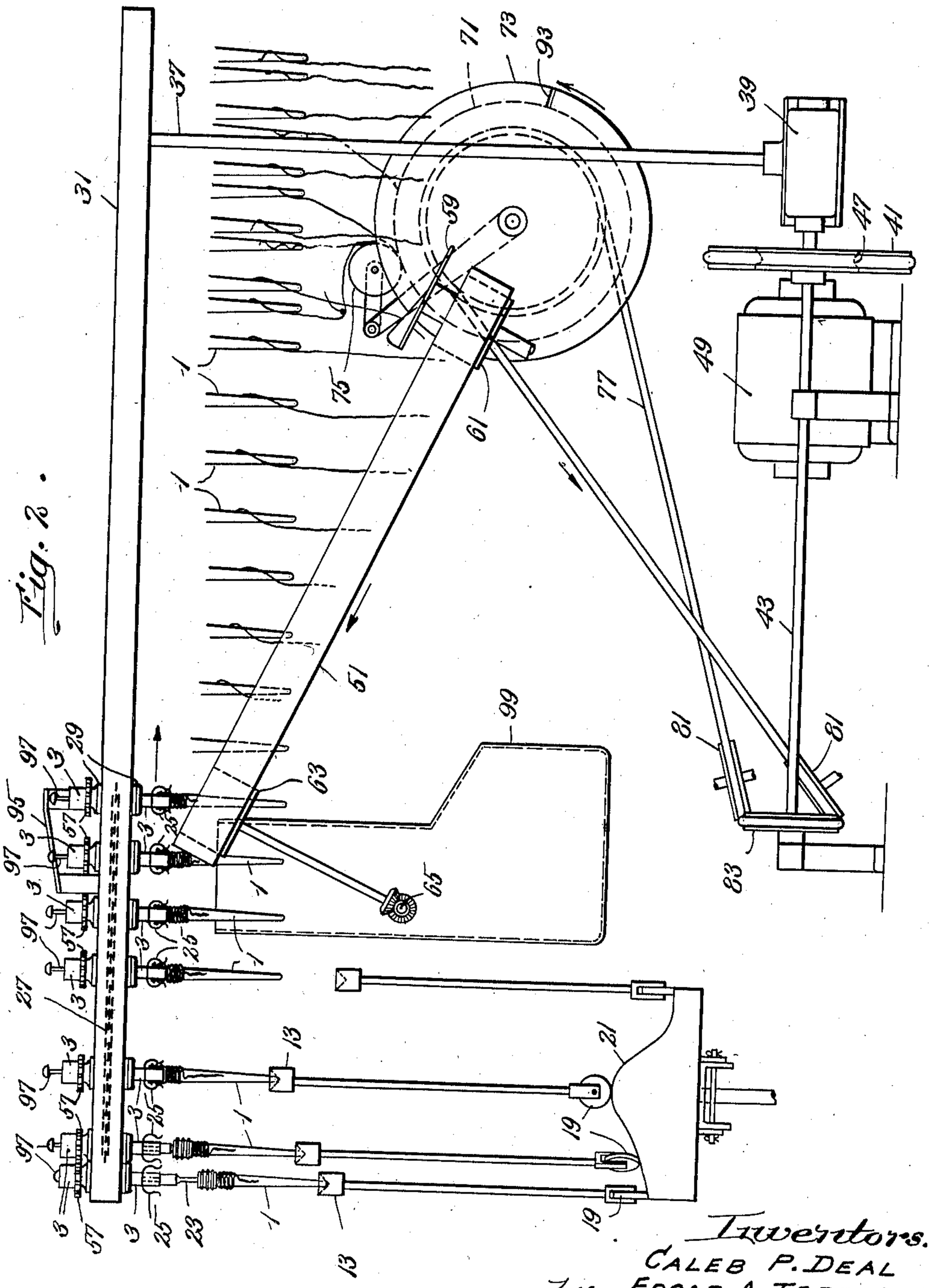
Fig. 2.



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BOBBIN STRIPPER

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7 Sheets-Sheet 3

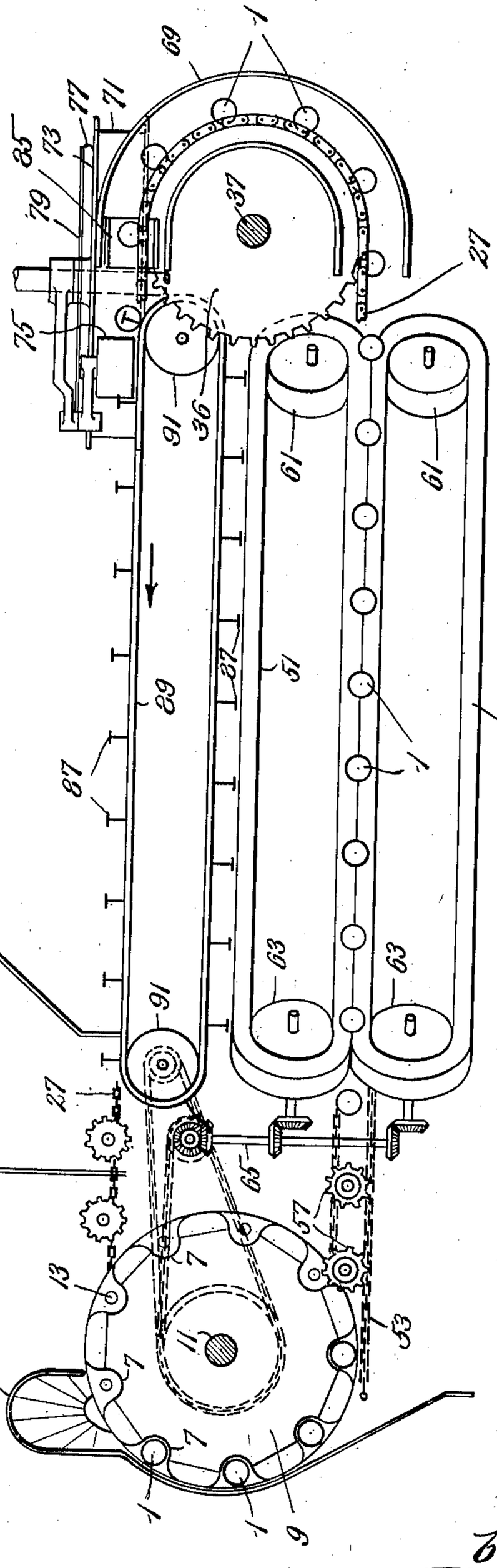

Fig. 3.

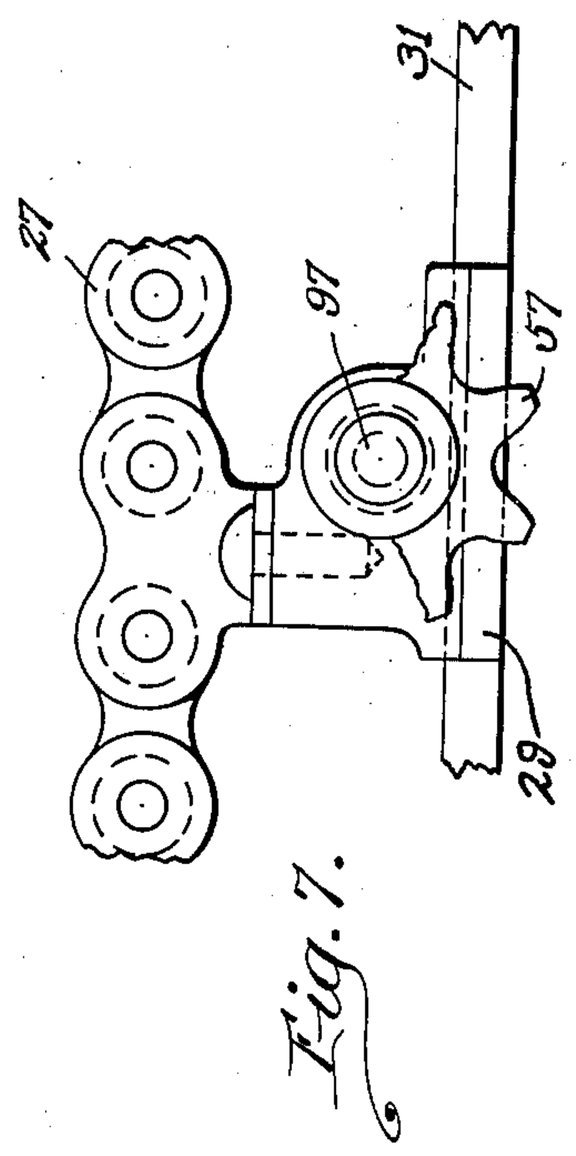

Fig. 7.

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BOBBIN STRIPPER

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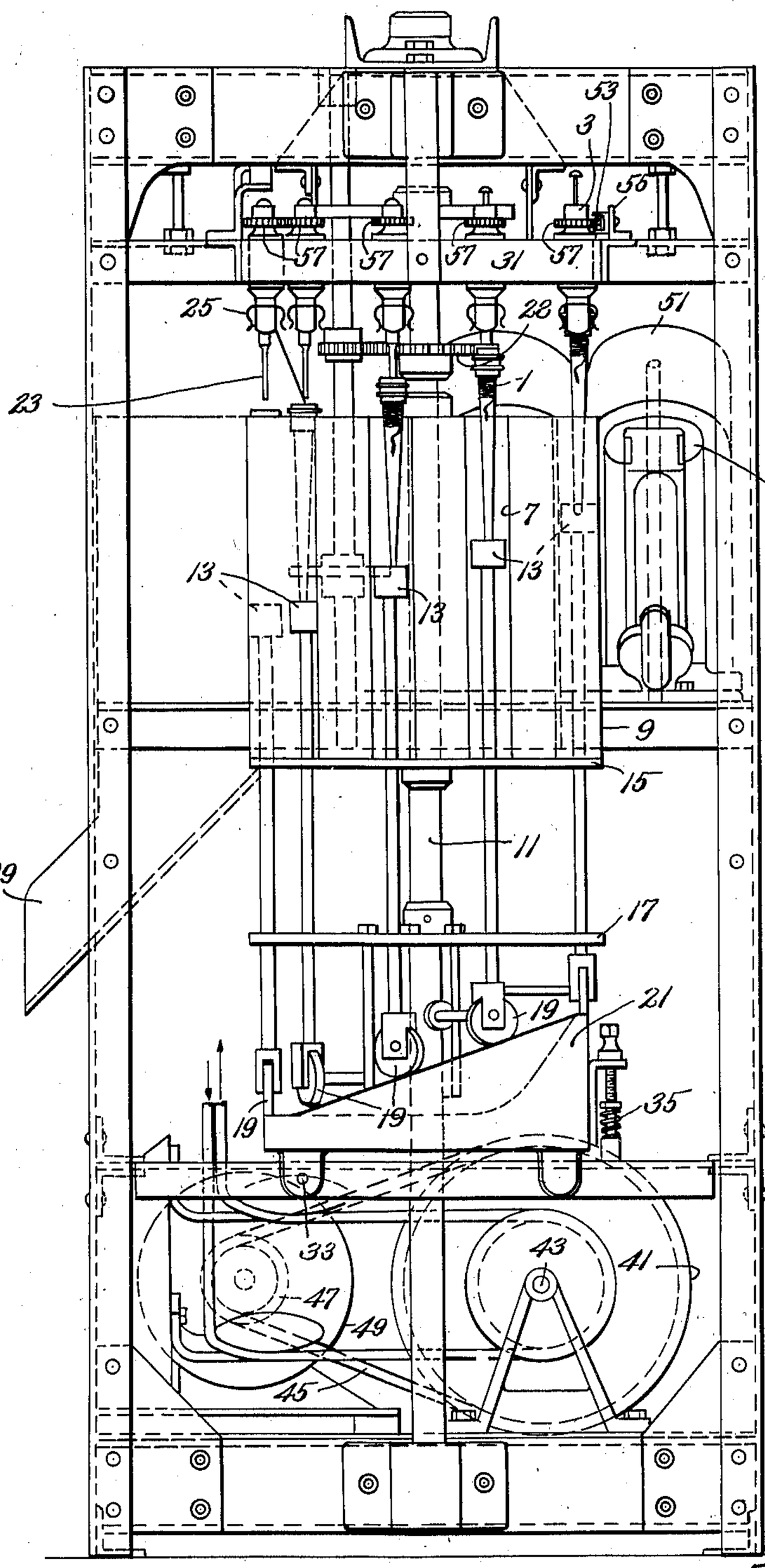

Fig. 4.

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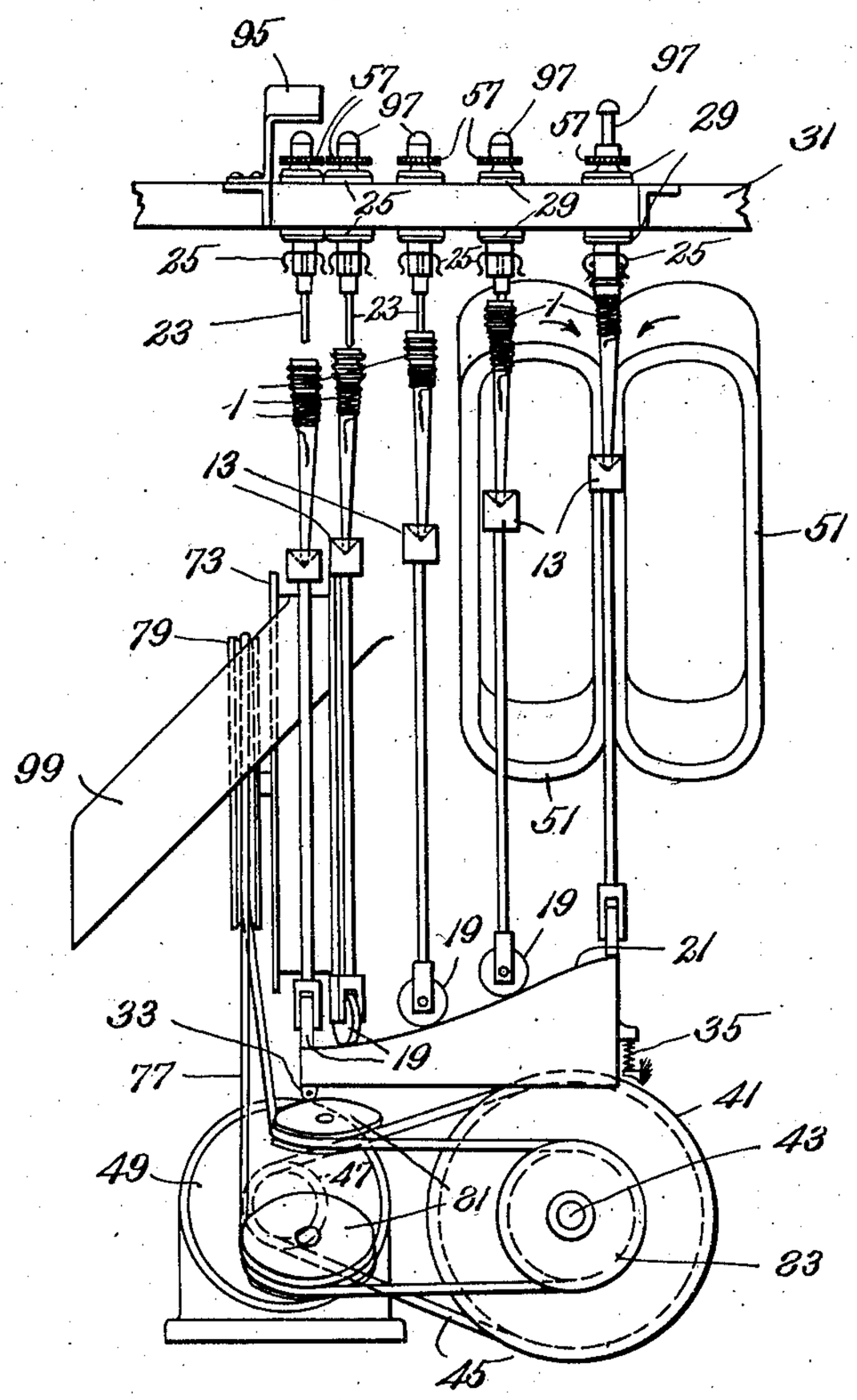
Fig. 5.



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BOBBIN STRIPPER

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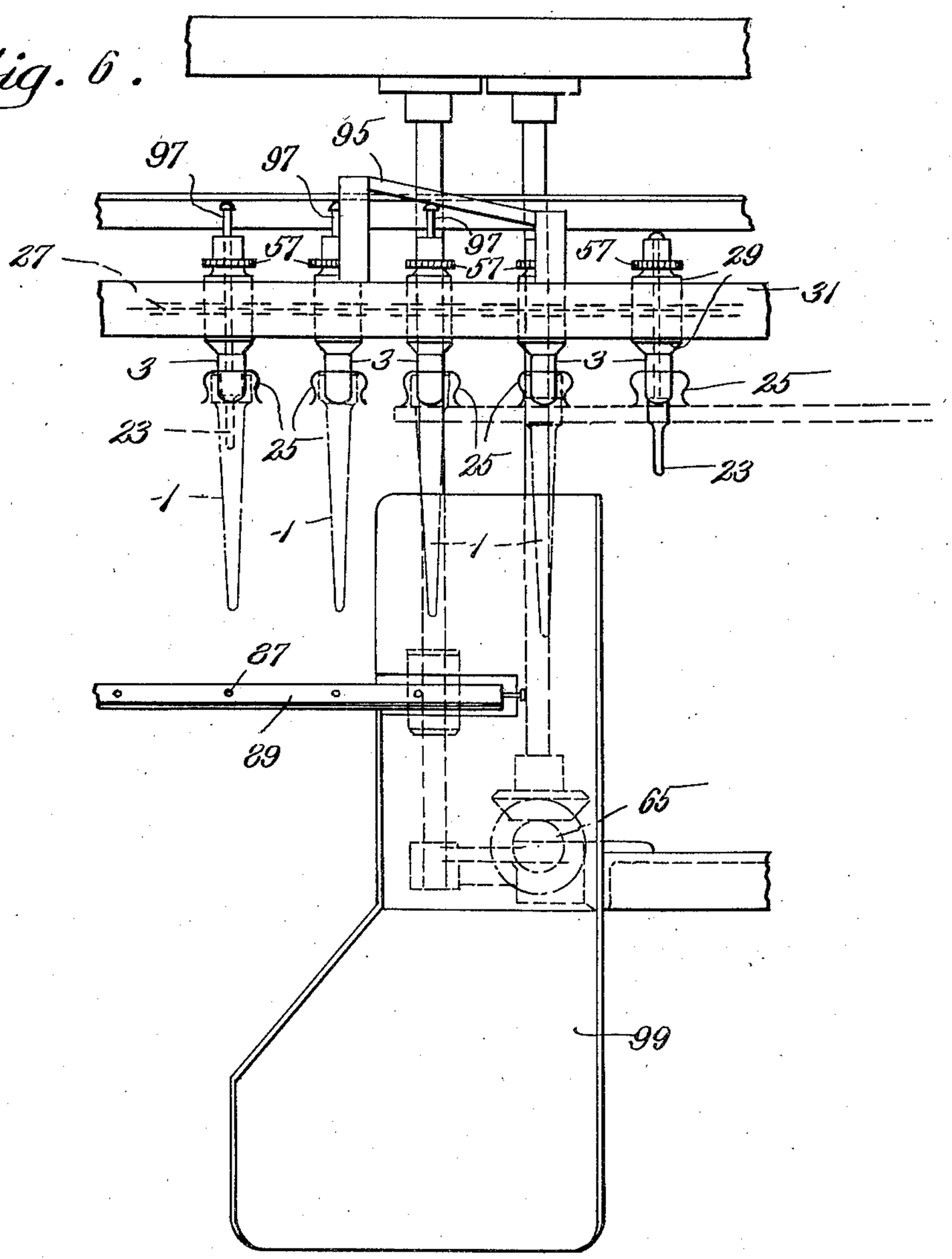
Fig. 6.



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BOBBIN STRIPPER

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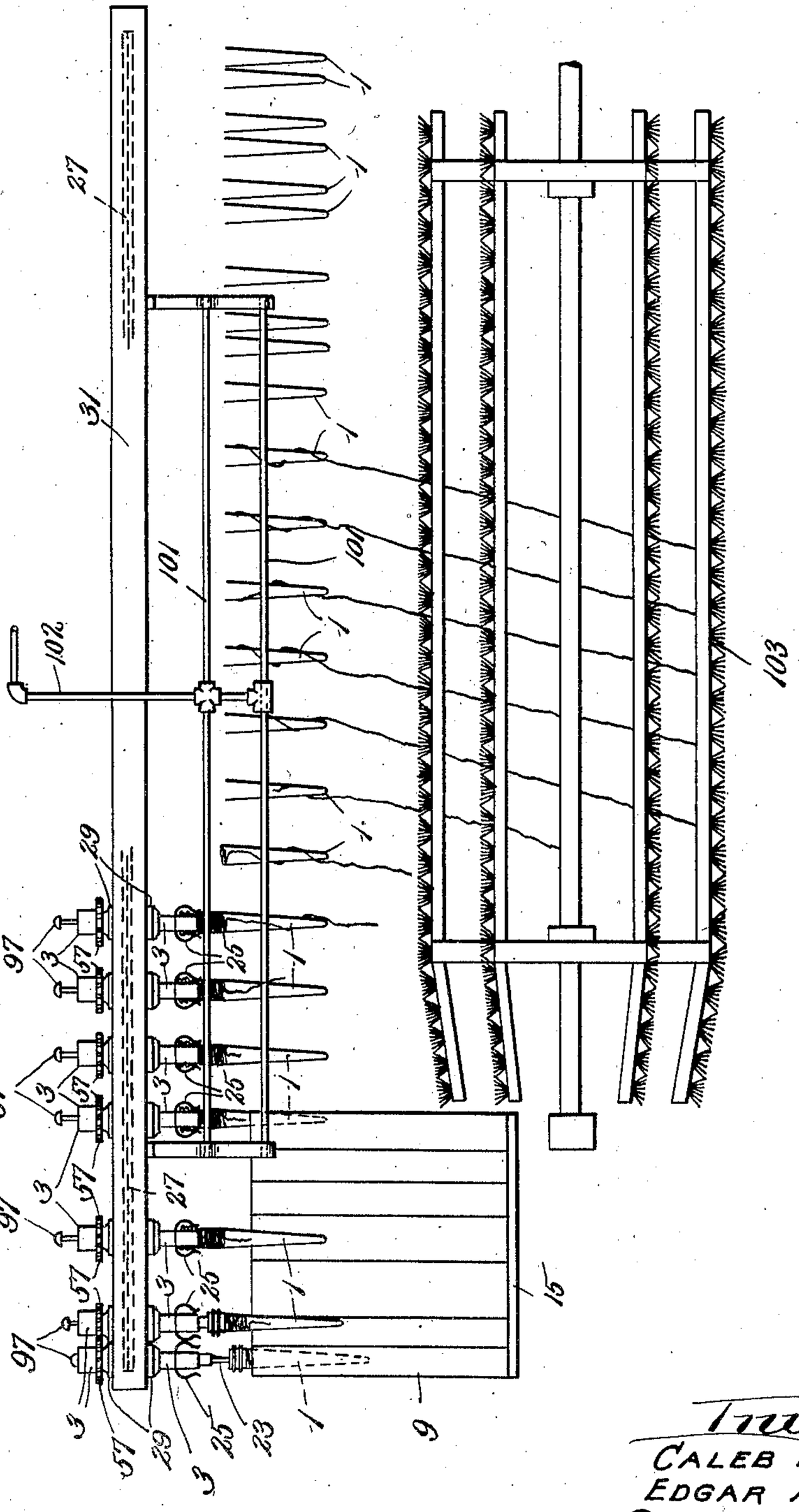
Fig. 8.



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UNITED STATES PATENT OFFICE

2,267,678

BOBBIN STRIPPER

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Application December 22, 1938, Serial No. 247,254

20 Claims. (Cl. 28—19)

This invention relates to apparatus for stripping waste yarn from bobbins, particularly for removing such waste from silk or rayon loom bobbins which must be stripped without marring or roughening of their smooth surfaces, or scratching or chipping the enamelled finish thereof, as such injury would result in fracture of these yarns during weaving.

The invention aims to provide rapid and effective bobbin stripping devices, particularly adapted for rayon and silk bobbins, which in their action shall make no abrasive or scraping contact with any surface on the bobbin which comes in contact with the yarn.

To this end, and in accordance with one principle of the invention, the waste-bearing bobbins are supported, fed, and guided through the machine solely by engagement with their heads, or with surfaces in connection with the heads such as the rings on the outside or the bores within the heads, in pendent relation with their tips free and pointing downward, while subjecting the wound mass of waste yarn on the barrel of each bobbin to wiping or brushing contact with yielding surfaces for the purpose of freeing or starting the end of the yarn loose from the wound mass and bringing it down toward or below the tip of the bobbin in preparation for stripping the bobbin by unwinding the yarn therefrom off from the tip of the bobbin. Such unwinding or stripping may be accomplished in any known or preferred way, either by the weight of the free end of the yarn itself, or with the aid of jets of air, or through the use of rotating unwinding rolls or reels pulling the yarn off over the tips of the bobbins.

In accordance with another principle of the invention, the bobbins are mechanically rotated on their axes in the presence of means for loosening and freeing the ends. In applying this principle, such freeing means may comprise the yielding brushing or wiping surfaces referred to, or jets of compressed air, or any other type of gentle force. Through such rotation, not only is the entire circuit of the wound mass on the bobbin and thus the end or extremity of the yarn itself brought within range of and subjected to the action of the end-freeing means when such is employed in addition to gravity, but the unwinding of the wound mass of waste is effectively begun.

Illustrative embodiments of the invention are shown in the accompanying drawings in which—

Fig. 1 is a side elevation of a machine embodying the foregoing principles in which yielding wiping or brushing surfaces are used to free the ends from the bobbins while the latter are rotated on their axes, the free ends then being engaged and drawn off by a rotating cylinder or reel.

Fig. 2 is a simplified view of the same, reduced to the main working parts of the machine.

Fig. 3 is a more or less diagrammatic plan view of the same, also illustrating only the main working parts.

Fig. 4 is an elevation on an enlarged scale from the left-hand end of Fig. 1, showing the mechanical means for loading the bobbins onto the conveyor chain which carries them through the machine, with the feeding funnel and housing for the feed drum removed.

Fig. 5 is a more or less diagrammatic end elevation similar to Fig. 4, but reduced to a showing of the working parts alone.

Fig. 6 is a detail side elevation from the opposite side of the machine from that shown in Fig. 1, and on an enlarged scale, showing the means for discharging the stripped bobbins from the conveyor chain, and also a portion of the drive for the end-starting belts and the traveling yarn guides.

Fig. 7 is a detail plan view showing the mounting and guiding of the feeding spindles on the conveyor chain.

Fig. 8 shows an alternative form in which compressed air jets are employed instead of yielding brushing or wiping surfaces to free and bring down the ends of yarn from the bobbins to enable them to be engaged by the unwinding cylinder.

In accordance with the invention, the bobbins 1 to be stripped are positively fed through the machine while held by their heads in tip-downward position and in spaced relation to each other by means of individual feeding and rotating spindles 3. Either wooden bobbins or paper cops can be stripped by this machine. The bobbins 1 are dropped tip downward one after another by the attendant into a funnel 5, Fig. 3, which guides them downward and laterally into successive vertical grooves 7 in the outer surface of drum 9 fixed on vertical shaft 11. Plungers 13 carried in holes in bottom plate 15 of the drum and in guide-plate 17 on the shaft travel upward in each groove 7 as the rollers 19 on their lower ends ride up the high point of stationary cam 21, forcing the head-end of each bobbin dropped into the funnel in turn onto the sliding central pins 23 of the spindles 3 and into spring clips 25 fixed on sleeves rotatably mounted in bearings formed in outward extensions of special links in endless feed-chain 27, Figs. 3 and 7, traveling around the entire top of the machine, the special links having guide

portions 29 engaging a closed track 31 around the top of the machine just outside the course of the chain. Cam 21 is pivoted at 33 and supported by spring 35 to compensate for variation in the length of bobbins 1. Chain 27 drives the feeder drum 9 by passing around a sprocket (not shown) on drumshaft 11, and the chain itself is driven by a similar sprocket 36, Figs. 1 and 3, fixed on vertical shaft 37 at the opposite end of the machine, the latter being driven through reduction gear 39, large pulley 41 on the shaft 43 thereof, belt 45, and small pulley 47 on the shaft of motor 49.

The travel of the chain 27 carries the bobbins one after the other in single file between two end-freeing belts 51 comprising sponge rubber surfaces mounted on a suitable canvas or leather backing, having courses running at the same speed and in the same direction in contact with each other along and directly below a portion of one run of feed-chain 27, so that they travel obliquely downward in unison and have a horizontal component of travel matching the speed of travel of chain 27. Thus, the bobbins which have been forced onto the spindles 3 within the grooves of feed-drum 9 by plungers 13 are carried along suspended by their heads in tip-downward relation and entered between the two belts 51, the sponge rubber surfacing thereon enveloping the yarn bearing portion of the barrel of each bobbin just below its head. At the same time, a stationary length of chain 53, mounted on angle iron 55 to form a rack, engages with a sprocket 57 fixed on each spindle 3, to rotate the latter in its bearing on its special link and thus to impart axial rotation to the bobbin reversely of its wind while lightly embraced between the opposing runs of sponge-surfaced belts 51. By reason of the diverging paths of belts 51 with respect to feed-chain 27, belts 51 have a downward movement axially of the bobbins during which their sponge rubber surfaces exert a wiping action over the entire length and circuit of the slowly rotating bobbins in a direction from head to tip. As the sponge rubber embraces practically the entire circuit of the bobbin barrel, this spiral wiping action reversely to the wind of the bobbin effectually frees the end of yarn and retains its grip on the latter after the bobbin has been drawn from between the two belts 51.

The free ends of yarn depending from the bobbins and gripped between or clinging to the surfaces of the sponge rubber are carried between two overlapping disks 59, one fixed and the other with a plane scalloped edge and mounted on the shaft to which one lower sponge-belt pulley 61 is fixed and rotated thereby, such disks acting as shears to trim off the trailing ends to a uniform length so that they will hang free without entanglement. An overlying guard with V-shaped notch prevents any portion of a bobbin entering the bite of the shear. Belts 51 are driven through pulleys 63, by means of appropriate shafts and bevel gears, sprockets, and a chain, from feed drum shaft 11, as shown in Fig. 3. The entire assembly of end-freeing belts 50 is adjustable about the axis of horizontal bevel gear shaft 65, to raise or lower the delivery ends of such belts, as to match the speed of their horizontal component of travel to that of the bobbins, or to give the bobbins a longer dwell between the belts. The position of the lower end is adjustably determined by the point of its attachment to supporting link 67.

The bobbins with their pendent trimmed ends of yarn reverse their direction of travel, as the feed-chain 27 goes around its sprocket 36 on shaft 37 at the far end of the machine, within a U-shaped chest 69 protecting the ends from air currents which might cause entanglements or premature uncoiling, and are trailed over fabric-covered surface 71 of a short flanged reel 73, being pressed into adhering contact with this surface or the surface of previously-wound waste yarns thereon by a spring-loaded gravitating roller 75. Winding roll 73 is rotated by belt 77 passing around pulley 79, skew pulleys 81 and pulley 83 fixed on reduction gear shaft 43. A leather flapper 85 is provided in the bottom of U-shaped chest 69 adjacent reel 73 to prevent air drafts from blowing the loose ends of yarn out of reach of the nip between reel 73 and roller 75.

To pull the yarn from each bobbin in an axial direction while the bobbins continue their movement around the machine and thus away from a position in which their tips point directly toward the winding reel 73, traveling guides 87 on a belt 89 carried by flanged pulleys 91 are caused to travel along below and in line with each bobbin as the latter starts away from reel 73, to give the unwinding yarn the right lead. This belt is driven in accurately timed relation to the travel of feed-chain 27 by appropriate chain-and-sprocket connection with feed drumshaft 11, as indicated in Fig. 3. As feed-chain 27 carrying the bobbins moves away from winding reel 73 and toward drum 9, the remaining waste yarn on the successive bobbins is rapidly drawn off over the tips of the respective bobbins, reeves around the guide pins 87 and is wound up on the surface of reel 73.

A cut 93 in the opposing flanges of reel 73 facilitates cutting loose the wound mass of waste yarn accumulated on the reel.

As the bare and empty bobbins approach drum 9, a stationary oblique cam 95, Figs. 2 and 6, fixed directly over the path of the bobbins, engages and depresses the upper ends 97 of the sliding central pins 23 of spindles 3, thus causing the shoulder on the lower end of pins 23 which fits within the counterbore of each bobbin to thrust the head of the bobbin out from the grip of spring clips 25. When this happens, the bobbin is no longer supported, and falls down chute 99 into a catcher box, to be subsequently removed for rewinding.

An alternative form of the invention is shown in Fig. 8, in which compressed air jets are employed instead of yielding brushing or wiping surfaces to free and bring down the ends of yarn from the bobbins to enable them to be engaged by the unwinding cylinder. In this instance, the feed-chain 27 and its bobbin-supporting and discharging appurtenances, and also the feed drum 9 with its operating parts, are or may be as described in the first embodiment, but the oblique sponge-rubber wiper belts 51 are replaced by two pairs of compressed air pipes 101 fed by pipe 102 from a source of compressed air, one pair located at each side of and parallel to the course of the bobbins as they leave feed drum 9, one pipe at each side being at approximately the level of the heads of the bobbins, and another at midlength of the bobbins, and all four equipped with orifices directing jets of compressed air at high speed obliquely downward against the waste-bearing portions of the bobbin barrels, to start the ends free from the wound mass and blow them down so that they can be engaged by the winding reel. Also, the short reel 73 rotating on a transverse axis in the previous embodiment is replaced by a single reel 103 ro-

tating on a longitudinal axis, and of sufficient length to extend from substantially the point where the bobbins leave the feed drum 9 to the point where they reverse their direction at the far end of the machine. Thus, an end of yarn freed from its wound mass on a bobbin and blown downward at practically any point in the travel of the bobbins from the feed drum 9 to the far end of the machine can be engaged by the unwinding reel, and the drawing-off of the waste yarn can continue if necessary during the entire course of the bobbin just indicated, whether the bobbin is traveling outwardly or back. In this instance, no end trimming means or presser roll is needed. The slats of the unwinding reel may be clad with bristles or a fabric sleeve, to help catch the first ends of waste yarn. All other parts of the machine are or may be as described in the first instance.

While we have illustrated and described certain forms in which the invention may be embodied, we are aware that many modifications may be made therein by any person skilled in the art, without departing from the scope of the invention as expressed in the claims. Therefore, we do not wish to be limited to the particular forms shown, or to the details of construction thereof, but what we do claim is:

1. In a bobbin stripper, in combination, means feeding the bobbins along a path in pendent tip downward relation and simultaneously rotating the bobbins about their axes, and means projecting air jets against the yarn-bearing portions of the bobbins.

2. In a bobbin stripper, in combination, means for supporting bobbins by their heads in pendent tip downward relation and propelling them laterally while the yarn is being unwound over their tips, and surfaces engaging the yarn-bearing portions of the bobbins while thus propelled and moving with the bobbins and simultaneously axially of the bobbins toward their tips.

3. In a bobbin stripper, in combination, means feeding the bobbins along a path in pendent relation with their tips lowermost, and means engaging the yarn-bearing portions of the moving bobbins while traveling with the bobbins in a path diverging from the path of the bobbins to free the end of yarn from the said portion.

4. In a bobbin stripper, in combination, bobbin supporting and propelling means, and a belt traveling obliquely to the course of the bobbins, having a surface wiping the yarn-bearing portions of the bobbins and freeing the ends of yarn therefrom.

5. In a bobbin stripper, in combination, means feeding the bobbins along a path in pendent relation with their tips lowermost, and a pair of belts frictionally engaging the yarn-bearing portions of the moving bobbins from opposite sides while traveling with the bobbins in a path diverging from the path of the bobbins, whereby the end of yarn is freed for unwinding.

6. In a bobbin stripper, in combination, means feeding the bobbins along a path in pendent relation with their tips lowermost, rotating unwinding means engaging and winding off the yarn, and means frictionally engaging the yarn-bearing portions of the bobbins, moving with and also relatively to the moving bobbins to free the ends of waste yarn for engagement with the unwinding means.

7. In a bobbin stripper, in combination, means feeding the bobbins along a path in pendent relation with their tips lowermost, frictional surfaces engaging the yarn-carrying parts of the bobbins, and means producing relative movement between the frictional surfaces and the bobbins causing unwinding of the yarn from the bobbins.

8. In a bobbin stripper, in combination, means feeding the bobbins along a path in pendent tip downward relation and simultaneously mechanically rotating the bobbins about their axes reversely to their wind, and means acting on the yarn-bearing portions of the bobbins to free the ends of the waste yarn.

9. In a bobbin stripper, in combination, means feeding the bobbins along a path in pendent tip downward relation and simultaneously rotating the bobbins about their axes, means frictionally engaging the yarn-bearing portions of the bobbins to wipe free the ends of the waste yarn, such frictional means also drawing the freed ends of yarn off endwise from the bobbins, and rotating means engaging and winding up the ends so freed and thus drawing off the remainder of the waste yarn on the bobbins.

10. In a bobbin stripper, in combination, means feeding the bobbins along a path in pendent tip downward relation, and means making a wiping contact around the circumference of the yarn-bearing portions of the bobbins and also in a direction toward the tip of the bobbins.

11. In a bobbin stripper, in combination, means supporting and propelling bobbins along a path through engagement solely with their heads, and with their tips and yarn-bearing portions free, and wiping means loosening and conveying the ends of waste yarn from the bobbins.

12. In a bobbin stripper, in combination, means supporting and propelling bobbins along a path and imparting axial rotation to the bobbins through engagement solely with their heads, and with their tips and yarn-bearing portions free, and wiping means loosening and conveying the ends of waste yarn from the bobbins.

13. In a bobbin stripper, in combination, means supporting and propelling bobbins along a path through engagement solely with their head ends, and with their tips and yarn-bearing portions free, rotating unwinding means, wiping means loosening and conveying the ends of waste yarn from the bobbins for engagement by the rotating unwinding means, and means causing relative rotation between each bobbin and the wiping means.

14. In a bobbin stripper, in combination, a driven endless traveling surface engaging the head ends of bobbins to propel them in pendent tip downward relation, belts engaging opposite sides of the bobbins while thus propelled and traveling obliquely away from the endless traveling surface in a direction from heads to tips of the supported bobbins to free the ends of yarn on the bobbins, and a rotating unwinding roll to engage and draw off over the tips of the pendent bobbins the yarn freed by the obliquely traveling belts.

15. In a bobbin stripper, in combination, an endless conveyor propelling bobbins along a path through engagement solely with their head ends, and with their tips and yarn-bearing portions free, means loading the bobbins onto the conveyor, opposed wiper belts engaging opposite sides of the bobbins while traveling with the conveyor, rotating unwinding means engaging and drawing off the yarn from the traveling bobbins, and means discharging the bobbins from the conveyor.

16. In a bobbin stripper, in combination, means

supporting and propelling bobbins along a path, unwinding means engaging and drawing off the yarn over the tips of the bobbins while thus propelled, and rotating about an axis at right angles to the direction of movement of the bobbins, and means maintaining the lead of the yarn in axial alignment with its respective bobbin after the latter has passed out of line with the unwinding means.

17. Apparatus for stripping waste yarn from bobbins, having in combination a driven endless traveling surface, means on such surface engaging the head ends of bobbins to cause the bobbins to be supported and transported by such surface in pendent tip-downward relation, means unwinding the waste yarn over the tips of such bobbins, a chambered drum rotating in synchronism with the endless traveling surface, and plungers automatically bringing the head ends of successive bobbins deposited in the chambered drum into engagement with such means.

18. Apparatus for stripping waste yarn from bobbins, having in combination a driven endless traveling surface, projecting parts on such surface engaging surfaces in connection with the head ends of bobbins to support and transport the bobbins in pendent tip-downward relation, means unwinding the waste yarn over the tips of such bobbins, and devices including a rotary drum applying the head ends of the bobbins to such projecting parts.

19. Apparatus for stripping waste yarn from bobbins, having in combination a driven endless traveling surface, spaced bobbin-holders thereon gripping the head ends of the bobbins to support and transport the bobbins, guide means including a drum for the successive bobbins moving in unison with the traveling surface and the bobbin-holders thereon, and means moving the bobbins endwise along the guide means into the bobbin-holders.

20. Apparatus for stripping waste yarn from bobbins, having in combination a driven endless traveling surface, spaced bobbin-holders thereon gripping the head ends of the bobbins to support and transport the bobbins, a drum having lengthwise pockets receiving individual bobbins, means causing rotation of the drum to present the bobbins carried thereby in axial alignment with the bobbin-holders while the latter travel, plungers forcing the bobbins head first from the pockets into the bobbin-holders, and cam means actuating the plungers.

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