April 28, 1942. E. CLARK 2,281,268

CARDING MACHINE

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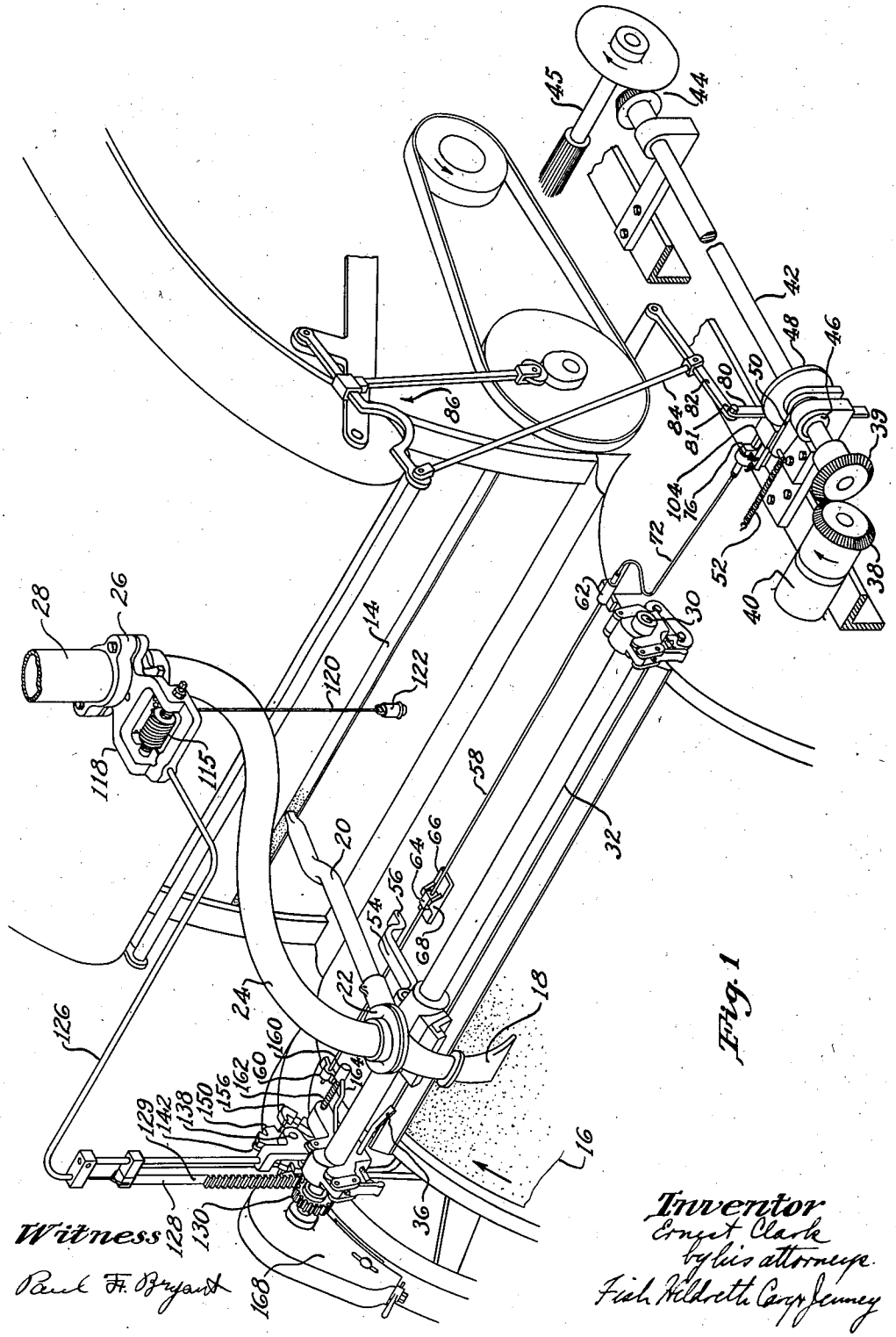


Fig. 1

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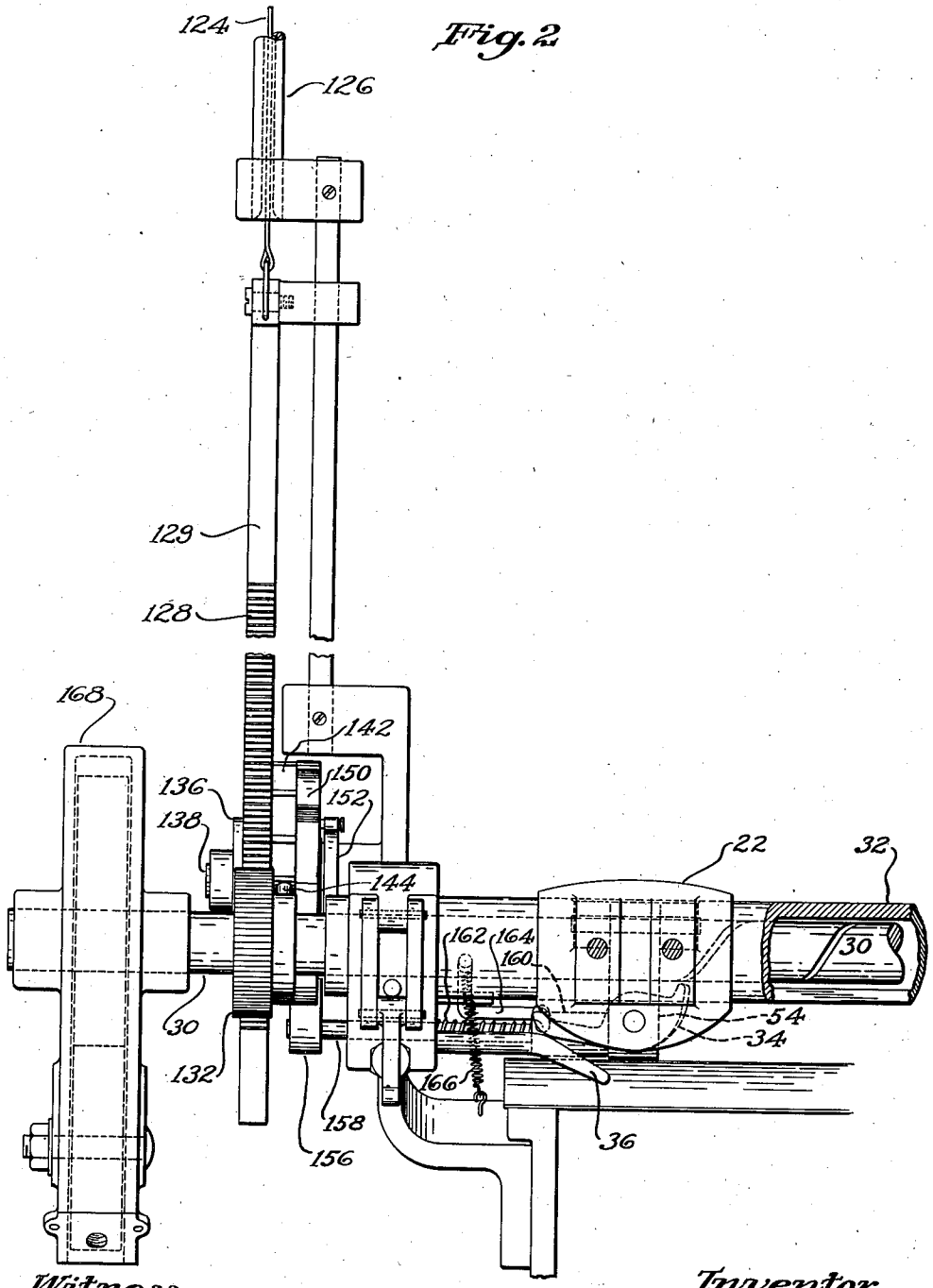
Inventor
Ernest Clark
by his attorneys
Fish, Kildreth & Cary & Jenney

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CARDING MACHINE

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Fig. 2



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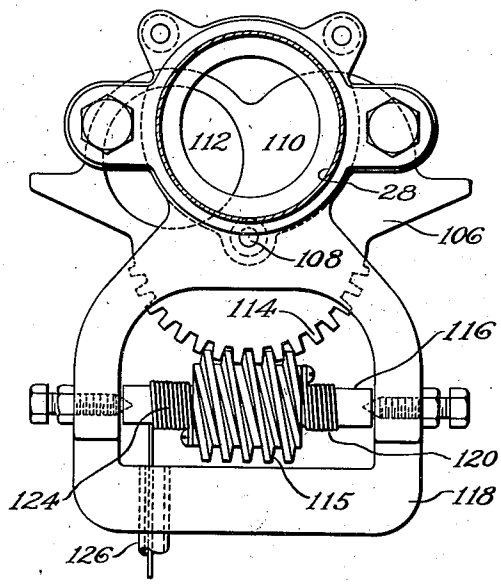
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CARDING MACHINE

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Fig. 3



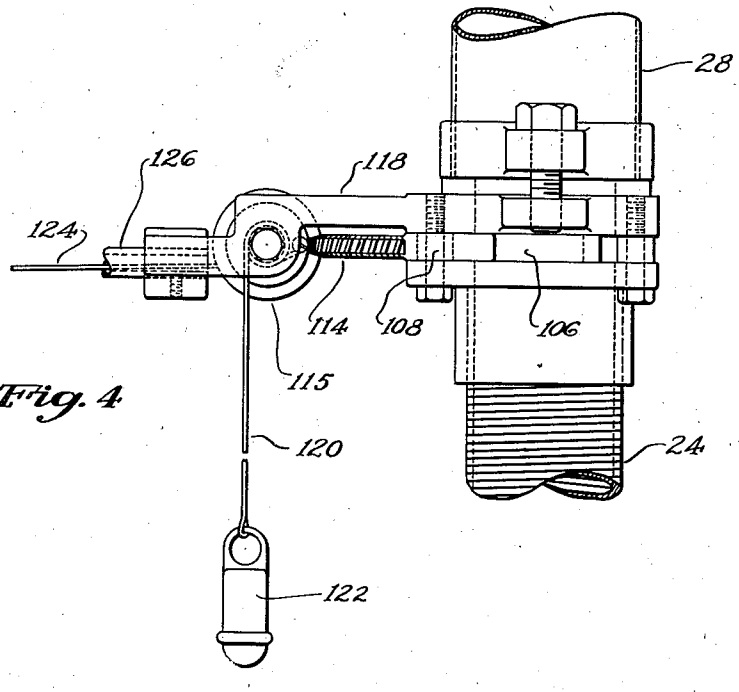


Fig. 4

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CARDING MACHINE

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Fig. 5

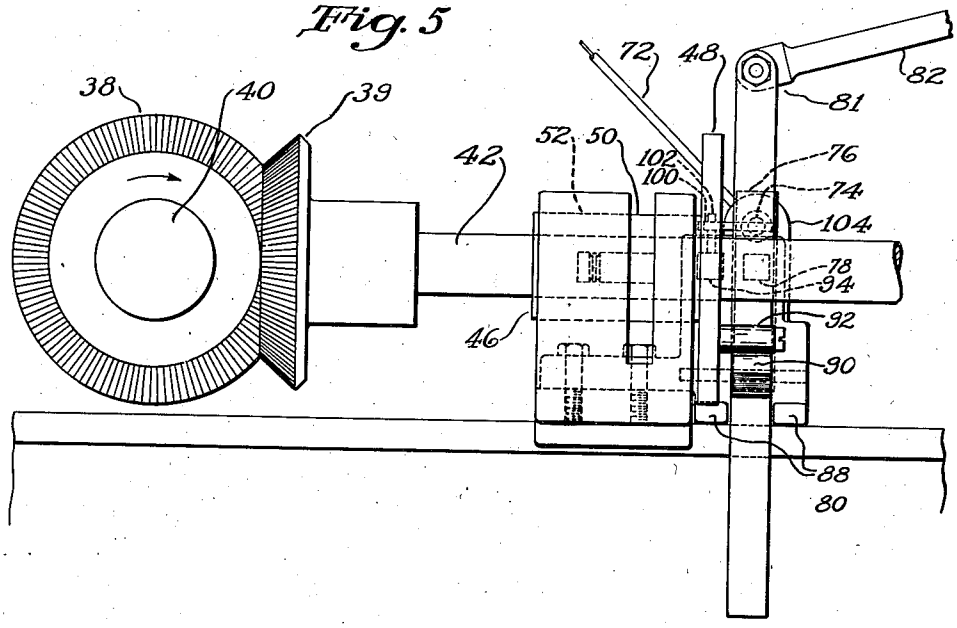
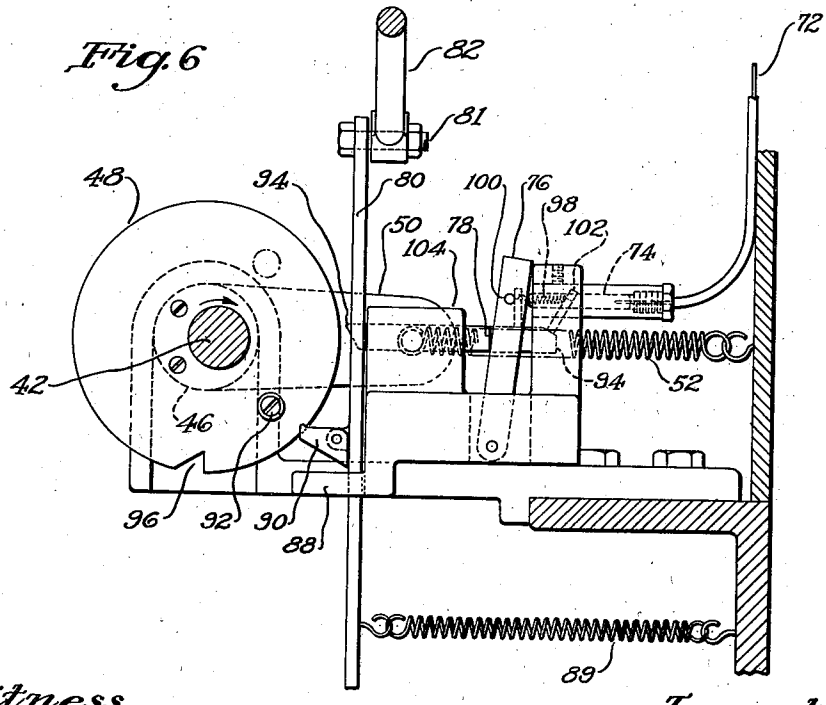


Fig. 6



Witness
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CARDING MACHINE

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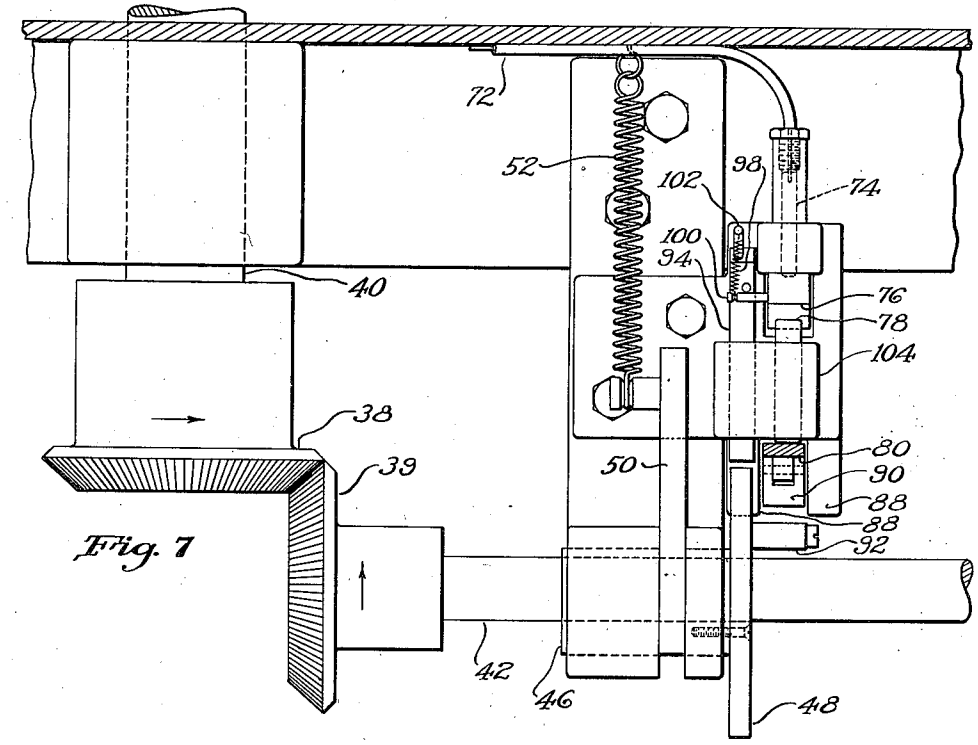


Fig. 7

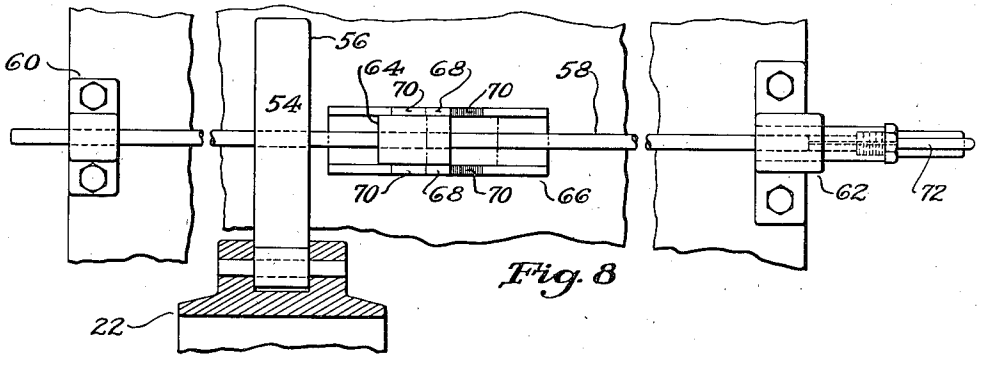


Fig. 8

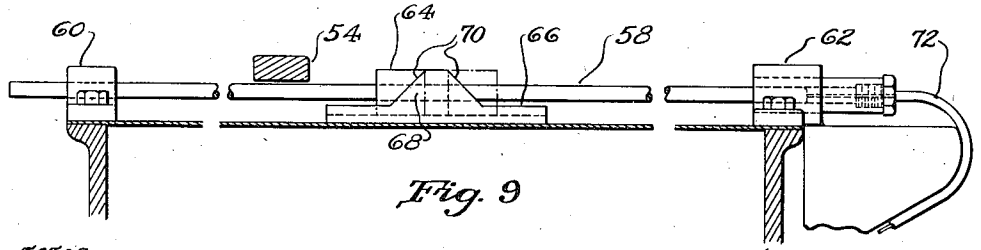


Fig. 9

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CARDING MACHINE

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Fig. 11

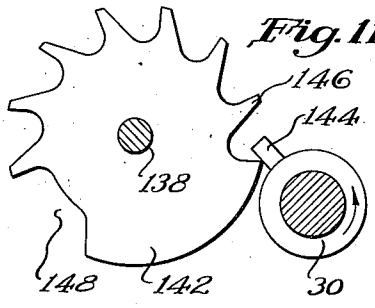
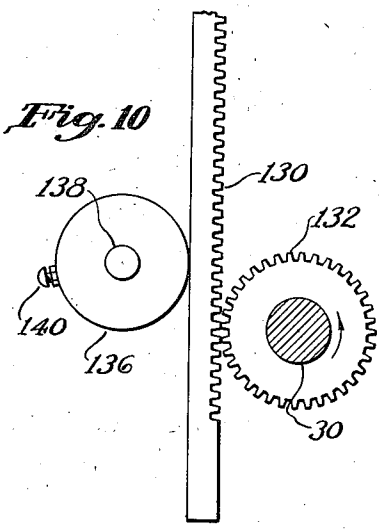


Fig. 10



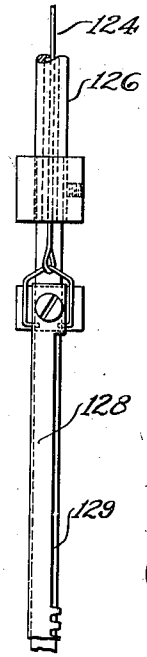


Fig. 12

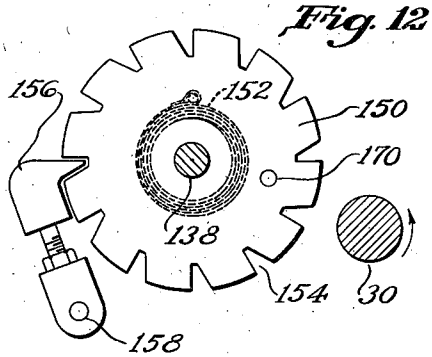
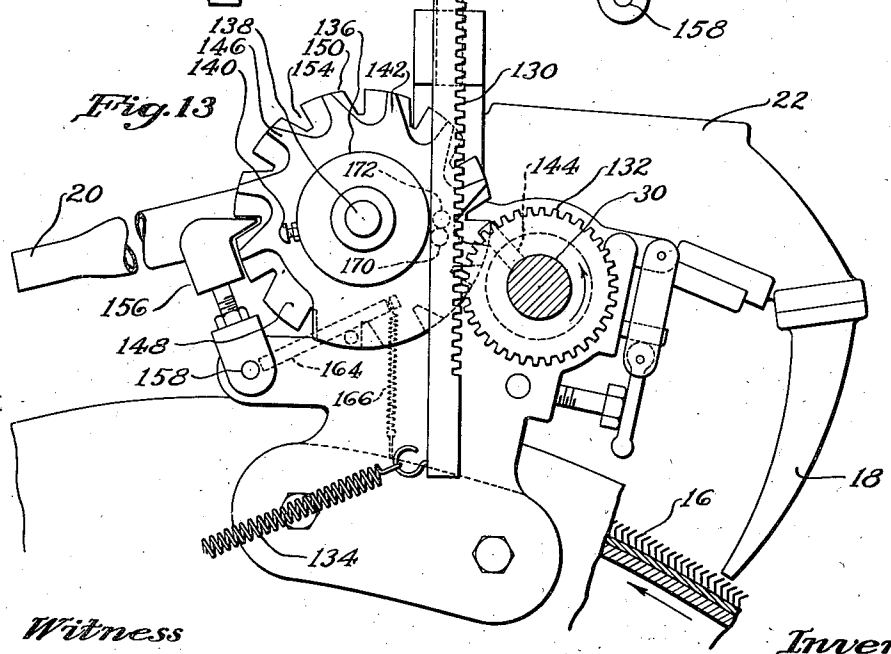


Fig. 13



Witness

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Patented Apr. 28, 1942 2,281,268

UNITED STATES PATENT OFFICE

2,281,268

CARDING MACHINE

Ernest Clark, Brockton, Mass., assignor to Abington Textile Machinery Works, Boston, Mass., a trust of Massachusetts

Application November 2, 1940, Serial No. 364,075

14 Claims. (Cl. 19—109)

The present invention relates to carding machines and more particularly to carding machines employing pneumatic stripping mechanism of which that shown in my prior Patent 1,905,265, dated April 25, 1933, may be taken as an example.

The usual type of pneumatic stripper comprises one or more nozzles operated by a traverse mechanism to move in relation to the card-clothed surfaces of the machine. The nozzles are connected with a vacuum or suction line. At the proper time for stripping, the operator shuts off the feed of new material to the machine, sets the nozzles in position to be operated by the traverse mechanism, and opens the suction valve. The operator may then leave the machine to take care of other duties. When the stripping operation is completed the operator must go back to the machine to cut off the suction and throw in the feed, in order that normal carding service may be resumed. Later he must go back to it again to perform the usual piecing operation on the newly carded material when it begins to come through.

Ordinarily, several machines are subjected to the stripping operation at the same time, that is, the operator will start the nozzle traverses on several adjacent machines, one after another. The number of machines undergoing stripping at one time is limited by the capacity of the vacuum system; hence it is important to take a stripped machine off the suction line as soon as possible after the operation has been completed in order that stripping may be started on a new machine. This is also important in another respect, namely, to restore a stripped machine to productive carding service with minimum delay. These various duties impose a difficult burden on the operator, since he must continually retrace his steps to machines which have been stripped. Moreover, it is practically impossible to time his motions in proper relation to the time required for the stripping operation, with the result that excessive delays occur in restoring a machine to production.

The object of the present invention is to provide means operating automatically to restore the feed and to cut off the suction, whereby production may be resumed immediately on completion of the stripping.

With this and other objects in view the present invention comprises the machine hereinafter described and particularly defined in the claims.

In the accompanying drawings Fig. 1 is a perspective view of so much of a carding machine as is necessary for an understanding of the present invention; Fig. 2 is a detailed front elevation of a part of the traverse mechanism and the suction control; Figs. 3 and 4 are detail views of the suction valve; Figs. 5, 6 and 7 are detail views of the feed throw-out mechanism; Figs. 8 and 9 are detail views of the control device for the feed throw-out mechanism; Figs. 10, 11 and 12 are detail views of the control devices for the suction valve; and Fig. 13 is an end elevation of the suction control mechanism.

The carding machine shown in Fig. 1 has the usual main cylinder 14 and doffer 16. There are also provided a doffer nozzle 18 and a main cylinder nozzle 20, both connected into a head 22 leading through a tube 24 to a valve indicated generally at 26, which is connected to a suitable main suction pipe 28. The nozzles 18 and 20 are caused to traverse their respective cylinders by means of a traverse screw 30 enclosed in a traverse tube 32 and having a spiral groove in which is received the tail of a follower pawl 34. The traverse mechanism is in general similar to that disclosed in my Patent 1,614,103, dated January 11, 1927. During normal operation of the machine the nozzles remain idle at the left-hand end thereof as viewed in Fig. 1. To start the stripping operation the operator moves the head 22 to the right, whereupon the tail of the follower engages in the groove of the traverse screw and the nozzles are moved automatically to the left. At the limit of leftward movement, the follower 34 is disengaged from the traverse screw by riding up on a lifter plate 36.

The machine also includes feed mechanism of which only the feed drive is shown. This drive comprises bevel gears 38, 39 connecting the doffer shaft 40 with an intermediate shaft 42 and another set of bevel gears 44 between the shaft 42 and the feed shaft 45.

According to the present invention the feed is stopped at the start of the stripping operation and is re-started at or near the end of the stripping operation. The suction is cut off automatically at the conclusion of the stripping operation. The mechanisms by which these results are accomplished will now be described.

As shown in Figs 1, 5, 6 and 7, the feed throw-out mechanism includes an eccentric bearing 46 in which the shaft 42 is journaled. The position of the bearing is determined by a latching disk 48 connected with a laterally extending arm 50. The disk 48 is normally held in such position that the gears 38 and 39 are in mesh by means of a spring 52 connected by the arm 50 and a stationary part of the machine. When the disk is

turned about 90 degrees, so that the arm 50 is vertical, the eccentric bearing is operated to throw the gears out of mesh.

Pivotally mounted on the nozzle head 22 is a control arm 54 having a foot 56 adapted to ride on the doffer cover. This arm rides above a control rod 58 which is supported near its ends in bearings 60 and 62 on the doffer cover. At an intermediate point the rod carries a block 64 which is adapted to be moved in one direction or the other by the control arm. The block slides in a guide 66 which is attached to the cover and which has upwardly extending side pieces 68 on opposite sides of the block. As shown in Figs. 8 and 9 the side walls 68 are inclined at 70 so that the arm 54 in its traverse can ride up over them. It will be seen that a left-to-right motion of the control arm 54 will cause the block to shuttle from its full line position to the dot-and-dash line position of Fig. 9, whereas a right-to-left motion will cause the block to shuttle in the opposite direction. In either case the movement of the block causes a longitudinal movement of the control rod 58. A left-to-right movement of the rod during the manual shift of the nozzles operates the eccentric bearing to unmesh the gears 38, 39 and thus to stop the feed. To accomplish this result, the rod 58 is connected through a Bowden wire 72 with a plunger 74 which bears against an arm 76 pivoted on the frame of the machine adjacent to the latch disk 48. The motion of the wire 72 under a left-to-right motion of the control rod turns the arm 76 counter-clockwise, as viewed in Fig. 6. The arm presses against a plunger 78 which is adapted to push against a reciprocating arm 80. The arm 80 continuously reciprocates up and down during normal operation of the machine and may be operated in any suitable manner from any movable part of the machine. Conveniently it is pivoted at 81 to a link 82 connected by a link 84 with the flat brush bar mechanism which is indicated in a general way at 86 in Fig. 1. The pivotal connection 81 is sufficiently loose so that the arm 80 can swing sidewise when pressed upon by the plunger 78. The arm 80 is guided in its vertical motion in a forked bracket 88, and is normally kept ineffective with respect to the latch disk 48 by a light spring 89 connected between the lower end of the arm and a stationary part of the machine. The arm carries a pivoted pawl 90 which is moved under a pin 92 on the latch disk 48 when the arm is moved sidewise by the plunger. It will be seen from Fig. 6 that the pivoted construction of the pawl 90 permits the pawl to ride by the pin in case the arm 80 should be moved sidewise at a time when the pawl is above the pin. On the first upward movement of the arm 80 following the operation of the plunger, the latch disk is turned counter-clockwise about a quarter of a revolution against the tension of the spring 52, thereby unmeshing the gears 38, 39. The disk 48 is latched in its upper position by a second plunger 94, the end of which snaps into a notch 96 in the edge of the disk. The plunger 94 is urged into latching position by a spring 98 connected between the pin 100 on the arm 76 and a pin 102 connected to the rear of the plunger. After the control rod has been moved to the right, therefore, and so long as it remains in its right-hand position, the disk 48 is held latched to keep the feed gears out of mesh. As shown particularly in Fig. 7, the plungers 78 and 94 are supported for longitudinal movement in a bracket 104.

After the nozzles have been moved to their extreme right-hand position and the traverse follower 34 engages with the traverse screw, the nozzles are moved automatically to the left. At some point in the leftward movement determined by the position of the guide 66, the control arm 54 shuttles the block 64 to the left, thereby pulling on the Bowden wire, restoring the plungers to their original positions, and unlatching the disk 48 so that the feed gears are again caused to mesh. This operation preferably occurs a short time before the stripping has been entirely completed since it has been found unnecessary to wait for completion of the stripping before starting the feed. The guide 66 may be placed in such a position as to re-start the feed at any desired time in advance of the completion of the stripping operation.

When the stripper reaches the limit of its left-hand movement, the follower is disengaged from the traverse screw as previously described. The valve 26 is automatically closed at a predetermined time thereafter. The valve and mechanism for operating it will now be described.

As shown particularly in Figs. 3 and 4, the valve includes a plate 106 pivoted at 108 and provided with a solid portion 110 to shut off the suction as well as an opening 112 adapted to be brought into register with the tubes 24 and 28. The plate is provided with gear teeth 114 to engage a worm 115 mounted on a shaft 116 which is journaled in a bracket 118. A cord 120 to permit manual opening of the valve is wound around the shaft at one side of the worm and is provided at its end with a pull handle 122. A cord 124 for controlled automatic closure of the valve is wound on the other side of the worm and is passed through a tube 126 for connection with an operating rack 128. The rack has at its upper end a smooth portion 129 and is provided at its lower end with teeth 130 which are normally out of mesh with a gear 132 on the traverse screw shaft, but are adapted to mesh therewith under circumstances presently to be described. The rack teeth are normally held out of engagement with the gear by means of a spring 134 connected between the lower end of the rack and a stationary part of the machine. The rear face of the rack lies against a hub 136 on a shaft 138. The hub is provided, as shown in Fig. 13, with a member 140 indicated as a bolt which is adapted to push against the rear face of the rack and force it into engagement with the gear 132 when the shaft is turned clockwise approximately a half revolution. Mounted on the shaft 138 immediately adjacent to the rack 128 and the hub 136 is a ratchet 142 which is particularly shown in Fig. 11. An operating arm 144 extending outwardly from the traverse screw shaft is arranged to engage the ratchet 142. The ratchet is of peculiar construction, having a series of uniformly spaced teeth 146 and an open space 148 in which the operating arm can move ineffectively after the ratchet has been advanced sufficiently from its position of Fig. 11. A detent ratchet 150 is also mounted on the shaft adjacent to the ratchet 142 and is provided with a torsion spring 152 tending to move the shaft 138 and its associated parts in a counter-clockwise direction. The ratchet 150 has a series of uniformly spaced notches 154 adapted to be engaged by a detent pawl 156. The pawl 156 is mounted on a rod 158 having at its inner end a head 160 adapted to be engaged by the control arm 54 as the latter approaches its limit of movement toward the left.

A spring 162 encircling the rod 158 tends to hold the pawl out of engagement with the ratchet 150.

The pawl is urged rotationally toward the shaft 138 by spring arm 164 attached to the head 160 and acted upon by spring 166 connected between the end of the rod and a stationary part of the machine.

At any time during the stripping operation when the control arm 54 is out of engagement with the head 160, the pawl 144 which is rotated by the traverse shaft is ineffective to advance the ratchet 142 because the detent pawl 156 is out of engagement with the detent ratchet 150. The operating arm 144, therefore, simply clicks against the first tooth of the ratchet 142 on each revolution of the shaft, and after the pawl passes the tooth the ratchet is restored to its original position by the spring 152. As the nozzle head approaches the limit of its leftward movement, however, the arm 54 engages the head 160 and moves the detent pawl 156 into a notch of the detent ratchet 150. As soon as the detent pawl and ratchet come into operative engagement the operation of the arm 144 advances the ratchets one tooth for each revolution of the traverse shaft. The head 160 is arranged with relation to the lifting plate 36 so that the detent pawl is fully engaged in a notch of the ratchet 150 when the movement of the stripper is completed. Therefore, after leftward movement of the stripper nozzles has been stopped, the suction remains on for a time determined by the number of teeth in the ratchet 142. This continued application of the suction is necessary to strip the left-hand edges of the cylinders.

As the ratchets advance, the rack operating member 140 eventually comes into engagement with the rack and forces it sidewise against the pull of the spring 134 so that the rack teeth engage with the gear 132. The gear then pulls the rack down, thereby drawing on the cord 124 in a direction to close the valve and shut off the suction. The operating arm 144 then continues to operate in the open space 148 of the ratchet 142 and the gear 132 turns idly against the smooth part 129 of the rack above the rack teeth 138. These parts may continue to operate idly during the normal carding operation but, if desired, motion of the traverse shaft may be stopped by manually unmeshing the usual gears contained in the gear box 168.

When the nozzle is later manually shifted to the right for a subsequent stripping operation, the head 160 is released from engagement with the arm 54 and moves inwardly under the influence of the spring 162, thereby disengaging the detent pawl 156 from the ratchet 150. The ratchets then return to their original position (Fig. 13) under the influence of the torsion spring 152. The return position of the ratchets is determined by stop pins 170 and 172, the former on the ratchet 150 and the latter being fixed on the main support. The member 140 moves out of engagement with the rack, which is then acted upon by the spring 134 so that the rack will be free to pass the teeth of the gear 132 when the valve is manually opened by the pull handle 122.

The operation of the machine will be briefly reviewed. In the normal carding operation the stripper is idle and the suction is cut off at the valve 26. When the time comes for stripping, the operator slides the head 22 to its extreme right-hand position and pulls on the handle 122 to open the valve. During the right-hand manual movement of the nozzles the feed of material to the carding machine is cut off by the automatic unmeshing of the bevel gears 38, 39. The follower 34 engages with the spiral groove of the traverse screw when the nozzles have been moved to their extreme right-hand position and the stripping operation then starts, with the nozzles moving toward the left and with suction applied through the tube 24. The operator may then go to the next carding machine which is to be stripped and perform similar operations thereon, and so on until the number of strippers in operation approaches the capacity of the vacuum system. As each stripper approaches the end of the stripping operation the feed is restored. Also, as each stripper completes its stripping operation the suction is automatically cut off. As soon as the stripping is completed on the first machine the operator may start stripping on a fresh machine, and so on, whereby the number of machines undergoing stripping may be kept substantially at the full capacity of the suction system. As the new material fed into any machine begins to come through, the operator performs the usual piecing operation. Since feed restoration and suction cut-off are automatic, it is unnecessary for the operator to divert his attention from other machines on which he may be working, until such time as the piecing operation is required. The operator may therefore plan his motions with respect to the several machines in such a manner that a maximum number of machines within the capacity of the suction apparatus may be subjected to stripping at any time. Accordingly, the time of the operator is conserved and the machines are kept out of carding service for a minimum time.

Having thus described the invention, I claim:

1. In a carding machine, pneumatic stripping mechanism including a nozzle, means for applying suction to the nozzle, traverse mechanism for the nozzle having means to limit traverse thereof, feed gearing adapted to be disconnected, means operated in relation to nozzle traverse to re-connect the feed gearing, and means for cutting off the nozzle suction after completion of the traverse.

2. In a carding machine, pneumatic stripping mechanism including a nozzle, means for applying suction to the nozzle, traverse mechanism for the nozzle having means to limit traverse thereof, a valve for controlling the nozzle suction, timing mechanism operative as the nozzle approaches the end of its traverse, and connections operated by the timing mechanism to close the valve a predetermined time after completion of the traverse.

3. In a carding machine, pneumatic stripping mechanism including a nozzle, means for applying suction to the nozzle, traverse mechanism for the nozzle having means to limit traverse thereof, feed gearing adapted to be disconnected during at least a part of the stripping operation, means operated automatically during traverse to re-connect the feed gearing, and timing mechanism for cutting off nozzle suction after completion of the traverse.

4. In a carding machine, pneumatic stripping mechanism including a nozzle, means for applying suction to the nozzle, traverse mechanism for the nozzle having means to limit traverse thereof, a suction valve, timing means operative a predetermined time after completion of the traverse for closing the valve, said means including a ratchet operated by the traverse mechanism, a detent pawl to permit intermittent advance of the

ratchet and movable into operative position as the nozzle approaches the end of its traverse, and connections operative to control the valve after predetermined movement of the ratchet.

5. In a carding machine, pneumatic stripping mechanism including a nozzle, means for applying suction to the nozzle, traverse mechanism for the nozzle having means to limit traverse thereof, a suction valve, timing means operative a predetermined time after completion of the traverse for closing the valve, said means including a ratchet operated by the traverse mechanism, a detent pawl to permit intermittent advance of the ratchet and movable into operative position as the nozzle approaches the end of its traverse, a gear rotated by the traverse mechanism, a rack having teeth normally out of engagement with said gear, means controlled by predetermined advance of said ratchet to cause engagement of the rack and gear, and a connection between the rack and the valve.

6. In a carding machine, pneumatic stripping mechanism including a nozzle, means for applying suction to the nozzle, traverse mechanism for the nozzle having means to limit traverse thereof, feed gearing including an eccentric bearing, a member to turn the bearing into a position to disconnect the gearing, means operated by setting of the nozzle to operate said member, and means operated by the traverse mechanism for automatically restoring said member.

7. In a carding machine, pneumatic stripping mechanism including a nozzle, means for applying suction to the nozzle, traverse mechanism for the nozzle having means to limit traverse thereof, feed gearing including an eccentric bearing, a member to turn the bearing into a position to disconnect the gearing, means operated by setting of the nozzle to operate said member, means for latching said member, and means operated by the traverse mechanism for unlatching said member.

8. In a carding machine, pneumatic stripping mechanism including a nozzle, means for applying suction to the nozzle, traverse mechanism for the nozzle having means to limit traverse thereof, a feed drive including normally meshed gears, an eccentric bearing associated with one of said gears, means controlled by setting of the nozzle and operated by a continuously movable part of the machine for rotating the bearing to unmesh the gears, a latching device operable upon unmeshing of the gears, and means operated during traverse to unlatch said device and restore the feed.

9. In a carding machine, pneumatic stripping mechanism including a nozzle, means for applying suction to the nozzle, traverse mechanism for the nozzle having means to limit traverse thereof, a feed drive, feed throw-out mechanism, a member movable in one direction upon setting of the nozzle and in the opposite direction during traverse of the nozzle, and connections between said member and the throw-out mechanism.

10. In a carding machine, pneumatic stripping mechanism including a nozzle, means for applying suction to the nozzle, traverse mechanism for the nozzle having means to limit traverse thereof, a feed drive, feed-throw-out mechanism, a shuttling block, a device movable with the nozzle to move the block in one direction upon setting of the nozzle and in the other direction at a predetermined point during traverse of the nozzle, and connections between said block and the throw-out mechanism.

11. In a carding machine, pneumatic stripping mechanism including a nozzle, means for applying suction to the nozzle, traverse mechanism for the nozzle having limit means to stop traverse thereof at the end of the cylinder, automatic devices to cut off the suction from the nozzle, and timing means to delay cutting off of the suction for a sufficient time after stopping of the traversing movement to permit stripping of the end of the cylinder.

12. In a carding machine, pneumatic stripping mechanism including a nozzle, means for applying suction to the nozzle, traverse mechanism for the nozzle having limit means to stop traverse thereof at the end of the cylinder, a valve for controlling the nozzle suction, timing mechanism operated in relation to the traverse to close the valve a predetermined time after completion of the traverse.

13. In a carding machine, pneumatic stripping mechanism including a nozzle, means for applying suction to the nozzle, traverse mechanism for the nozzle having limit means to stop traverse thereof, a suction valve, timing means set into operation at the end of the traverse, and means controlled by the timing means to close the suction valve a predetermined time after completion of the traverse.

14. In a carding machine, pneumatic stripping mechanism including a nozzle, means for applying suction to the nozzle, traverse mechanism for the nozzle having limit means to stop traverse thereof, a suction valve, timing means set into operation by the traverse mechanism at the end of the traverse, and means controlled by the timing means to close the suction valve a predetermined time after completion of the traverse.

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