Jan. 2, 1923.

M. R. RAWSON.
POLE PUNCTURING MACHINE.
FILED MAR. 19, 1921.

1,440,893

4 SHEETS-SHEET 1

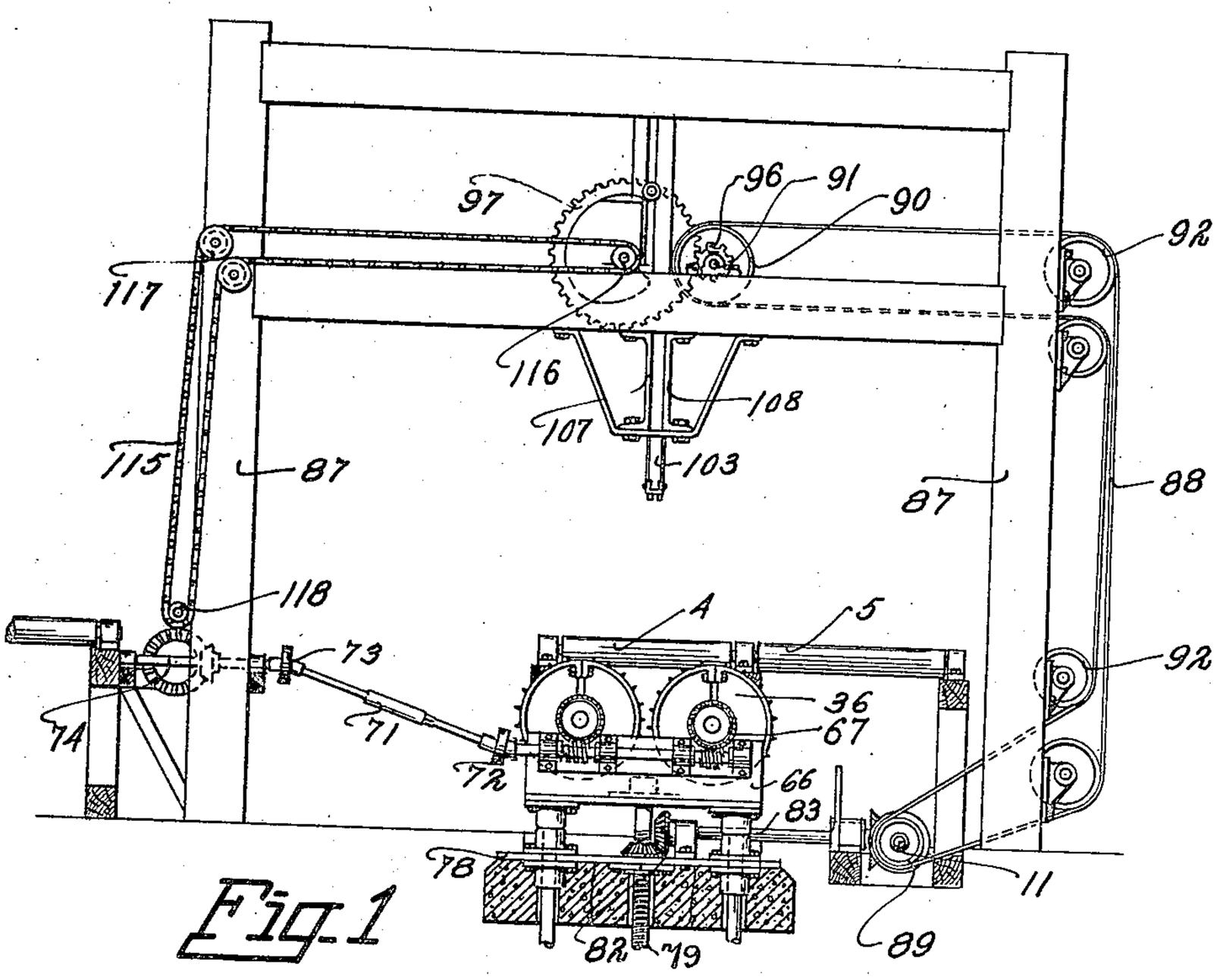
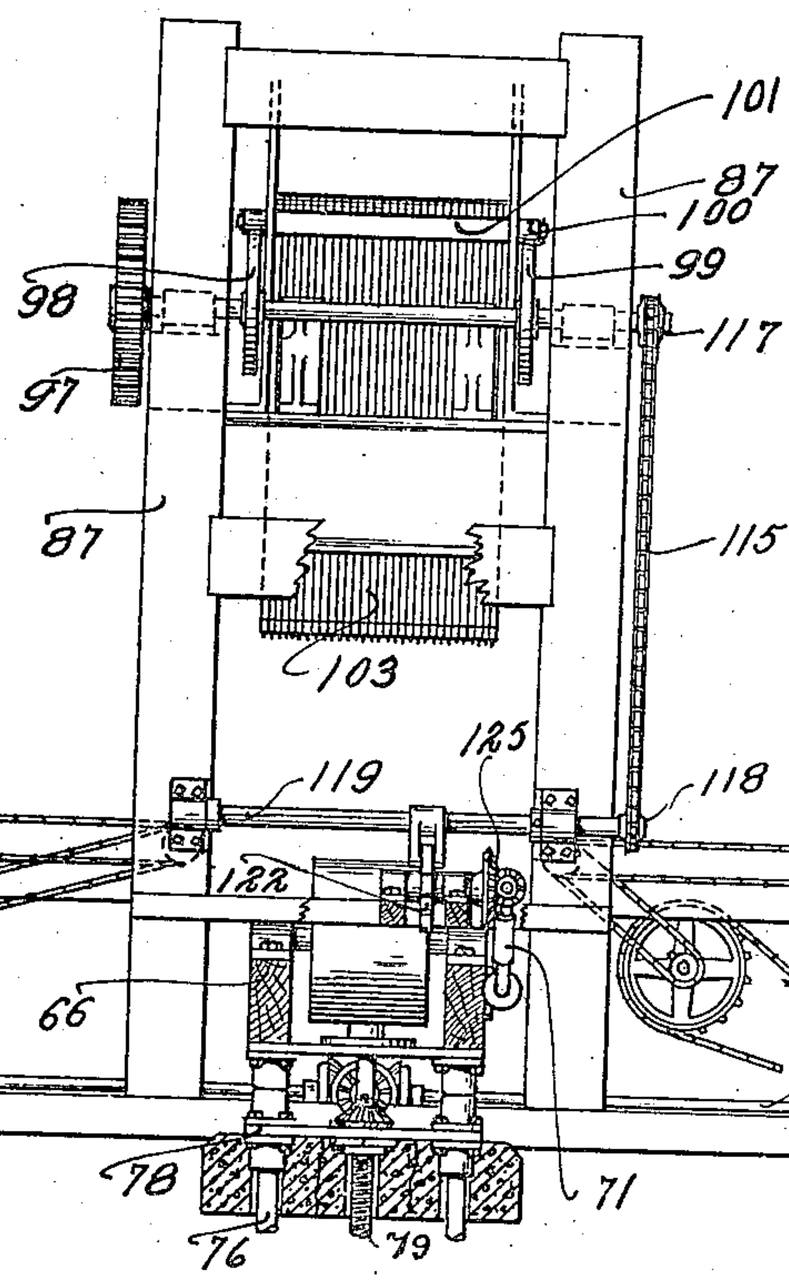


Fig. 1

Fig. 2



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4 SHEETS-SHEET 2

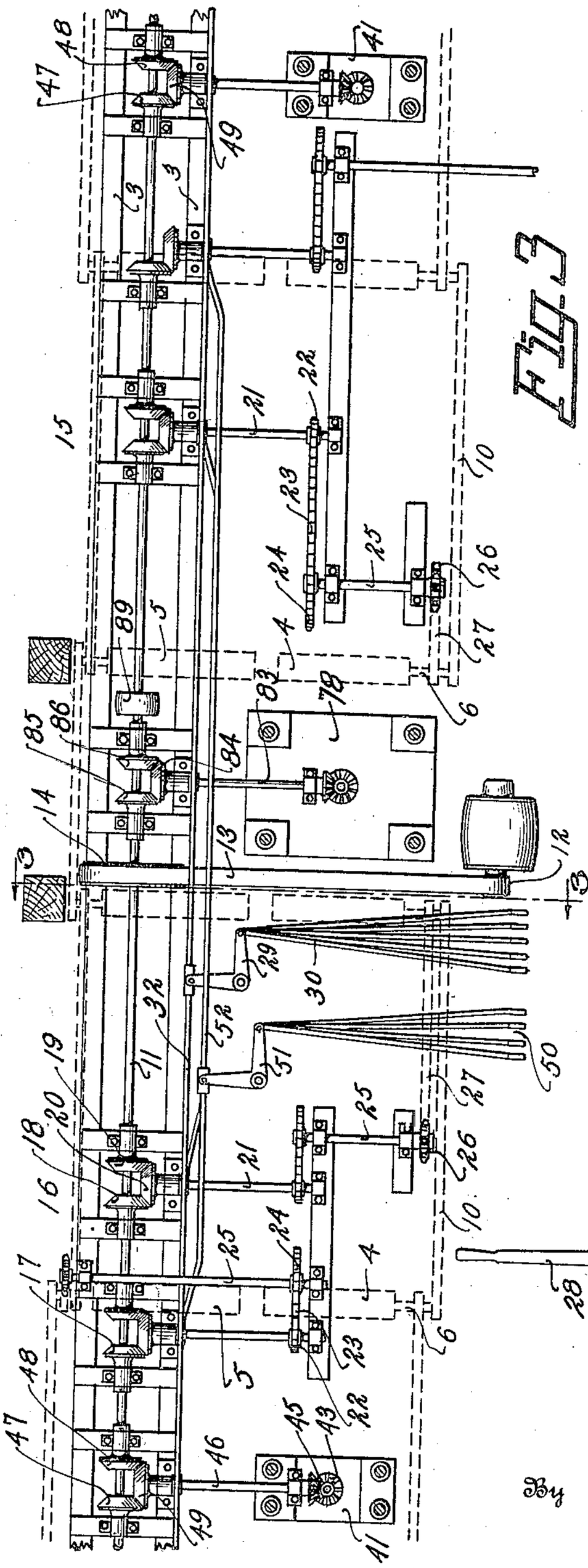

FIG. 3

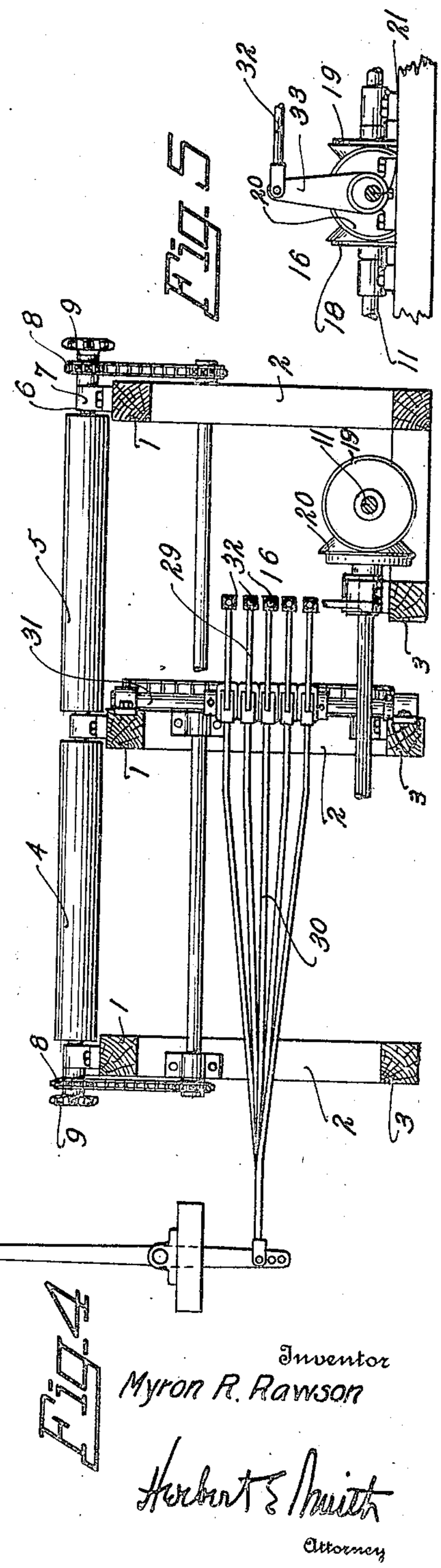

FIG. 5

FIG. 4

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4 SHEETS-SHEET 3

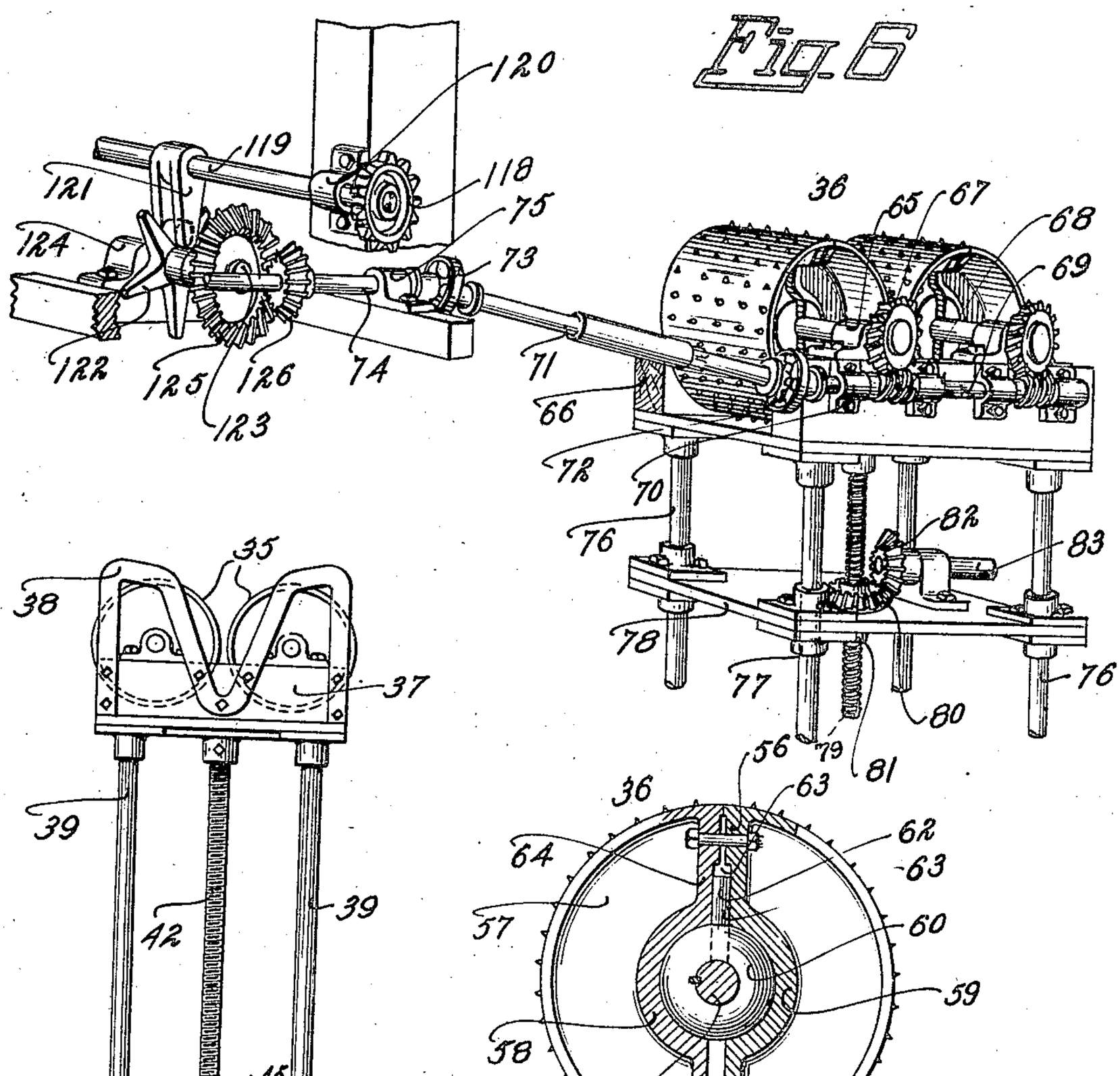

Fig. 6

Fig. 7

Fig. 8

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Fig. 10

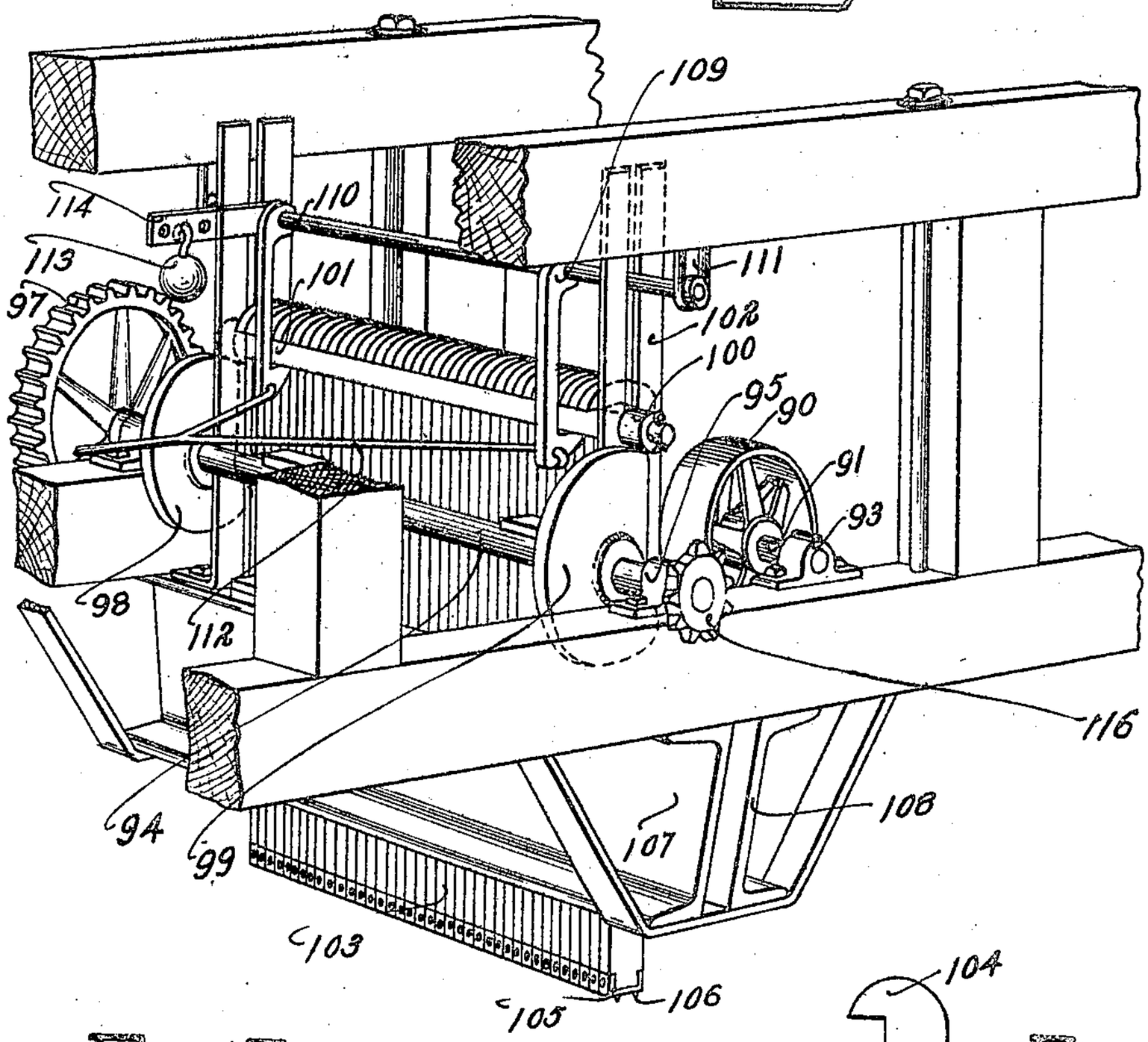


Fig. 9

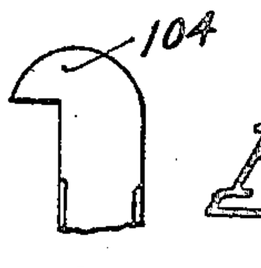
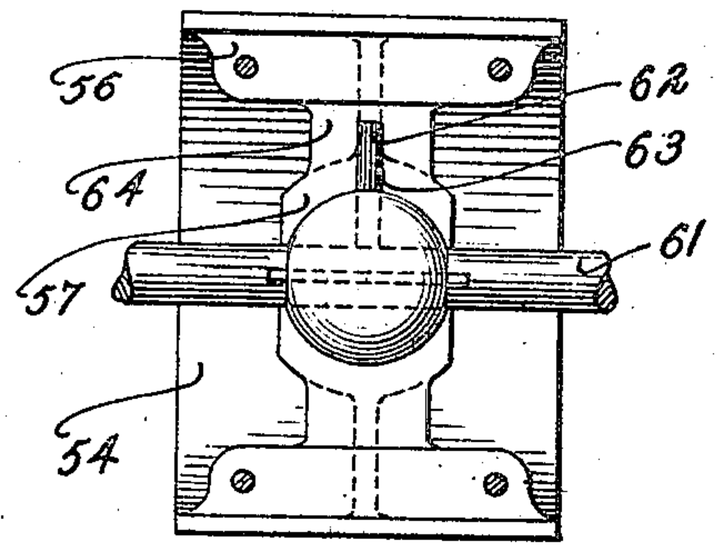


Fig. 11



Inventor
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By Herbert E. Quiet
Attorney

Patented Jan. 2, 1923. 1,440,893

UNITED STATES PATENT OFFICE.

MYRON R. RAWSON, OF SPOKANE, WASHINGTON, ASSIGNOR TO WESTERN CEDAR POLE PRESERVERS, OF SPOKANE, WASHINGTON, A CORPORATION.

POLE-PUNCTURING MACHINE.

Application filed March 19, 1921. Serial No. 453,644.

To all whom it may concern:

Be it known that I, MYRON R. RAWSON, a citizen of the United States, residing at Spokane, in Spokane County, and the State of Washington, have invented certain new and useful Improvements in Pole-Puncturing Machines, of which the following is a specification.

My present invention relates to improvements in pole puncturing machines designed for the purpose of piercing or making a hole in the periphery of a log or pole for subsequent treatment in a bath or by spraying, in order that the oil or other preservative applied may penetrate to the required depth from the surface of the log or pole. The primary object of the invention is the provision of improved mechanisms and means for facilitating the operation of puncturing in order to reduce the time and labor required, and to insure proper treatment of the log or pole in the puncturing machine. With these and other objects in view the invention contemplates the utilization of a stationary conveyer upon which the log or pole is received from a railway car and conveyed to proper position for action by the puncturing device. Means are employed for elevating the pole to position to be operated on by the puncturing device, and means are also employed for presenting the entire area of the log to be punctured. After having been properly treated the pole is restored to the conveyer, moved to final position, and then may be transferred to a waiting railway car upon which it is loaded. In this manner the pole may be brought to the puncturing machine on a loaded car, transferred and conveyed through the puncturing plant, and reloaded upon a waiting car upon the same track. The invention consists in certain novel combinations and arrangements of parts for carrying out the above indicated objects as will be hereinafter more fully described and claimed.

In the accompanying drawings one complete example of the physical embodiment of the invention is illustrated in which the parts are combined and arranged according to the best mode so far devised for the practical application of the principles of the invention, and this embodiment has proven highly satisfactory in actual operation.

Figure 1 is a front view of a portion of a machine embodying the invention, shown partly in section.

Figure 2 is a view in side elevation of the machine showing the reciprocable puncturing head and supporting roll therebeneath.

Figure 3 is a plan view of the actuating parts of the machine, with the conveyer rolls shown in dotted lines, and the pole-supporting rolls omitted.

Figure 4 is a sectional view of the machine at line 3—3 of Figure 3, illustrating a pair of conveyer rolls, and the lever mechanism for controlling the mechanism for rotating these conveyer rolls.

Figure 5 is a detail view of the eccentric friction clutches of the control mechanism actuated from the lever of Figure 4, for the conveyer rollers.

Figure 6 is a perspective view of the rolls for intermittently turning the pole, showing the operating means therefor, and the means for elevating and lowering these rolls and their supporting frame.

Figure 7 is a detail view in elevation of a pair of idler, supporting rollers for the pole, showing also the elevator or vertically movable frame which is moved synchronously with the elevator or frame of the turning rollers of Figure 6.

Figure 8 is a transverse sectional view of one of the turning rollers, which are supported to oscillate on their longitudinal axes to adapt them to the pole which they are to support and revolve or turn.

Figure 9 is a longitudinal sectional view of one of the turning rollers.

Figure 10 is a perspective view of the vertically reciprocable punch or puncturing device, showing also the cam actuating mechanism therefor, and means for retaining the device in inoperative position.

Figure 11 is a detail view of one of the puncturing bars of the head, showing pointed pins at the lower end.

In the puncturing plant as now actually in use I utilize a longitudinally extending supporting frame comprising the three sills 1, 1, 1, supported above the ground on the posts or uprights 2 from the timbers 3 to provide a support for the conveyer rolls arranged in pairs as 4 and 5. The rolls are alined on shafts 6 and the shafts are journaled at 7 at the top of the frame and at

the ends of each shaft a driven sprocket wheel 8 and a driving sprocket wheel 9 are fixed to revolve therewith. The respective sprocket wheels are connected by sprocket chains 10 in order that the several pairs of conveyer rollers that are located at proper intervals throughout the length of the frame, may be driven synchronously, to convey the pole to the right or to the left in Figure 3.

The main driving shaft 11 in Figure 3 is driven from the pulley 12 through belt 13 and pulley 14 on the shaft, and from this shaft connections are made for positively revolving the conveyer rolls which are arranged in five or more pairs distributed throughout the length of the frame of the conveyer. There are three sets of transmission gears indicated in Figure 3 as 15, 16 and 17, the gear set 16 also being shown in Figures 4 and 5, by means of which power is transmitted from the driving shaft to the several sprocket wheels and chains for revolving the conveyer rollers, and power is transmitted through the opposed beveled gears 18 and 19 by an eccentric friction or cone clutch member 20 on the clutch shaft 21. The clutch shaft is provided with a sprocket wheel 22 connected by sprocket chain 23 to a complementary sprocket wheel 24 on countershaft 25, and the countershaft 25 has a driving sprocket wheel 26 connected by chain 27 to one of the driven sprockets 8 on the roller shafts 6. The main driving shaft revolves continuously in one direction but power may be received therefrom through clutch shafts 21 for a forward or reverse drive of the several sprocket chains of the conveyer, in order to move the logs or poles to the right or left in Figure 3. In Figure 4 a single lever 28, located in such position as to be readily accessible by the operator, is shown for controlling the movement of the several clutch shafts, and the clutch lever is connected to a series of bell crank levers 29 by links 30, the bell cranks being pivoted on a single upright post 31, and each having a connecting rod 32 extending longitudinally of the main frame and parallel with the main driving shaft. Each of these connecting rods is pivoted to a clutch arm 33, as in Figures 4 and 5, and it will readily be apparent that by shifting the clutch lever 28 to the right or left in Figure 4 the eccentric clutch members 20 of the several gear sets or transmission gears 15, 16, 17, and others not shown, will engage either gear 18 or 19 of the transmission set to revolve the clutch shafts 21, and through the above described connections the conveyer rolls are rotated to move a log supported thereon either to the right or left in Figure 3. Thus a car load of poles may be drawn up alongside the conveyer frame at the left in Figure 2, and the poles from the car unloaded one at a time, onto the conveyer rollers at the left of the center of Figure 3. Sometimes the butt end of the pole will be at the front, and, as usually loaded on the cars, the smaller or tip end of the tapered pole may sometimes be at the front end or be that end nearer to the center of the longitudinal frame where the puncturing machine is located.

Assuming the pole to have been loaded on the rollers shown in dotted lines, at the left of the center of Figure 3, or Figure 2. The clutch lever 28 is thrown over to engage the friction clutch member 20 for moving the pole to the right, where its butt end may be punctured.

While in this position, and supported on the conveyer rollers, the pole is bodily elevated, and lifted from the conveyer rollers by means of at least two pairs of rollers indicated by the numbers 35 and 36 respectively in Figures 7 and 6, and the pole is adapted to be turned while supported in these two devices.

The rollers 35, as shown best in Figure 7, are idle rollers journaled in a frame or elevator 37 with the rollers in axial alinement with the longitudinal axis of the pole supported thereon, and a metallic guard 38 may be attached to the elevator having a V-shape central construction. This guard is fashioned of a metal strap, shown as of M-shape and bolted to the elevator with its central V-shape portion in position to obstruct the pole against lateral movement and prevent it from jumping or twisting out of the rollers. The elevator is in the form of a rectangular platform from the four corners of which depend guide rods 39 which pass through guide sleeves 40 fixed to the guide plate 41. The guide plate 41 is fixed and suitably supported and the guide rods are vertically reciprocable in the sleeves 40 through the action of a central screw bar 42 attached at the underside of the elevator platform and central thereof. A bevel gear 43, with a non-traveling nut portion 34 is journaled in the guide plate 41 and the screw bar is threaded through this non-traveling nut. The non-traveling nut and bevel gear are revolved through the driving gear 45 on the horizontal, transversely extending shaft 46 shown in Figures 3 and 7. and the shaft 46 as seen in Figure 3 may be revolved in two directions from the gear set 47, 48 on the main drive shaft and the friction clutch member 49 on the shaft 46. This clutch mechanism is similar to that illustrated in Figure 5 and the several gear sets for elevating the supporting rollers 35, are controlled by a lever similar to lever 28 that is connected by rods or links 50 to the bell crank levers 51, and the bell crank levers are connected to the clutches by connecting rods 52 extending parallel with the

main shaft of the machine. Thus it will be apparent that the elevators with their pairs of rollers 35 may be elevated or lowered by action of the screw bars 42 actuated from the gear sets on the main shaft in connection with the clutch mechanism 49 on the shafts 46. The utilization of two elevators is illustrated in Figure 3, one at each side of the longitudinal center of the frame, but it will be understood that more may be used if desired, although not illustrated in the drawings.

In connection with the idle rollers, a pair of turning rollers 36 are also elevated or lowered to support and to turn or revolve the pole. One pair or set of these rollers is used, and they are of special construction to adapt them to support and turn the pole during the process of puncturing it. The poles are usually of a tapering form, the butt end, which is to be punctured, being larger in diameter than the remainder of the pole, and to accommodate the pole in its tapering shape or to adapt the turning rollers to other irregularities in the peripheral shape of the pole, the turning rollers are adapted to oscillate on their longitudinal axes. For this purpose the turning rollers 36 are made in sections 53 and 54 in Figures 8 and 9, each section having spikes or spurs 55 interspersed over its entire exterior to engage the periphery of the pole and assist in turning the pole on its axis. The two sections are provided with longitudinally extending flanges 56, bolted together by transversely extending bolts, and the transverse web 57 of each section is fashioned with a hemispherical cup as 58 and 59 which together form a spherical socket for the encased ball 60 which is keyed to the longitudinally extending shaft 61 of each turning roller. The ball of course revolves with the shaft to which it is fixed and the roller is revolved with the ball through the instrumentality of a pin 62 extending radially from the ball into a slot 63 formed therefor in the transverse spoke portion 64 of the two sections of the roller. From this construction it will be apparent that the turning roller may wobble or oscillate longitudinally on the ball and socket bearing at the center thereof while the roller is revolved from its shaft 61.

The duplex rollers 36 are arranged in parallelism and their shafts are journaled at 65 in bearings on the elevator 66. On one end of each shaft 61 a worm wheel 67 is fixed, and the two worm wheels are turned through the worms 68 on the worm shaft 69 journaled at 70 at one end of the elevator, as shown in Figure 6. The worm shaft is revolved from a flexible, telescoping shaft 71 provided with a universal joint 72, and a second universal joint 73 connects the flexible shaft with a countershaft 74 journaled at 75 on a suitable support. The two turning rollers are intermittently revolved in the same direction, through these connections as will be described.

The elevator 66 supporting the turning rollers is lifted and lowered in manner similar to the elevator for the idle rollers, and the construction of the elevator 66 is substantially similar to these elevators for the idler rollers. Thus as seen in Figure 6 the platform or elevator 66, which is of rectangular shape is provided with four guide rods 76, one at each corner, and these guide rods pass through sleeves 77 at the corners of the fixed guide plate 78. A center screw bar 79 depends from the elevator 66 and passes through a bevel gear 80 forming a non-traveling nut 81, and the gear 80 is revolved by a complementary gear 82 on the gear shaft 83 that extends transversely toward the main shaft of the machine. The gear shaft 83 is provided with a clutch member 84 co-acting with either of the gears 85 or 86 forming a gear set on the main shaft, as shown in Figure 3 at the center thereof. The clutch member 84 is controlled from one of the bell crank levers 51 and connecting rod 52 in manner similar to the control of the clutches forming part of the elevating mechanism for the idle rollers, and by manipulating the links 50 from the elevating lever (not shown) the elevators for the idle rollers and the elevator for the turning rollers are all synchronously either raised or lowered, as will be understood.

The turning rollers are intermittently rotated in connection with a vertically reciprocating puncturing mechanism, the rollers being revolved to turn the pole supported thereon after each working stroke of the reciprocable puncturing head as will be described.

The puncturing mechanism is supported in an upright frame 87 (Figures 1, 2, and 10) erected over the turning rollers, and is actuated from the main shaft 11 through a belt 88 passing over the drive pulley 89 on the main shaft, driven pulley 90 on the drive shaft 91 of the puncturing mechanism, and over guide pulleys 92 on the upright frame for carrying the belt through its angular position. The driving shaft 91 of the puncturing mechanism extends longitudinally of the main conveyer frame of the machine and is journaled in bearings 93 in the upright frame, parallel with a cam shaft 94 that has bearings 95. The driving shaft 91 is connected with the cam shaft by a small pinion 96 and a larger gear 97 the former on the driving shaft and the latter on the cam shaft, and the cam shaft is provided with a pair of cam disks 98, 99 near its respective ends that engage complementary rollers 100 on the ends of a horizontal beam 101. The beam is vertically recipro-

cable in the slotted guide plates 102, supported vertically in the upright frame, and as the cam shaft is revolved, the cam disks thereon, through contact with the cam rollers alternately lift the beam and permit it to drop, the beam being guided in its movement in the slotted guide plates therefor.

The beam forms a supporting head for a series of vertically arranged closely spaced and alined plunger bars, 103, one of which is illustrated in Figure 11. Each of the bars or plungers has a head 104 projecting therefrom to rest upon the upper surface of the beam and be suspended therefrom in vertical position, and at its lower end the plunger is provided with a cap plate 105 with spikes or spurs 106 projecting downwardly therefrom. The suspended plungers are guided and held in proper position between a pair of guide plates 107 and 108, preferably in the form of metallic channel beams positioned horizontally in the frame, parallel with the driving shaft and cam shaft, and below these shafts, as seen in Figure 10. It will be evident that as the head beam 101 is elevated it will lift all the suspended plungers, and that when the cam disks permit the head beam to drop, the plungers will also be free to drop. The plungers are of sufficient length to strike the pole supported on the turning rollers beneath the plungers, but the head beam has a drop greater than the expected drop of any of the plungers. Thus the plungers of the series may drop different distances before their spikes or spurs encounter the supported pole to adapt the puncturing device to irregularities in the periphery of the pole. If the taper of the pole is great, the plungers at the end of the head beam above the smaller diameter of the pole will fall a greater distance than the plungers at the opposite end of the head beam will fall before their spikes penetrate the pole, or a plunger encountering a protuberance on the pole will fall a less distance than its neighboring plungers which encounter the regular periphery of the pole. A flexible puncturing device is thus provided which insures proper penetration of the pole throughout the length of the series of plungers on the working stroke of the plungers, while on the return or upward stroke of the plungers the heads beam engages the heads of the plungers successively and then lifts the plungers with a uniform movement to normal upper position. If it is desired for any reason to retain the beam and its plungers in uplifted position, while the cam plates are revolving, I may swing a pair of retaining hooks 109 under the beam for this purpose. The hooks are fixed to a rock shaft 110 journaled in brackets or hangers 111 suspended from the upper part of the upright frame, and a Y-shape yoke 112 is connected to the lower free ends of the hooks for swinging the hooks into engagement with the beam, or out of engagement therefrom. The yoke may be manipulated by hand directly, or through suitable connections, and the rock shaft is counterbalanced by a weight 113 on the arm 114 fixed to the shaft.

In Figure 10 the hooks are illustrated in position under the head beam and are held in this position by the weight 113. To release the beam the yoke is pulled to swing the hooks out of engagement with the beam and then the yoke is restrained in this position by any suitable means. When the yoke is released the weight automatically swings the hooks to position to engage under the beam.

The pole is supported at rest in the turning rollers while the plungers are operating on their working stroke, and after each working stroke of the plungers the pole is turned by action of the spiked turning-rollers, which are intermittently revolved through the flexible shaft connection shown in Figure 6. This shaft connection is intermittently actuated by the continuously moving sprocket chain 115 in Figure 1 which is driven from the sprocket wheel 116 on the cam shaft 94 of the puncturing mechanism, the chain passing over guide wheels 117 on the upright frame, and extending around a driven sprocket wheel 118 (Figures 1 and 6) on the rotor shaft 119 which is journaled on bearings 120 on the upright frame. This shaft 119 carries a slotted arm or yoke 121 radiating therefrom, which is designed to engage successively the teeth of a star wheel 122 rotatable with its shaft 123. The star wheel shaft is journaled in bearings 124 at right angles to the shaft 74 and the star wheel shaft has a bevel gear 125 meshing with the pinion 126 on the shaft 74. The sprocket chain 115 and its wheels are timed to revolve the rotor or yoke 121 with each reciprocable movement of the plungers, and after each working stroke of the plungers the star wheel is turned one tooth, thus actuating the connections to the turning rollers which results in revolving these rollers sufficiently to turn the pole supported thereon to present another portion of the pole to be penetrated by the next working stroke of the plungers.

After the pole has been properly pierced or punctured, the plungers of the puncturing device may be retained in uplifted position, the supporting frames for the idler rollers and turning rollers are lowered, permitting the pole to rest upon the conveyer rollers 4. The pole may now be conveyed toward the delivery or right end of the machine in Figure 1, making room for another pole to be loaded upon the rollers 4, and then the second pole is punctured in same manner as the first. By this arrangement of mecha-

nisms the poles are manipulated or handled with facility and dispatch, and are brought successively to the proper position for puncturing as described.

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

1. The combination in a pole puncturing machine with a vertically reciprocable puncturing mechanism, of a longitudinal conveyer, a plurality of elevators and actuating means therefor for lifting a pole from the conveyer, and means on one of said elevators for turning a pole after each working stroke of said reciprocable puncturing mechanism.

2. The combination in a pole puncturing machine with a longitudinal conveyer, of a plurality of elevators and actuating means therefor for lifting a pole from the conveyer, and longitudinally oscillatable means on one of said elevators for turning said pole.

3. The combination with a plurality of elevators and actuating means therefor, pole supporting elements on said elevators, one of said elements comprising a pair of driven rollers adapted to receive a pole between them and for turning said pole, and supports for said rollers whereby the rollers oscillate on their longitudinal axes to adjusted position for supporting the pole.

4. In a pole puncturing machine, the combination with a pair of supporting and turning rollers, of a vertically reciprocable head-beam, a series of alined plungers independnetly supported on said beam above said rollers, means for elevating said beam, and said elevating means adapted to permit dropping of said beam and plungers for the purpose described.

5. In a pole puncturing machine, a reciprocable head-beam, guiding means therefor, and rollers on the ends of said beam, a cam shaft and operating means therefor, cam disks on the shaft engaging said rollers to elevate said beam, plungers on the beam, and said beam and plungers adapted to drop when the cams are disengaged from said rollers.

In testimony whereof I affix my signature.

MYRON R. RAWSON.