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WIRE TYING MACHINE

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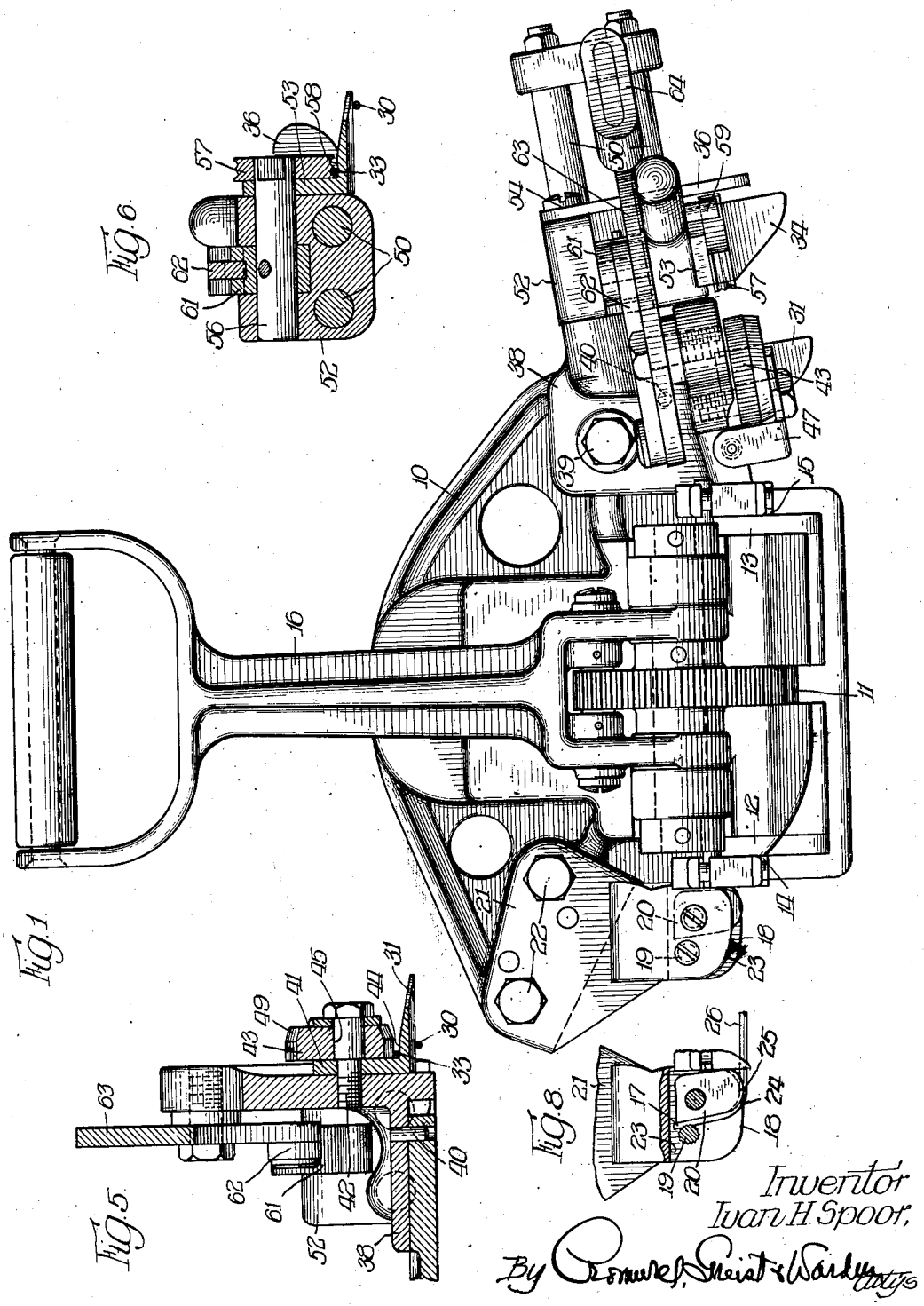

Fig. 1

Fig. 6

Fig. 5

Fig. 8

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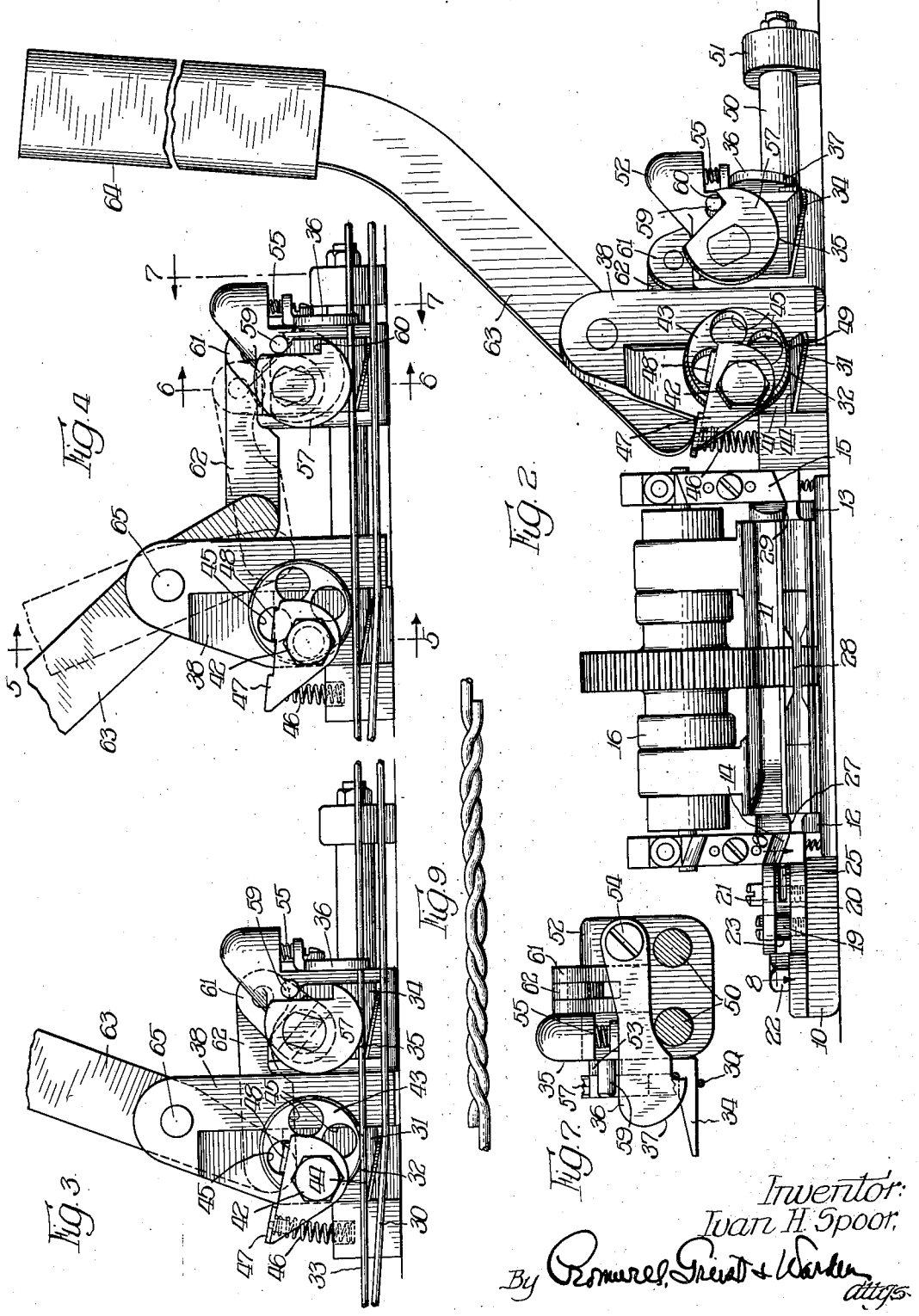

Fig. 4

Fig. 2

Fig. 3

Fig. 9

Fig. 7

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WIRE TYING MACHINE

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Application May 27, 1931, Serial No. 540,330

6 Claims. (Cl. 254—73)

The present invention relates to wire tying machines, and is particularly concerned with the tensioning mechanisms employed in such machines.

The principal object of the invention is to provide an improved tensioning mechanism which will quickly take up the slack in a looped wire and tighten the same without weakening the wire at the places engaged by the mechanism.

Another object is to provide an improved tensioning mechanism in the form of a traveling gripper of novel construction, arrangement and operation.

Other objects and advantages of the invention will be apparent to those skilled in the art upon a full understanding of the nature of the improvements.

In order that the invention may be readily understood, one form of the same is presented herein, but it will of course be appreciated that the invention is susceptible of embodiment in other structurally modified forms coming equally within the scope of the appended claims.

In the accompanying drawings:

Fig. 1 is a top view of a portable wire tying machine equipped with the improved tensioning mechanism;

Fig. 2 is a front view of the machine;

Fig. 3 is a fragmentary front view of the machine near one end of the latter, showing the reciprocating gripper of the tensioning mechanism about to engage with and pull the wire;

Fig. 4 is a similar view, showing the reciprocating gripper after it has pulled the wire and is about to release the same prior to returning to reengage with the wire at another place;

Fig. 5 is a vertical section through the stationary take-up gripper, taken on the line 5—5 of Fig. 4;

Fig. 6 is a vertical section through the reciprocating gripper, taken on the line 6—6 of Fig. 4;

Fig. 7 is a vertical section taken on the line 7—7 of Fig. 4 through the guide rods on which the reciprocating gripper travels, showing the latch carried by the gripper.

Fig. 8 is a horizontal section taken on the line 8—8 of Fig. 2; through the stationary anchoring gripper at the other end of the machine; and

Fig. 9 shows a twisted knot of the type formed by the particular tying mechanism shown.

The improved tensioning mechanism which forms the subject matter of this invention is shown in the drawings applied to a wire tying machine of the type disclosed in Spoor application Serial No. 389,115 filed August 29, 1929, but such mechanism may be applied with equally good results to other kinds of wire tying machines. The particular machine chosen to illustrate the manner of application of the mechanism includes a flat base 10, a slotted wire twisting pinion 11, two slotted wire holding yokes 12 and 13 which are located at opposite sides of the pinion 11 in spaced relation to the latter, two wire cutters 14 and 15 which are positioned against the yokes 12 and 13 above the slots therein, and an operating handle 16 for first turning the pinion 11 to form a twist in lapped strands of the wire and then moving the cutters 14 and 15 to sever different strands at the ends of the twisted section. The kind of tie formed by this particular machine is shown in Fig. 9.

In using the machine to tie a wire about an object, the machine is placed upon the object and one end 17 of the wire is inserted in a stationary anchoring gripper 18 (see Fig. 8), between a peripherally serrated stud 19 and a pivoted clamping block 20. The gripper 18 is located at one end of the machine and is mounted in a flat bracket 21 which is secured to the base 10 of the machine by bolts 22. The stud 19 and the block 20 are positioned in a narrow forwardly opening slot 23 in the bracket. After the end 17 of the wire has been inserted between the stud and the block, the adjoining portion 24 of the wire is bent in a curve about a grooved portion 25 of the block, whereupon the pressure of the bent portion of the wire against the block will turn the latter far enough to firmly clamp the end 17 against the stud. From the gripper 18, the adjoining portion 26 of the wire, which is to receive the twist, is moved into the slot 27 in the yoke 12, the slot 28 in the pinion 11 and the slot 29 in the yoke 13. From the last slot 29, the wire is trained at 30 under an anvil lip 31 (see Fig. 3) which forms a part of the stationary take-up gripper 32 of the tensioning mechanism, then passed about the object to be bound, then moved into the slots 27, 28 and 29 again into lapped contiguous relation with the portion 26 already positioned in the slots, then trained at 33 over, instead of under, the lip 31, and then finally trained over a similar anvil lip 34 which forms a part of the reciprocating gripper 35 of the tensioning mechanism. The wire, after being positioned on the lip 34, is held against inadvertent removal therefrom by a pivoted latch 36 (see Fig. 7) on the gripper 35, which latch has a beveled nose 37 in rearwardly converging relation to the lip 34 which causes the latch to cam upwardly to receive the wire when the latter is pressed rearwardly against the same.

The improved tensioning mechanism—which includes both the stationary take-up gripper 32 and the reciprocating gripper 35—is mounted on an L-shaped bracket 38 (see Fig. 5) which is secured to the base 10 of the machine by a bolt 39 and a positioning dowel pin 40. The stationary take-up gripper 32 includes an L-shaped anvil 41 on the front end of which the lip 31 is formed. The upright portion of the anvil 41 is fastened to the upright portion of the bracket 38 by a bolt 42, and the front end of the bolt 42 forms a support for a peripherally serrated clamping disk 43, which disk is eccentrically pivoted on the bolt against the upright portion of the anvil 41 with the lower portion of the periphery of the disk in opposition to a flat portion 44 of the anvil on which the wire section 33 rests. The disk 43 is preferably provided with a plurality of eccentrically located bearing apertures 45, whereby to permit the angular position of the disk to be changed to present new gripping surfaces at the bottom of the same. The disk 43 is cammed against the wire section 33 by means of a small coil spring 46 which is compressed between a portion of the bracket 38 and a clip 47, which clip is mounted on the bolt 42 in front of the disk 43 and is non-rotatably interlocked with the latter by means of a rearwardly extending tongue 48 which extends into one of the reserve bearing apertures 45. The front portion 49 of the periphery of the disk 43 is preferably beveled to cause the disk to move upwardly away from the flat portion 44 of the anvil when the wire section 33 is pressed rearwardly therebetween. The disk 43 will not interfere in any way with movement of the wire section 33 in the direction of the reciprocating gripper 35, but will bind against the wire and hold the same against retrograde movement when the reciprocating gripper 35 releases the wire at the outer end of its stroke in order to return and take a new hold thereon.

The reciprocating gripper 35 is mounted on two parallel guide rods 50 which project horizontally from the outer end of the bracket 38 in receding relation to the axis of the slots 27, 28 and 29 and terminate in a connecting end block 51. The gripper 35 includes a block 52 (see Fig. 7) which is slidably mounted on the rods 50. The lip 34 is formed on the front end of an L-shaped anvil bracket 53 which is fixedly attached to the front face of the block 52, and the latch 36 is pivotally attached to the block at 54 and is urged downwardly by a coil spring 55 which is compressed between a portion of the latch and an opposed portion of the block 52. The block 52 rotatably supports a shaft 56 (see Fig. 6), and a circumferentially grooved disk 57 is secured eccentrically to the front end of such shaft in a position against the front face of the upwardly extending portion of the anvil 53, with the lower portion of the periphery of the disk in opposed relation to a flat surface 58 formed on the anvil 53 for the reception of the wire section 33. When the shaft 56 is rotated in a clockwise direction as viewed from the front of the machine, the lower portion of the periphery of the disk 57 will clamp the wire section 33 firmly against the flat portion 58 of the anvil, and, when the shaft is oscillated in the opposite direction, the lower portion of the periphery of the disk will be withdrawn from engagement with the wire. The oscillation of the disk 57 in the last mentioned direction is definitely limited to the position shown in dotted lines in Fig. 4 by a pin 59 which engages with a shoulder 60 which is formed at the lower end of a cut-out portion in the periphery of the disk. An arm 61 is fixedly attached to the shaft 56 intermediate the ends of the latter and is connected by a link 62 to the lower end of a tensioning lever 63. The lever 63 is provided at its upper end with a handle 64 and is fulcrumed above the link 62 on a bolt 65 which is mounted in the upper end of the bracket 38. When the handle 64 is swung to the right as viewed from the front of the machine, the gripping disk 57 will first move away from the opposed surface 58 of the anvil 53. As soon as the shoulder 60 on the disk engages with the pin 59, however, the disk will stop turning and the entire traveling gripper assembly will move toward the stationary gripper assembly until brought to rest by engagement of the block 52 with the bracket 38. When the handle 64 is now moved downwardly toward the left, the gripping disk 57 will first turn until it has come into firm clamping engagement with the wire section on the anvil 53, after which further movement of the handle and the link mechanism connected therewith will move the traveling gripper outwardly in continued gripping engagement with the wire, pulling the wire smoothly through the automatically releasing take-up gripper 32. This cycle of operation may be repeated as many times as may be found necessary in order to take up all of the slack in the wire and place the same under the desired tension. If the wire section 30 should be latched in the reciprocating gripper 35 without being first placed under the disk 43 of the stationary gripper 32, the action of the reciprocating gripper 35 in pulling the wire will draw the latter into proper position beneath the disk 43 by reason of the inclination of the guide 50 to the axis of the wire slots combined with the bevel on the front edge of such disk.

The tensioning mechanism above described will not bend up the wire or otherwise deform the same and will not mark the wire to such an extent as to appreciably weaken the same. The serrations on the periphery of the disk 43 will not cut to any extent into the wire because that disk merely has to hold the wire against retrograde movement. The disk 57 also will not cut into the wire because the surface thereof is comparatively smooth. The use of such smooth surface is made possible by reason of the fact that the force used to pull the wire with the disk is simultaneously applied through the disk to the wire as a clamping force.

It will be observed that in the preceding specification and following claims the machine to which the tensioning mechanism is applied is referred to as a "wire tying" machine. This language is intended to include within its meaning all types of machines for applying binding material, regardless of whether the wire is round or flat and irrespective of whether the tie is a twist, an interlocking deformation or a sleeved seal, the tensioning mechanism, with suitable modification, being usable with wire of various cross-sectional shapes.

I claim:

1. In a wire tying machine, a tensioning mechanism comprising a stationary anchoring gripper at one side of the machine, a stationary take-up gripper at the other side of the machine, a spring for closing the take-up gripper, a traveling gripper beyond the take-up gripper, and means for reciprocating the traveling gripper, said stationary take-up gripper opening automatically against the action of the spring to initially receive the wire when the latter is pulled by the

traveling gripper into laterally camming engagement with the stationary gripper.

2. In a wire tying machine, the combination, with a tying mechanism, of a tensioning mechanism comprising a stationary anchoring gripper at one side of the tying mechanism which is adapted to engage one end of the wire, a stationary take-up gripper at the other side of the tying mechanism which is adapted to engage the wire after it has been passed through the tying mechanism, looped about the object to be bound and again passed through the tying mechanism, a traveling gripper beyond the take-up gripper which is also adapted to engage the wire, and means for reciprocating the traveling gripper at an angle to the longitudinal axis of the tying mechanism.

3. In a wire tying machine, the combination, with a tying mechanism, of a tensioning mechanism comprising a stationary anchoring gripper at one side of the tying mechanism which is adapted to engage one end of the wire, a stationary take-up gripper at the other side of the tying mechanism which is adapted to engage the wire after it has been passed through the tying mechanism, looped about the object to be bound and again passed through the tying mechanism, a traveling gripper beyond the take-up gripper which is also adapted to engage the wire, and means for reciprocating the traveling gripper, said means consisting of a lever which is pivoted to the machine at a point between the traveling gripper and the tying mechanism.

4. In a wire tying machine, a tensioning mechanism comprising a stationary anchoring gripper at one side of the machine, a stationary take-up gripper at the other side of the machine, and a reciprocating gripper beyond the take-up gripper, said take-up gripper being beveled along one edge to permit the wire to wedge itself into the same when pulled by the reciprocating gripper.

5. In a wire tying machine, a tensioning mechanism comprising a bracket, an upright hand lever fulcrumed at a point above its lower end on the bracket, a guide projecting from the bracket, a block slidably mounted on the guide for movement toward and away from the bracket, a gripper eccentrically mounted on the block, means for connecting the gripper with the lower end of the lever, and a stop on the block for arresting the turning movement of the gripper in one direction.

6. In a wire tying machine, a tensioning mechanism comprising a stationary anchoring gripper at one side of the machine, a stationary take-up gripper at the other side of the machine, a traveling gripper beyond the take-up gripper, and means responsive to the pressure of the wire against one side of the take-up gripper for causing the latter to automatically open up to receive the wire.

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