June 17, 1947. A. M. KAMPER ET AL 2,422,643

STRAPPING MACHINE

Filed July 13, 1942 4 Sheets-Sheet 1

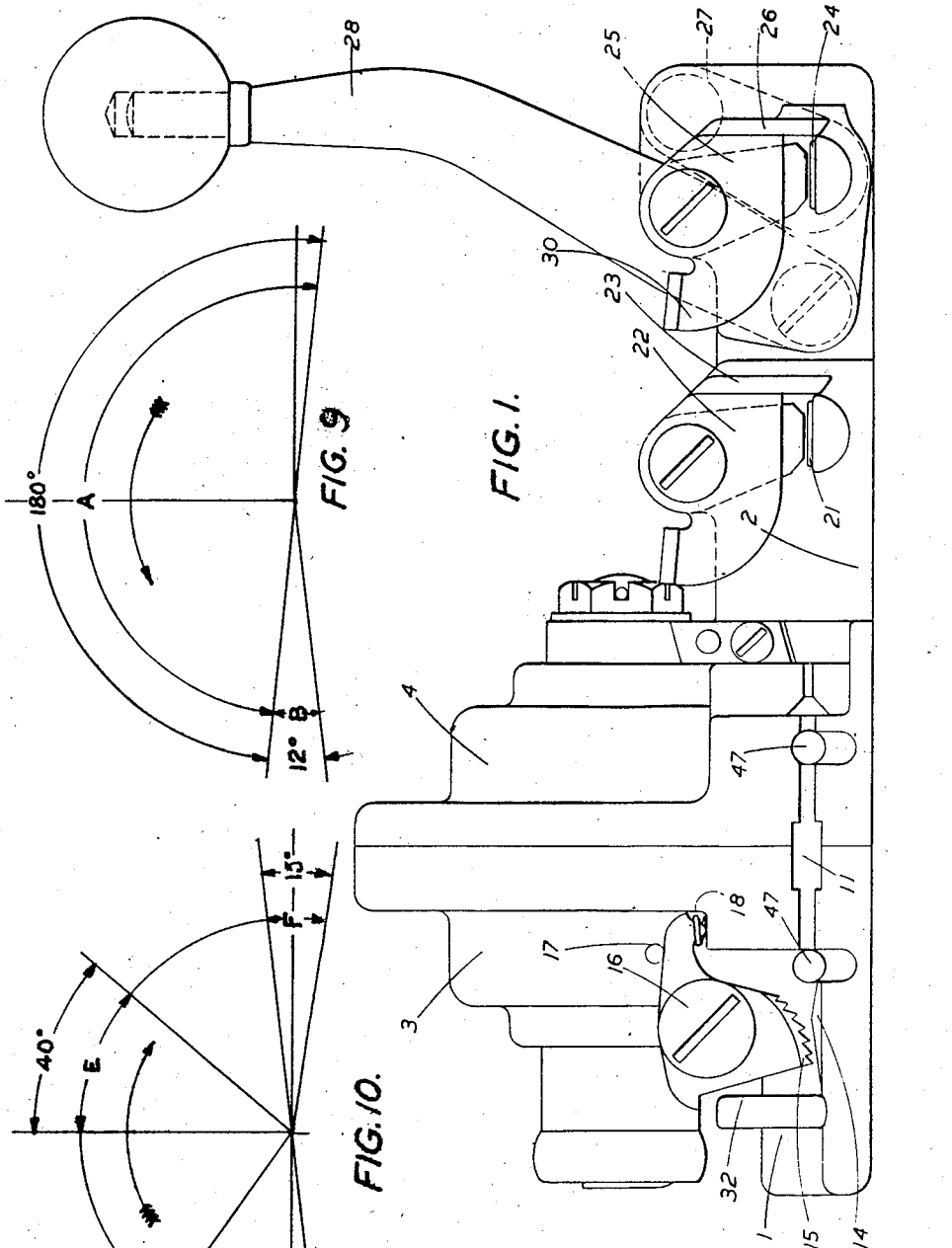


FIG. 1.

FIG. 9.

FIG. 10.

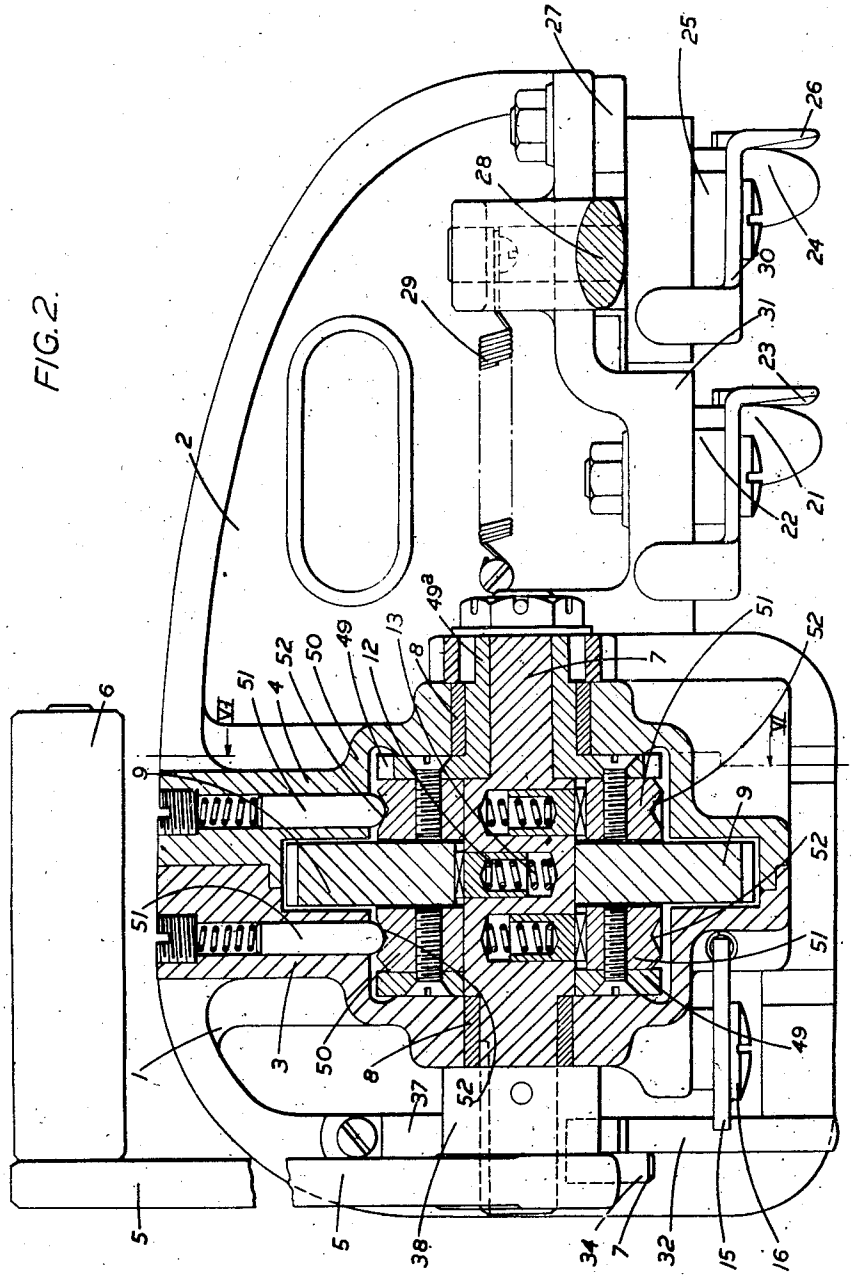
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FIG. 2.



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FIG. 3.

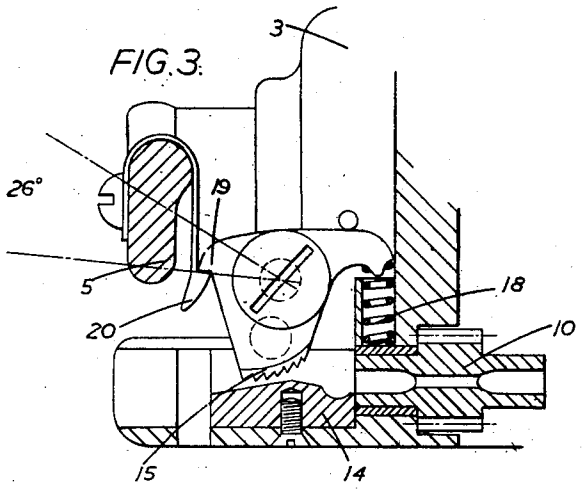


FIG. 4.

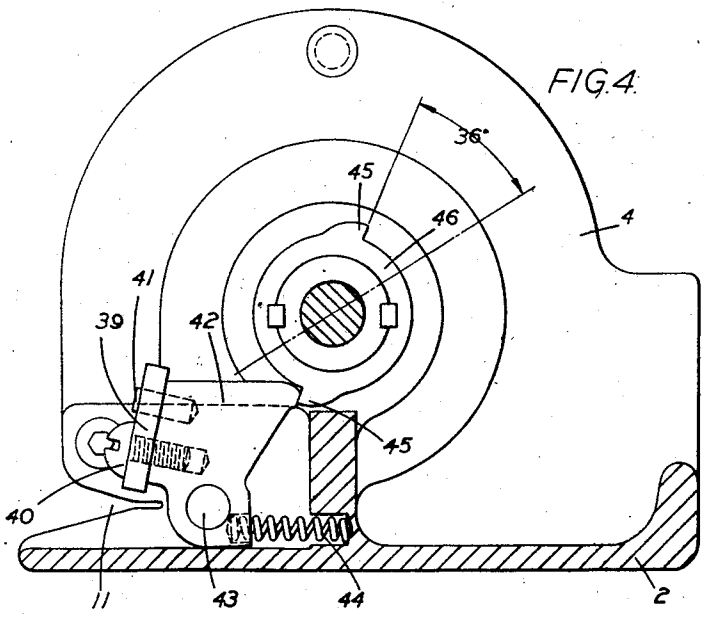
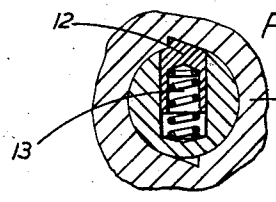


FIG. 5.



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FIG. 6.

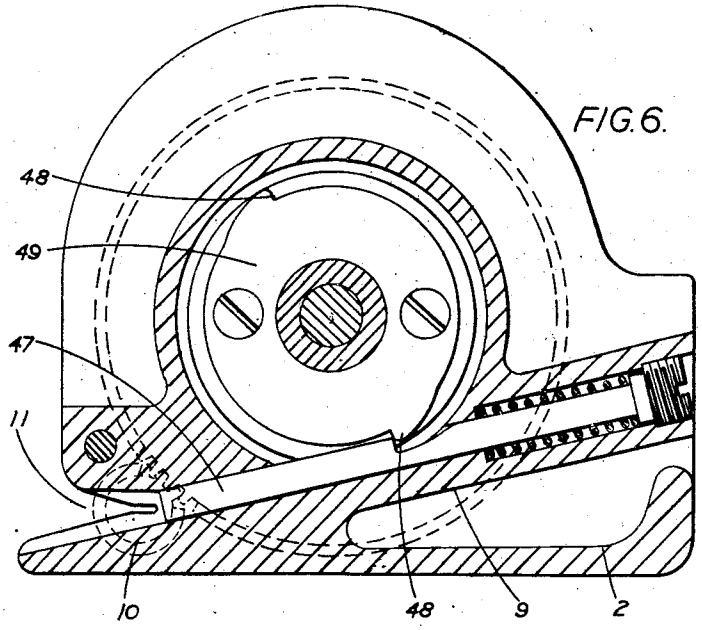


FIG. 7.

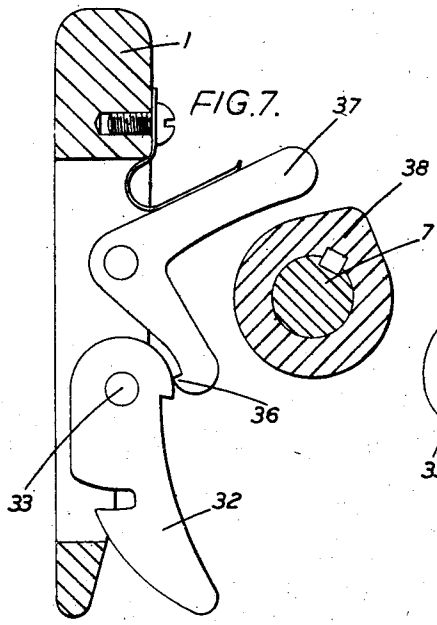
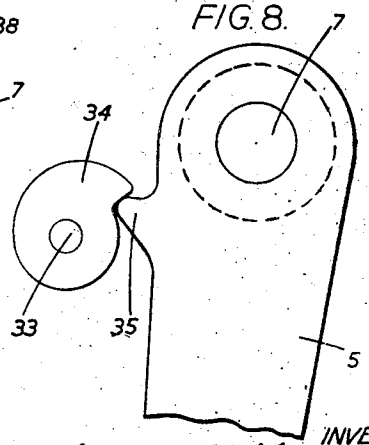


FIG. 8.



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2,422,643

UNITED STATES PATENT OFFICE

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STRAPPING MACHINE

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Application July 13, 1942, Serial No. 450,828
In Great Britain August 6, 1941

Section 3, Public Law 690, August 8, 1946.
Patent expires August 6, 1961

5 Claims. (Cl. 140—93)

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This invention relates to strapping machines of the kind by which a wire is tensioned round a box or other package and an intertwisted helical tie formed. It is concerned primarily with a portable machine in which wire is gripped at one end of the machine and tensioned at the other, the overlapping lengths of wire between the gripping and tensioning means being twisted by a slotted pinion engaged by a larger toothed wheel so that a single forward throw of an operating lever engaging the larger wheel will produce the required number of twists.

The invention is designed to provide a light and robust machine which will be easy and safe to operate and to disengage from the strapping just completed. It embodies improvements co-operating to this end.

The parts of the invention for which a monopoly is desired are those set out in the claims; they are embodied in a typical machine which will now be described with reference to the accompanying drawings in which:

Fig. 1 is a front elevation,

Fig. 2 is a sectional plan view.

Fig. 3 is a fragmentary view with parts cut away to show the mechanism at the left hand of Fig. 1,

Fig. 4 is a sectional elevation illustrating the cutter mechanism,

Fig. 5 is a fragmentary section of the driving spindle and timing gear wheel,

Fig. 6 is a sectional view on the line VI—VI of Fig. 2, showing knot ejecting mechanism,

Figs. 7 and 8 are fragmentary views to illustrate the operation of the wire retaining latch, and

Figs. 9 and 10 are diagrams showing the timing of the various operations on the forward and return strokes of the lever.

As illustrated, the machine is of the general type in which the machine is placed on the box or like to be strapped and wire from a reel or coil in any convenient position to the right of the machine has its end inserted in a gripper at the left hand end of the machine. The bight of the wire is then pushed back into the slot of the twisting pinion and a loop carried clockwise round the box, the second wire being pushed back behind a retaining latch, into the slot of the pinion and into the tensioning means at the right hand end of the machine. The wire is then tensioned and surplus fed back towards the reel or coil and the twisting and cutting off operations performed.

The main body casting of the machine shown has its two ends 1, 2 made separately, each including a portion 3, 4 respectively of a central

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housing. An operating lever 5 with a cranked handle 6 is mounted on the main driving spindle 7 carried in bearings 8. The central portion of the spindle 7 is of larger diameter and carries the larger main or timing gear wheel 9 which engages the twisting pinion 10 positioned behind the slot 11 of the housing. A plunger 12 in the central portion of the spindle 7 is pressed by spring 13 to act as a pawl engaging a ratchet step in the bore of the wheel 9, so that the wheel is carried with the forward stroke of the lever to operate the twisting pinion.

The left-hand gripper is best seen at Figs. 1 and 3. It comprises a fixed anvil 14 and a dog 15 pivoted on a pin 16 and pressed towards a stop 17 by a spring 18. A step 19 is engaged by a spring pawl 20 carried by the handle 5 as the latter nears the end of its forward stroke, so that the dog will be lifted and freed from the wire as the backward stroke begins. The grip (which is effective so long as there is a pull on the wire end) is thus released and will readily allow the wire to move out sideways.

The wire having been looped round the box, as described above, with lengths of the bight lying one behind the other in the slot of the twisting pinion 10, it is engaged by the tensioning mechanism shown at the right-hand end of Figs. 1 and 2. This is of a normal type including stationary and movable one-way gripping devices by which surplus wire can be paid back towards the reel.

In a typical form the stationary gripper includes a fixed anvil 21 and a pivoted jaw 22 which is influenced in movement toward the anvil, as by gravity or a spring, not shown. The jaw 22 is so positioned relatively to the pivotal axis that it will grip the wire tightly when the relative movement of the jaw is towards the coil. The jaw has an extension 23 at the (right-hand) end nearer the coil. On inserting the wire which is to be fed back towards the coil it engages under a slope in front of the extension, lifting the jaw and allowing it to fall again after the wire has reached gripping position, when the extension will lie in front of the wire and retain it. The movable gripper has a similar anvil 24 and jaw 25 with a similar extension 26 but the whole assembly is carried by a short link 27 and pivotally connected to a tensioning lever 28. The lever is pressed by a spring 29 towards the stationary gripper and a backward extension 30 on the pivoted jaw is arranged to engage a fixed part 31 of the machine behind the stationary jaw, so that the rather stronger spring 29 acting to hold the lever normally to the left will over-come the

normal spring acting on the jaw and hold the latter open ready to receive the wire.

As the wire is carried round it is slipped under the retaining latch 32 which is fixed on its spindle 33. The latch 32 can thus be actuated by the stepped wheel 34 engaged by a nose 35 on handle 5 and will be retained by the catch 36 of the spring pressed rocker 37 until the rocker is actuated by a cam 38 on the spindle 7—all best seen in Figs. 7 and 8.

The cutter is best seen in Figs. 1 and 4. It is of a normal type, the blade 39 being held by a screw pin 40 and dowel 41 on the lever 42 pivoted at 43 and urged towards the up position by spring 44. It is actuated by one or other of the pawl projections 45 of the disc 46 keyed to an extension 49a of a member 49 which is unidirectionally rotated by the spindle 7 during the return stroke of lever 5.

A pair of spring-returned ejecting plungers 47 lie nearly horizontally behind the tie at each side of the twisting pinion 10.

On the return stroke of the lever the larger or timing wheel 9 is retained in known manner and the pawl projections 48 or like members on the discs 49 become operative, driving forward the ejector plungers and helping the machine to be freed from the completed tie. The discs 49 are carried by the unidirectional members 50 operated similarly to the wheel 9 but on the return stroke instead of the forward stroke of the lever 5. Spring pressed plungers 51 engage depressions 52 in the members 50 to locate the members 50 after each half revolution.

The operation may be followed by reference to Figs. 9 and 10. The lever 5 is in its furthest back position when the machine is ready to receive the wire. The wire end is inserted under the dog 15 and the encirclement of the box and placing of the wire in operative position behind the retaining latch 32, in the slot of the twisting pinion 10 and in the tensioning devices is carried out as already described. Upon the forward stroke of the lever 5 the timing wheel 9 is rotated by the plunger 12 through 180° as indicated by A, causing the appropriate number (usually three) rotations of the twisting pinion 10 and intertwisting the wires. A further 12° of overtwist is shown at B. The nose 35 on the lever 5 at this period lifts the latch 32 so that it is caught and held by the rocker arm 37. The return stroke is shown at Fig. 10. During period C the pawl 20 on lever 5 lifts the dog 15 and frees the left hand gripper. During period D the cutter is descending to cut off the wire leading to the reel or coil, the pawl projection 45 riding off the lever 42 at the end of the period. During a later period, preferably starting when the lever is about vertical and represented as 40° at E the ejecting plungers operate until the pawl projections 48 ride off them. During the final period F, represented as 15°, when the machine is free of the completed tie, the cam 38 operates to rock the arm 37 and free the latch 32 to return to its operative position by gravity.

It will be understood that other suitable mechanical expedients can be substituted for those actually shown without departing from the monopoly defined by the claims. The timing is also subject to variation within fairly wide limits and the operations can take place at other suitable locations in the cycle.

We claim:

1. In a strapping machine an oscillatable handle, wire twisting means, means responsive to movement of the handle in one direction to operate the twisting means, knot-ejecting means, and means responsive to movement of the handle in the opposite direction to operate the knob-ejecting means.

2. In a strapping machine of the kind referred to, the combination of a twisting pinion, a main spindle, a lever secured to said spindle, a larger gear wheel engaging said twisting pinion and having a bore mounted on said spindle, means to give unidirectional engagement within said bore between said spindle and said gear wheel whereby said spindle will operate said twisting pinion during a forward stroke of said lever, said machine having also other operative elements and at least one other member mounted on said spindle and having a bore, and means to give unidirectional operative connection within said last-named bore of said other elements during a return stroke of the lever.

3. In a strapping machine of the kind referred to, the combination of a twisting pinion, a main spindle, a lever secured to said spindle, a larger gear wheel engaging said twisting pinion and having a bore mounted on said spindle, means to give unidirectional engagement within said bore between said spindle and said gear wheel whereby said spindle will operate said twisting pinion during a forward stroke of said lever, said machine having also wire cutting means and knob-ejecting means and means to give operative connection between said lever and said cutting means and then between said lever and said knob-ejecting means during a return stroke of said lever.

4. In a machine of the kind referred to, the combination of twisting mechanism, a lever, means by which said lever is operatively connected to said mechanism during a forward stroke of said lever, other elements including a wire-retaining latch, means to cut the completed tie from the wire supply and knot ejecting means, and means operatively connecting said lever to said elements as follows: to the said latch to move it to wire releasing position, to said cutting means to cut the wire and to said ejecting means to eject the knot, said latch being thereupon released and automatic means being provided to return said latch on its release to position for receiving a wire.

5. In a machine as defined in claim 2, a main body casting made up of two end parts, each part defining a portion of a housing enclosing said pinion other than opposite the slot of said pinion in a predetermined position thereof and said gear wheel and also enclosing the means for giving unidirectional engagement during a forward and during a reverse stroke of said lever.

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