

June 16, 1925.

1,542,586

D. N. RUBIN ET AL

AUTOMATIC PORTABLE NAILING MACHINE

Filed Oct. 25, 1922

3 Sheets-Sheet 1

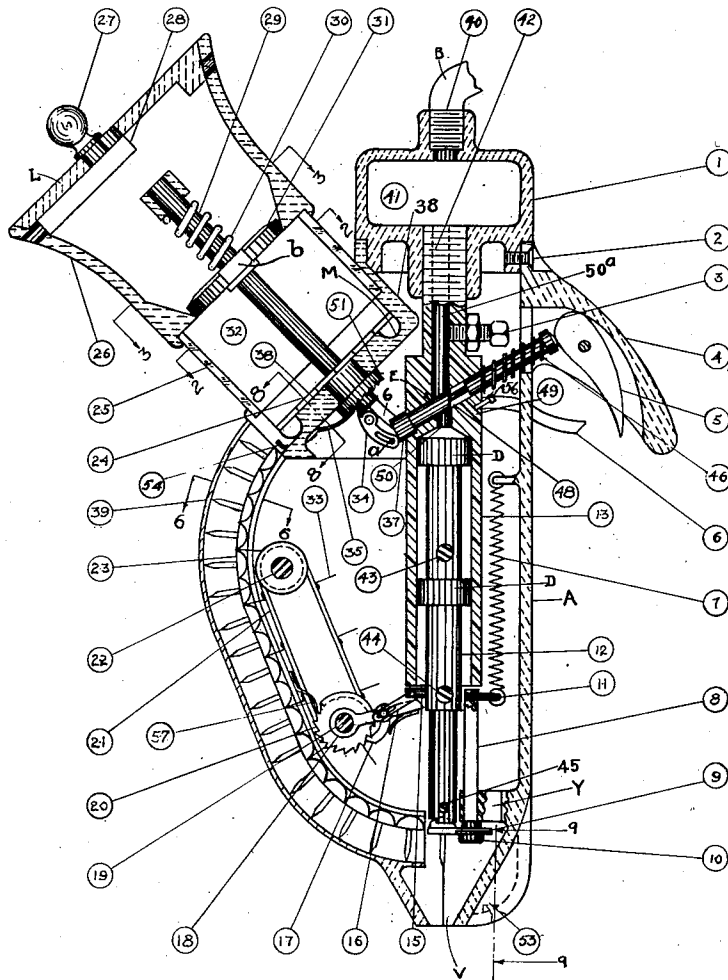


Fig. 1

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3 Sheets-Sheet 2

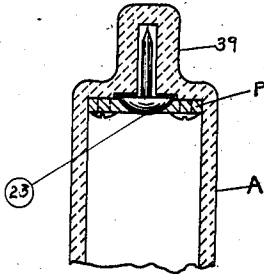


Fig. 6

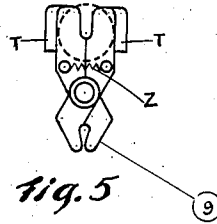


Fig. 5

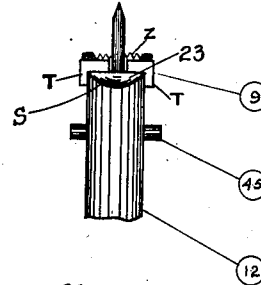


Fig. 4

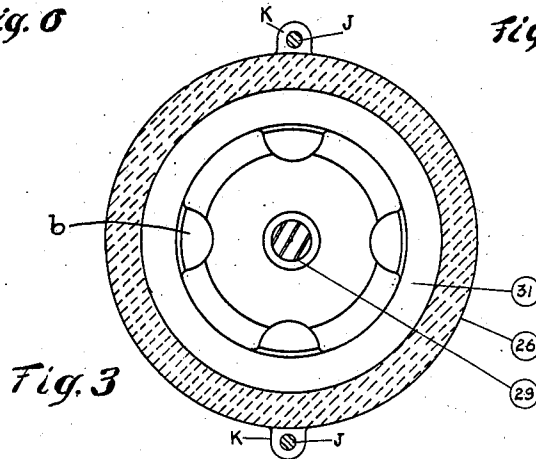


Fig. 3

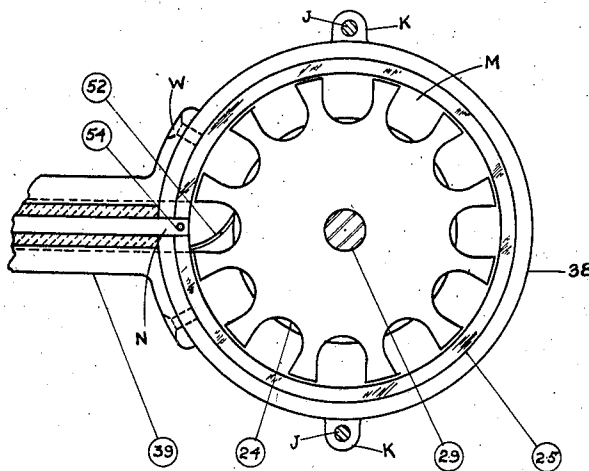


Fig. 2

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3 Sheets-Sheet 3

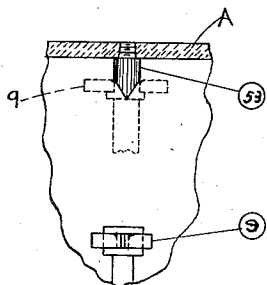


Fig. 9

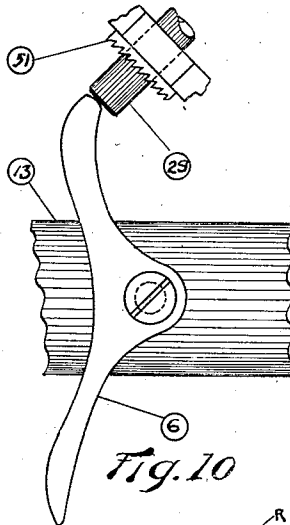


Fig. 10

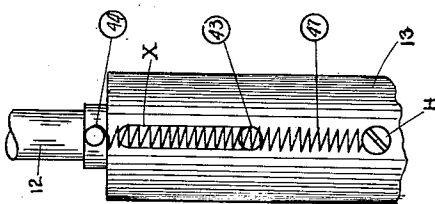


Fig. 7

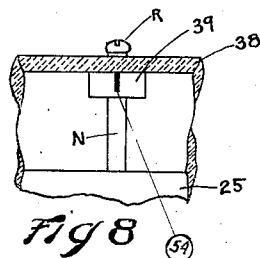


Fig. 8

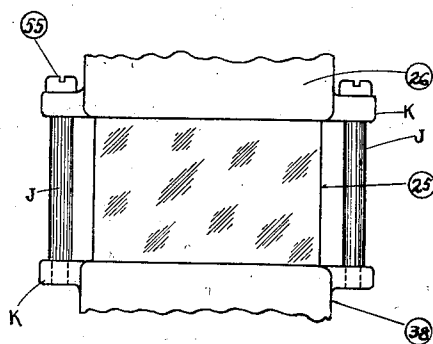


Fig. 11

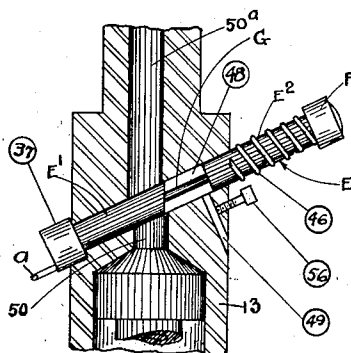


Fig. 12

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Patented June 16, 1925.

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UNITED STATES PATENT OFFICE.

DAVID N. RUBIN, OF WINTHROP, AND BENJAMIN SHAPIRO, OF BOSTON, MASSACHUSETTS.

AUTOMATIC PORTABLE NAILING MACHINE.

Application filed October 25, 1922. Serial No. 596,777.

To all whom it may concern:

Be it known that we, DAVID N. RUBIN and BENJAMIN SHAPIRO, citizens of the United States, residing at Winthrop and Boston, respectively, both in the county of Suffolk and State of Massachusetts, have invented a certain new and useful Improvement in Automatic Portable Nailing Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to nailing or tacking machines and has for its object to provide an efficient power driven machine which is nevertheless portable so as to be capable of use for driving carpet, upholstery, or other tacks, small nails, or similar fasteners (hereinafter referred to generally as "tacks") in substantially any position or direction, said machine being of the magazine type and having means for effectively and reliably feeding the tacks from the magazine or hopper to the driver notwithstanding the position or angle in which the machine is held, and for holding said tacks for the action of the driver and releasing the same when driven.

The more particular objects of the invention, together with means whereby the same may be carried into effect, will best be understood from the following description of one form or embodiment thereof illustrated in the accompanying drawings. It will be understood, however, that the particular construction and arrangement of parts herein shown and described have been chosen for illustrative purposes merely, and that the invention, as defined by the claims hereunto appended, may be otherwise practiced without departure from its spirit and scope.

In said drawings:

Fig. 1 is a substantially central longitudinal section of the complete machine.

Figs. 2 and 3 are transverse sections of the hopper taken substantially on the lines 2—2 and 3—3, Fig. 1.

Fig. 4 is a detail elevation of the driver, illustrating the cooperation therewith of the jaws for holding the tacks in position to be driven.

Fig. 5 is a detail plan view of the holding jaws, the position of the driver being indicated in dotted lines.

Fig. 6 is a detail cross section, taken sub-

stantially on the line 6—6 of Fig. 1 of the portion of the casing constituting the tack raceway.

Fig. 7 is a detail view of the motor cylinder and the driver operated thereby, showing the spring for retracting said driver.

Fig. 8 is a fragmentary section, taken substantially on the line 8—8 of Fig. 1, of the bottom of the hopper, showing the entrance to the raceway and detent therein.

Fig. 9 is a detail section, taken substantially on the line 9—9, Fig. 1, of the means for opening the tack holding jaws.

Fig. 10 is a fragmentary view of the lever for operating the hopper gate.

Fig. 11 is a fragmentary elevation of a portion of the hopper.

Fig. 12 is an enlarged detail section of the controlling valve and associated parts.

The machine as a whole is enclosed by a casing A to which is secured, as by screws 2, a hollow head block 1, said casing having a suitable handle 4 whereby the machine may be manipulated. The head block 1 is formed at its outer side with a threaded opening 40 for the attachment of a suitable fitting on the end of a flexible hose B, whereby the pressure chamber 41 in said head block may be supplied with compressed air. Said head block at its opposite side has threaded therein a stem 42 forming a part of a cylinder 13 containing a piston D carried by a piston rod 12 the outer end of which constitutes the driver. The motor comprising the cylinder 13 and piston D is of the single acting type, said cylinder being open at its outer end and communicating at its inner end, through passages 50 and 50^a in the head of said cylinder and in the stem 42, with the pressure chamber 41 in the head block 1, the effective size of the passage 50^a being regulated by valve 3 in the form of a screw in threaded engagement with an opening in said stem communicating with said passage. The passages 50 and 50^a are slightly offset from one another, and the passage afforded there-through is controlled by a piston valve E arranged to slide longitudinally in a transverse passage 48 intersecting the passages 50 and 50^a at their junction. The valve E is normally held in the position shown in Figures 1 and 12 by a spring 46 interposed

between the exterior of the cylinder 13 and a head F on said valve, the position of the valve under the influence of the spring 46 being determined by engagement of a head 5 37 thereon with an exterior recess in the opposite side of the cylinder. The valve E comprises two piston portions E¹ and E² connected by a stem G. The piston portion E¹ is adapted, when the valve is in its normal position under the influence of the 10 spring 46, to cut off the supply of air through the passage 50^a, but, due to the offset disposition of the passage 50 leading to the cylinder, the latter passage is not 15 fully closed but is left in communication with the passage 48 which, in turn, communicates with the atmosphere through a passage 49 whose effective area is regulated by an adjusting screw 56. Longitudinal 20 movement of the valve E against the tension of the spring 46 causes the piston portion E² to close the passage 49, and at the same time causes the piston portion E¹ to open communication between the passages 25 50 and 50^a and admit air to the cylinder. Said valve is operated for the latter purpose by means of a trigger or fingerpiece 5 pivoted in a recess in the handle 4. The driver is retracted, when the fingerpiece 5 30 is released and the valve E returned to normal position, by means of a spring 47 (Fig. 7) connecting a pin 44 on said driver with a pin H projecting from the exterior of the cylinder 13, the air in the inner end 35 of said cylinder at this time escaping through the passages 50, 48 and 49 to the atmosphere.

The tacks to be driven are supplied from a magazine or hopper secured to the casing 10 A in a position inclined to the path of movement of the driver so as to facilitate the feeding of tacks from said hopper in all positions of the machine between the vertical and the horizontal. Said hopper comprises substantially coaxial cylindrical sections 15 38 and 26, between which is interposed a section 25 (Figs. 1 and 11) of glass or other transparent material, the section 38 being secured to the casing A, as by screws 50 W (Fig. 2) and projecting thereinto through an opening therein, and the several sections being held in assembled relationship by means of bolts J connecting 55 lugs K on the sections 26 and 38. By merely removing the bolts J the hopper may be completely disassembled, if desired, in order to clear the propelling disk hereinafter referred to in case the latter should 60 inadvertently become jammed, as by the presence of a defective tack. The section 26 constitutes a receiving chamber which is normally separated from the delivery chamber, formed by the sections 25 and 38, by means of a gate 31 comprising a disk sub- 65 stantially fitting the reduced inner end of

said chamber 26 and having notches b in its periphery, as shown in Fig. 3, said notches being of an insufficient size to permit the passage of tacks except when the disk 31 is raised from its seat. The disk 31 is carried by a stem 29 which is guided for 70 axial movement in the hopper, said disk being normally seated by a spring 30. The inner end of the stem 29 is engaged by a lever 6 (Figs. 1 and 10) pivoted to the cylinder 13 and has its end extended, in the 75 form of a fingerpiece, through the casing A into a convenient position adjacent the handle 4. The outer side or end of the receiving chamber 26 is normally closed 80 by a removable cover L which is secured in place by a sliding bolt 28 having an operating knob 27. The tacks to be driven are supplied to the receiving chamber in the upper or outer section 26 of the hopper 85 which is filled with said tacks, the latter being admitted a few at a time to the delivery chamber of said hopper by manipulation of the lever, the number of tacks at any time in the latter chamber being readily 90 observed through the transparent section 25. By this arrangement a considerable supply of tacks can be carried in the hopper, said tacks being, however, supplied a few at a time to the means for feeding the same 95 from the hopper, thereby avoiding clogging of said feeding means.

The bottom of the section 38 of the hopper is formed with an annular groove M (Figs. 1 and 2) extending substantially there- 100 around, being provided at one point with a switch member 52 adapted to divert tacks passing about said groove through an outlet N in the hopper section communicating with the tack raceway 39. The latter comprises 105 a hollow rib (see Fig. 6) formed on the edge of the casing A so as to form a raceway which is closed at the outer side and open at the inner side, the raceway receiving the shanks of the tacks, the heads 23 of 110 which are slidably engaged by a pair of flanges or gibs P secured to the inner side of the casing adjacent the raceway. Retrograde movement of the tacks from the raceway 39 to the hopper is prevented by a 115 detent 54 (Figs. 1, 2, and 8) comprising a resilient pin or wire secured in place at the mouth of said raceway by a suitable screw R. The tacks are forced out of the delivery 120 chamber of the hopper, past the detent 53, and into the raceway 39 by means of a propelling disk 24 having a hub rotatably mounted in the bottom of the hopper section 38, said disk, as shown most clearly in Figure 2, having a peripheral series of notches 125 adapted to receive the heads of the tacks and permit the same to enter the groove M which is shaped substantially to fit them. The disk 24 is rotated to carry said tacks 130 about said groove to the switch portion 52

which diverts the same into the raceway and positively forces them past the detent 54. To this end the hub of the disk 24 is formed with a ratchet 51 which is engaged and actuated by a pawl 34 pivoted to the interior of the casing and operated by the head 37 of the valve E which carries a hooked pin *a* engaging a slot in said pawl, said ratchet 51 being held against retrograde movement by a holding-pawl 35. At each operation of the valve E by the fingerpiece 5, the disk 24 is actuated at an amount sufficient to force one tack from the hopper into the raceway, thereby maintaining the supply of tacks in said raceway as said tacks are used.

The tacks in the raceway 39 are positively propelled along the latter by means of fingers 33 on a belt 21 which passes over rollers having journals 19 and 22 journaled in the walls of the casing A. For advancing the belt 21 an amount equal to the width of one tack at each operation of the driver, the shaft 19 has fast thereon a ratchet 20 which is held against retrograde movement by a holding-pawl 57 and is advanced by an operating pawl 17 pivoted to a pawl carrier 18 loosely hung on the shaft 19 and connected by a link 16 with a pin 15 projecting from the driver 12. In order to insure the maintenance of the last named connections, the driver is held against turning by means of a stud 43 projecting therefrom and guided in a longitudinal slot X (Fig. 7) in the cylinder 13.

The foregoing mechanism, it will be seen, operates positively to supply a tack to the driver at each operation of the latter, the tacks being positively fed from the hopper and being positively propelled along the raceway at a rate depending upon the rate of operation by the driver, so that a supply of tacks to the latter is insured irrespective of the position or angle in which the device is held.

Each tack, after it is delivered from the raceway 39 to the driving point, is caught by a pair of jaws 9 pivoted to a head 10 on a slide 8 and connected by a spring Z. The slide 8 is guided in a lug Y on the inside of the casing A for movement parallel to the path of movement of the driver and is normally held in retracted position by a spring 7 connected to the casing A and to a pin 11 carried by said slide. The end of the driver 12 is recessed, as shown at S in Figure 4, to fit the heads of the tacks which are held in said recessed end by the jaws 9, the latter being pressed against the end of said driver by the spring 7 and having flanges T which normally embrace said end, substantially enclosing the tack head and securely retaining the same in the driving position. The forward movement of the driver causes the tack to be driven through the throat or nozzle V, and during this movement of the

driver the jaws 9 and slide 8 move with said driver. After the tack passes through the nozzle V, the rear ends of the jaws 9 are engaged by a wedge-shaped pin 53 carried by the casing, and thereby opened so as to release the tack head. Said jaws are spread apart sufficiently to clear the end of the driver 12, whereupon the spring 7 retracts the slide 8, this movement being limited by the engagement of said jaws with pins 45 projecting from said driver. Thereafter, as the driver is retracted, said jaws and slide move with it until their movement is arrested by engagement of the head 10 on said slide with the lug Y, this occurring just before the driver reaches its fully retracted position, so that the jaws are again caused to assume a position adjacent the end of said driver and are closed by their spring Z.

It will be understood that the apparatus as a whole may be moved from place to place, the flexible hose B permitting such movement while maintaining the supply of motive fluid and that when it is desired to drive a tack the trigger 5 is operated, whereupon air is admitted to the cylinder 13, and the driver 12 is advanced to drive a tack through the throat V. When the trigger 5 is released, the air is exhausted from said cylinder, permitting the springs 47 to retract said driver and return it to normal position. The fingerpiece 6 is also manipulated from time to time, as may seem necessary by observation of the tacks in the delivery chamber of the hopper through the transparent section 25, so as to renew the supply of tacks therein from the reserve stock in the receiving chamber 26, said tacks being thereupon positively fed from the hopper to the driver at a rate determined by the operation of the latter, so that the presence of a tack beneath the driver is always insured irrespective of the manner in which the machine is used and the position or angle in which it is held.

If desired the mechanism for actuating the tack feeding or propelling disk 24 may be so designed as to move the same an amount greater than is necessary to feed one tack from the hopper into the raceway, in order to insure that the latter is at all times filled, or to compensate for failure of said disk at any time to supply a tack, as when the machine is held in inverted position; in which case the end of the pawl 34 may be made yielding so as to move idly over the ratchet 51 when the raceway is full.

Having thus described our invention, we claim:

1. In a tacking machine, in combination, driving mechanism, operating mechanism for said driving mechanism, controlling means for said operating mechanism, a tack hopper, a tack raceway leading from said hopper to said driving mechanism, and means

operated by said controlling means for forcing the tacks one by one from said hopper into said raceway.

2. In a tacking machine, in combination, a driver, a fluid pressure motor for operating said driver, a valve for controlling said motor, means for operating said valve, a tack hopper, a tack raceway leading from said hopper to said driver, and means operated by said valve operating means for forcing the tacks one by one from said hopper into said raceway.

3. A portable tacking machine comprising a driver, a fluid pressure motor for operating said driver, a manually operated valve for controlling said motor, a tack hopper, means operated by the operation of said valve for feeding tacks from said hopper, and means operated by said driver for feeding said tacks thereto.

4. In a tacking machine, in combination, a driver, a fluid pressure motor for operating said driver, a valve for controlling

said motor, a tack hopper, a tack raceway communicating therewith, said hopper having in its bottom an annular groove terminating in a switch portion leading to said raceway, a disk in said hopper having notches communicating with said groove, a stem journaled in the bottom of said hopper and by which said disk is carried, a ratchet on said stem, and a pawl operated by said valve and cooperating with said ratchet.

5. In a portable tacking machine, a casing having a hollow rib constituting a tack raceway closed at the exterior of the casing and open at the interior thereof, and a pair of parallel flanges on the interior of the casing adjacent said raceway for slidably engaging the heads of the tacks in said raceway and retaining the same therein.

In testimony whereof we affix our signatures.

DAVID N. RUBIN.
BENJAMIN SHAPIRO.