

June 25, 1957

N. JOHNSON
NAIL DRIVING TOOL

2,796,608

Filed Feb. 17, 1954

2 Sheets-Sheet 1

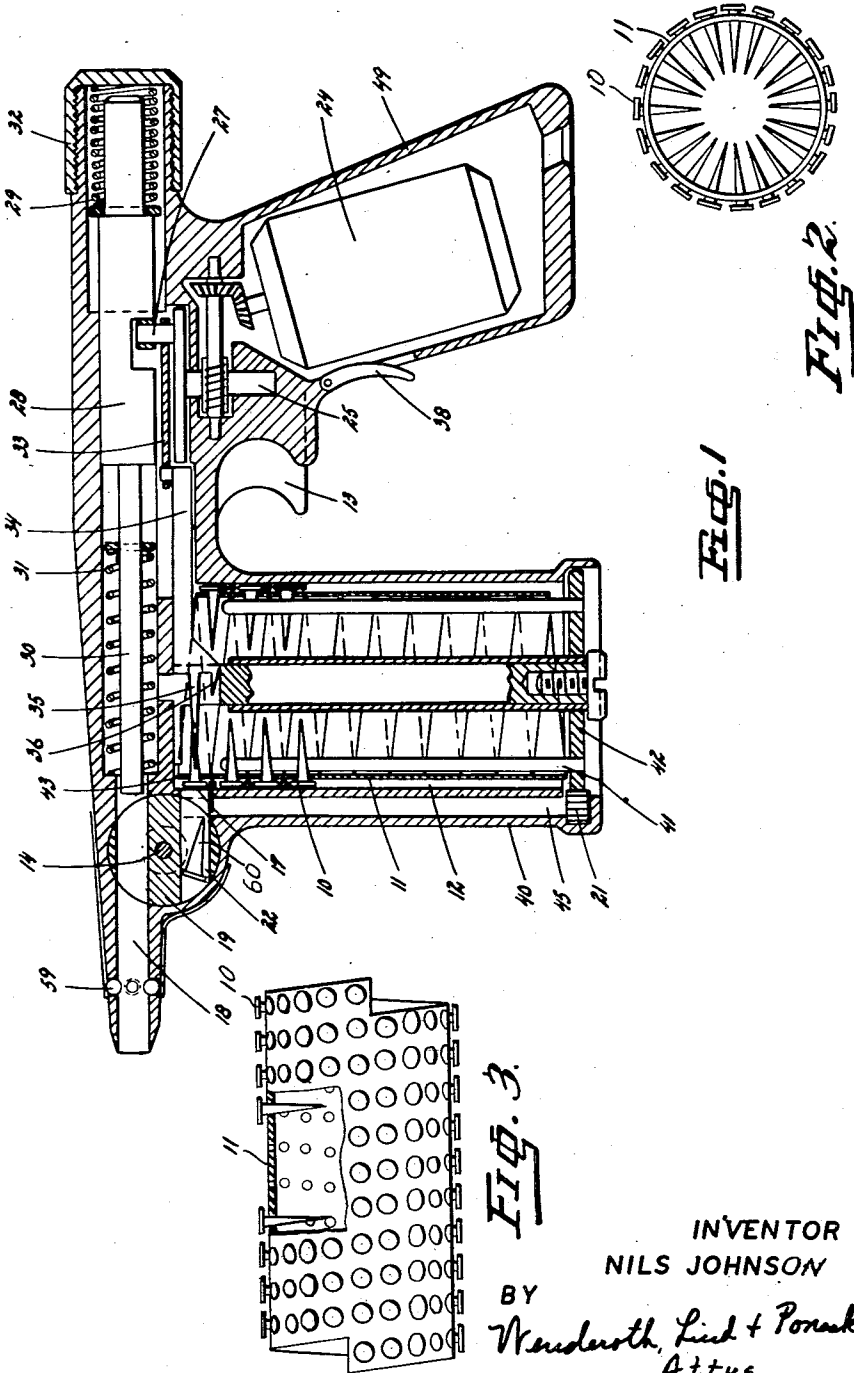


FIG. 3.

INVENTOR
NILS JOHNSON
BY
Kendall, Lind + Porank
Attys.

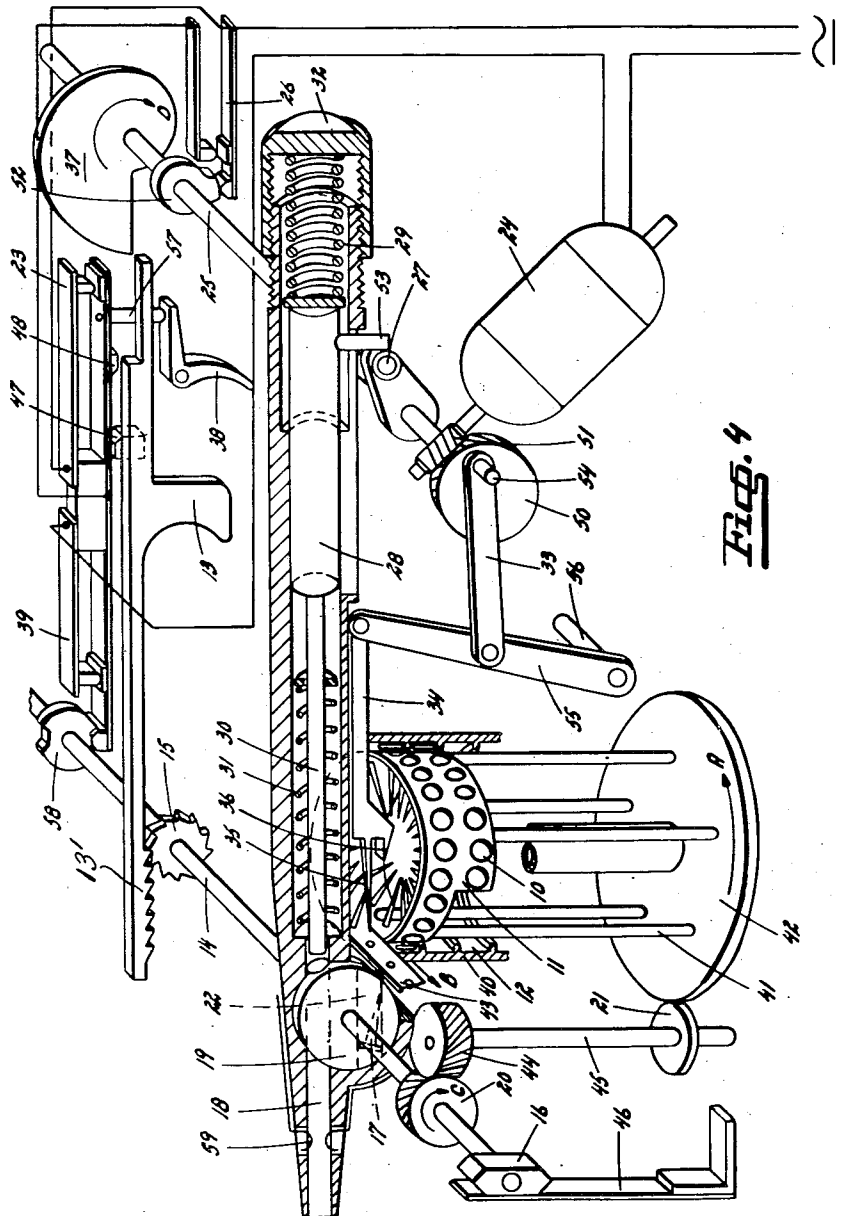
June 25, 1957

N. JOHNSON
NAIL DRIVING TOOL

2,796,608

Filed Feb. 17, 1954

2 Sheets-Sheet 2



INVENTOR
NILS JOHNSON
BY
Wendroth, Lind & Ponack
Attys

1

2,796,608

NAIL DRIVING TOOL

Nils Johnson, Stockholm, Sweden

Application February 17, 1954, Serial No. 410,999

Claims priority, application Sweden February 17, 1953

8 Claims. (Cl. 1—46)

The present invention relates to a nail holder from which the nails are adapted to be released one at a time and to be fed to nail driving position in a nail gun.

An object of the invention is to provide a nail holder which is simpler to manufacture than the prior art holders and which simultaneously ensures a more reliable function of the nail gun than the prior art holders which as a rule consist of a band containing the nails, which band is wound in a certain manner.

Another object of the invention is to provide a nail holder constituted by a hollow cylinder made as a rigid unit, in the outer surface of which cylinder the nails are inserted in succession along a helical line, the nail heads being directed outwardly.

The invention is also directed to a nail gun in which the above nail holder is adapted to be used.

Thus, it is a further object of the invention to provide a nail gun which is more reliable as well as simpler than the prior art nail guns. In addition, the nail gun according to the present invention can be used merely as an automatic percussion hammer in as much as in operation it need not necessarily supply its own nails.

A still further, more essential object of the invention is to provide a nail gun comprising means adapted, between each nail driving operation, to turn the nail holder through an angle corresponding to the angle between the nails in the nail holder as well as to displace the nail holder axially a distance corresponding to the axial spacing of the nails in the holder so that a positive feed of the nails is obtained.

Further objects and advantages of the invention will become apparent from the following, reference being had to the accompanying drawing illustrating an embodiment of the nail holder chosen by way of example and an embodiment of the nail gun in which the holder is adapted to be used. In the drawings:

Fig. 1 is a longitudinal section through the nail gun having a nail holder mounted in the magazine of the gun.

Fig. 2 is an end view of the nail holder.

Fig. 3 is a side view of the nail holder partly in section.

Fig. 4 is an exploded view of the nail gun at the start of a cycle, in which a number of details have been omitted for the sake of greater clarity.

As will best appear from Figs. 2 and 3, the nail holder comprises a hollow cylinder 11 which can be made preferably of cardboard. In the outer surface of the cylinder 11 nails 10 are inserted in perforations which are spaced equal distances apart along a helical line having the same pitch as a helical guide means in the magazine 40 of the gun. Said threaded portion may consist either of a centrally positioned threaded pin with which threads the points of the nails are adapted to cooperate, or of a thread-shaped groove 12 in the inner periphery of the magazine 40, as will appear from the drawing. Said groove 12 must be of the same width as the heads of

2

the nails 10. Before its insertion in the magazine 40 the nail holder 11 is fitted over a number of pins 41 secured to a rotatable disc 42, said pins and disc also forming part of the magazine. Said disc 42 is adapted to be rotated stepwise in the direction of the arrow A by a wheel 21 included in the driving mechanism of the gun, which mechanism will be described more in detail below. During each step the nail holder 11 is rotated an angle equal to the angle between two adjacent nails 10 of the nail holder 11. Simultaneously with the rotation the nail holder 11 is axially displaced by the nails engaged in the thread-shaped groove 12, said displacement being equal to the axial distance between two adjacent nails 10.

By the rotation of the nail holder 11 the nails 10 will be moved one at a time directly opposite feeding means in the form of a pin 35 which ejects the nails 10. A slide 34 imparts a reciprocating movement to said pin. Having been ejected, the nails 10 are fed into nail positioning means. The nail positioning means comprise a passage 22 which extends along a chord of a rotatable cylinder 19, which is adapted, after being rotated through half a revolution, to position a nail directly in alignment with the barrel 18 of the gun and the driver 30 therein.

To permit feeding the nail holder 11 upwardly, the slide 34 is provided with a cutting member 36 which is adapted, under the force imparted by the feeding movement, to cut the cylindrical nail holder 11 into a strip 43. The strip 43 is fed outwardly through a slot at the side of the gun in the direction of the arrow B.

The gun is provided with operating means for operating control means for an electric motor reciprocating the driver 30, and for operating indexing means for indexing the disc 42 in magazine 40 and rotating the disc 19 having passages 22 therein.

The operating means are in the form of a rack 13' having a trigger 13 thereon. The rack is meshed with indexing means for the nail holder 11 and the cylinder 19, which indexing means consist of a shaft 14 on which is mounted a toothed wheel 15 with which the rack 13' is meshed. The shaft 14 carries the cylinder 19 and in addition carries a gear 20 which is adjacent the nail holder 11. A gear 44 is meshed with the gear 20, and is mounted on the end of a shaft 45, which at the end opposite the gear 44 carries the driving wheel 21 for the disc 42.

On one end of the shaft 14 near the gear 20 is an elongated body 16 with its length extending transversely to the axis of the shaft 14, and which has two flat sides thereon. The flat sides bear against a leaf spring 46 mounted on the nail gun.

An electric motor 24 is provided in the handle of the gun and is connected to a source of electric current through the control means therefor, which control means are operated by the rack 13' with the trigger 13 thereon. An electric contact 23 is positioned adjacent the rack 13' and has an abutment 43 thereon which is positioned to be struck by an abutment 47 on the side of the rack 13'. The engagement of the abutments 47 and 48 closes the contact 23, which is otherwise normally open. One side of the contact is connected directly to the electric motor 24, and the other side is connected to the first side through the contact 26. A shaft 25 is driven by the electric motor 24 through a worm gear 51 and a gear 50, and has mounted thereon a cam 52 which opens contact 26. A cam 37 is also mounted on the shaft 25 which closes the contact 26 subsequent to the time it is opened by the cam 52.

On the opposite end of the shaft 14 from the elongated member 16 is a cam 58 having two depressions therein

3

which cooperate with a lug on the end of the contact 39. Contact 39 has one side thereof connected directly to the electric motor 24 and has the other side connected to the contact 23. Contact 39 is closed when the lug thereon is engaged with one of the depressions on the cam 58. This condition occurs when the elongated member 16 has one of its flat sides against the leaf spring 46.

A trigger 38 is pivoted to the nail gun, and contacts a pin 57 on one part of the contact 23 when it is pulled, thus closing the contact 23.

The means for driving the slide 34 with the pin 35 thereon comprise a link 33 pivoted to a pin 54 eccentrically positioned on the gear 50 driven by the electric motor 24. A crank arm 55 is pivoted on a stationary shaft 56, and has the other end pivoted to the end of the slide 34 opposite the pin 35. The link 33 is pivoted to a point near the center of the crank arm 55.

The means for driving the driver 30 comprise a crank pin 27 mounted on the shaft 25. The driver 30 is mounted for reciprocal sliding movement in the barrel 18, and has an enlargement 28 thereon from which a pin 53 depends through a slot in the barrel 18. The crank pin 27 bears against the pin 53. A cap 32 is threaded onto the end of the barrel 18 and has therein a strong spring 29 which bears against the enlargement 28 on the driver 30. A weaker counter spring 31 is positioned around the driver 30 in the forward part of the barrel 18, and counteracts the effect of the spring 29.

In the front end of the barrel 18 are provided two spring-like fingers 59 which serve to retain the nails in the barrel 18 regardless of the position of the gun. All of the parts of the nail gun may be mounted in a suitably shaped frame 60, the outline of which can be seen in Fig. 1.

In operation, a nail holder 11 with nails inserted therein is positioned on the disc 42 around the pins 41 and the whole is inserted into the magazine 40 with the heads of the nails in the groove 12. Thereupon, when the trigger 13 is pulled, the shaft 14 is revolved by the action of the rack 13' on the toothed wheel 15, and the elongated member 16 is revolved until the other flat side bears against the leaf spring 46, thus fixing the shaft 14. The cylinder 19 is thus revolved one half a revolution, and a passage 22 having a nail therein is aligned with the barrel 18. During the movement of the shaft 14, the gear 20 is also moved in the direction of the arrow, which in turn revolves the driving wheel 21 to index the nail holder 11. This advances a nail both in the axial direction of the magazine and in the peripheral direction, so that the first nail in the strip is in alignment with the other passage 22 in the cylinder 19.

During the rotation of the shaft 14, the cam 58 has kept the contact 39 open, thus keeping the motor 24 de-energized. When the elongated member 16 has reached its new position, however, with a nail in the barrel ready to be driven and a nail in the nail holder ready to be inserted into a passage in the cylinder 19, the cam 58 permits the contact 39 to close. At this time, the abutment 47 will strike the abutment 48, thus closing the contact 23. This will complete the circuit to the motor 24 through the contacts 39 and 23, and the motor 24 will be energized. This will cause shaft 25 to rotate. Cam 52 will be moved out of contact with contact 26 and the cam 37 will close it, thus insuring that the circuit to the motor will remain closed until the cam 52 completes a rotation and breaks the motor circuit thus stopping the motor. At this point, when the cam 52 has moved from the contact 26 and the cam 37 has closed it, the trigger 13 can be released, and the motor will continue to run for a complete revolution of shaft 25.

The revolution of shaft 25 causes the crank pin 27 to move the driver 30 to the rear of the barrel 18 against the action of the spring 29. As it continues its rotation, the pin 53 is released, and the spring 29 drives the driver

4

30 forward driving the nail in the passage 22 aligned with the barrel 18 out of the end of the barrel 18.

Rotation of the gear 50 also moves link 33 forward and moves crank arm 55, which in turn moves the slide 34. Pin 35 on the end of slide 34 pushes the nail in alignment with the other passage 22 out of the nail holder 11 into the passage, and the cutting member 36 cuts part of the strip 43 from the nail holder 11.

In order to permit use of the nail gun as an automatic hammer, the nail holder and magazine must be removed. The trigger 38 is then pulled. As long as this is held down, the contact 23 will be closed. Cam 58 being in a position to permit contact 39 to remain closed, the motor will be energized by the completed circuit, and the driver will be reciprocated continuously. Release of the trigger 38 stops the motor.

It is thought that the invention and its advantages will be understood from the foregoing description and it is apparent that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing its material advantages, the form hereinbefore described and illustrated in the drawings being merely a preferred embodiment thereof.

What I claim and desire to secure by Letters Patent is:

1. A nail gun comprising a frame, an electric motor mounted on said frame, control means mounted on said frame and connected to said electric motor for controlling the operation of the electric motor, operating means mounted on said frame and acting on said control means for operating said control means, a magazine on said frame for holding a nail holder positioned therein, indexing means connected between said magazine and said operating means and operated by said operating means, a nail driver reciprocally mounted on said frame, nail positioning means adjacent one end of said magazine for receiving nails from said magazine and positioning them in alignment with said driver, said nail positioning means connected to said operating means for operation thereby, feeding means on said frame for feeding nails from the nail holder in the magazine to said positioning means, means connecting said feeding means to said motor for operation thereby, and means connecting said nail driver to said motor for reciprocation thereby.

2. A nail gun comprising a frame, an electric motor mounted on said frame, cam means rotatably mounted on said frame rotated by said electric motor, switch means mounted on said frame partially closed by said cam means, a trigger mounted on said frame and comprising a rack reciprocable to further partially close said switch means, a magazine on said frame for holding a nail holder positioned therein, a driving wheel bearing against said magazine for rotating said magazine, gear means and a shaft carrying said gear means mounted on said frame and connected to said driving wheel, said gear means rotated by said rack on said trigger, a nail driver reciprocally mounted on said frame, means connecting said nail driver with said motor for reciprocation thereby, nail positioning means mounted on said shaft adjacent one end of said magazine for receiving nails from said magazine and nail holder therein, said nail positioning means rotated by the action of said rack on said gear means on said shaft for positioning the nails for driving, feeding means on said frame for feeding nails from the nail holder in said magazine to said positioning means, and means connecting said feeding means to said motor for operation thereby.

3. A nail gun comprising a frame, an electric motor mounted on said frame, control means mounted on said frame and connected to said electric motor for controlling the operation of the electric motor, operating means mounted on said frame and acting on said control means for operating said control means, a magazine on said frame comprising stationary helical guide means and a disc having a plurality of upstanding pins thereon, a nail

5

holder in said magazine comprising a rigid hollow cylinder for holding nails along a helical line on the surface of said cylinder with the nail heads facing outwardly for engagement in the helical guide means in the magazine, the pitch of the helical line being such that rotation of said nail holder through an angle corresponding to the angle between the nails in the holder will advance the holder a distance in the axial direction of the holder equal to the axial distance between the nails, said nail holder being fitted over said plurality of upstanding pins, indexing means connected between said magazine and said operating means and operated by said operating means, a nail driver reciprocally mounted on said frame, means connecting said nail driver to said motor for reciprocation thereby, nail positioning means adjacent one end of said magazine for receiving nails from said nail holder and positioning them in alignment with said driver, said nail positioning means connected to said operating means for operation thereby, and feeding means on said frame for feeding nails from said nail holder in said magazine to said positioning means, said feeding means having cutting means thereon for cutting said nail holder along said helical line and said magazine having an opening therein through which a strip cut from the nail holder is discharged.

4. For use in a nail gun having a frame, an electric motor mounted on said frame, control means mounted on said frame and connected to said electric motor for controlling the operation of the electric motor, operating means mounted on said frame and acting on said control means for operating said control means, a nail driver reciprocally mounted on said frame, means connecting said nail driver to said motor for reciprocation thereby, a magazine on said frame, indexing means connected between said magazine and said operating means and operated by said operating means, nail positioning means adjacent one end of said magazine for receiving nails from said magazine and positioning them in alignment with said nail driver, and feeding means on said frame connected to said operating means for feeding nails from said magazine to said nail positioning means, the magazine having a cylindrical interior surface with a helical groove therein and a disc having a plurality of upstanding pins thereon, the indexing means bearing on said

6

disc, that improvement comprising a nail holder for insertion into the magazine and comprising a rigid hollow cylinder for holding nails along a helical line on the surface of said cylinder with the nail heads facing outwardly for engagement in the helical groove in the magazine, the pitch of the helical line being such that rotation of the nail holder through an angle corresponding to the angle between the nails in the holder will advance the holder a distance in the axial direction of the holder equal to the axial distance between the nails.

5. A nail gun as claimed in claim 2 in which said magazine comprises stationary helical guide means in which the nails in the nail holder are engaged which nail holder is positioned in the magazine, and a disc having a plurality of upstanding pins thereon over which the nail holder is fitted, said driving wheel bearing against said disc.

6. A nail gun as claimed in claim 5 in which said helical guide means comprise a cylindrical interior surface on said magazine having a helical groove therein which receives the heads of the nails in the nail holder, the pitch of said helical groove being such that rotation of said disc through an angle corresponding to the angle between the nails in the holder will advance the holder a distance in the axial direction of the holder a distance equal to the axial distance between the nails.

7. A nail gun as claimed in claim 5 and means on said feeding means for cutting the nail holder along a helical line, said magazine having an opening therein through which a strip cut from the nail holder is discharged.

8. A nail gun as claimed in claim 2 in which said nail positioning means comprises a rotatable cylinder having at least one passage therethrough along a chord of said cylinder, said passage being aligned with said feeding means when the nails are fed to said nail positioning means and being aligned with said nail driving means when said nail driving means is reciprocated by said motor.

References Cited in the file of this patent

FOREIGN PATENTS

217,024	Switzerland	Jan. 16, 1942
740,206	Germany	Oct. 14, 1943