Aug. 31, 1926. 1,598,447

W. H. KLEPPINGER

SCREW DRIVER ATTACHMENT

Filed Sept. 22, 1924 2 Sheets-Sheet 1

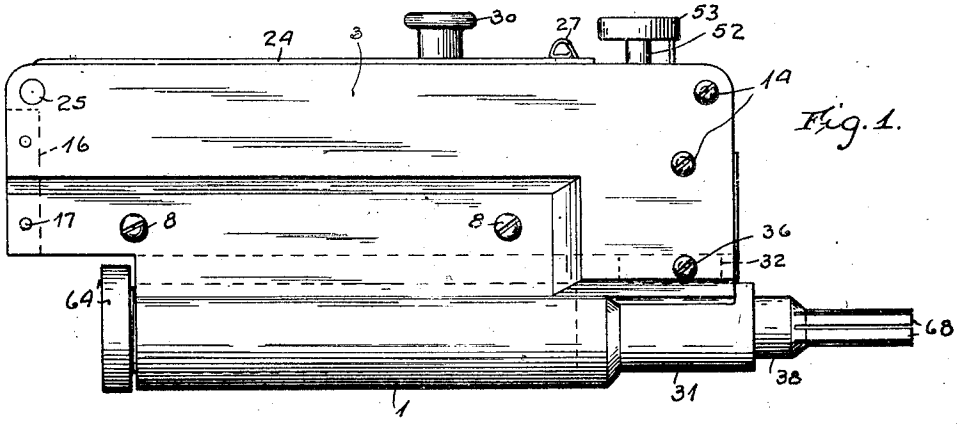


Fig. 1.

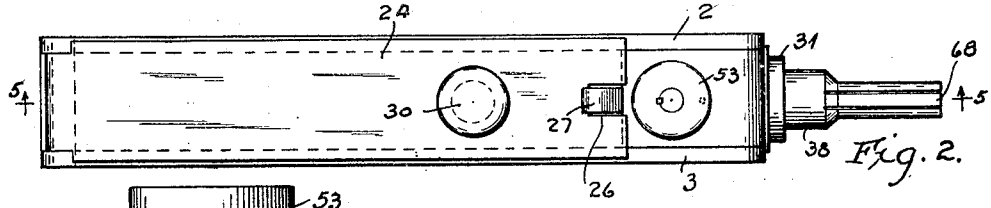


Fig. 2.

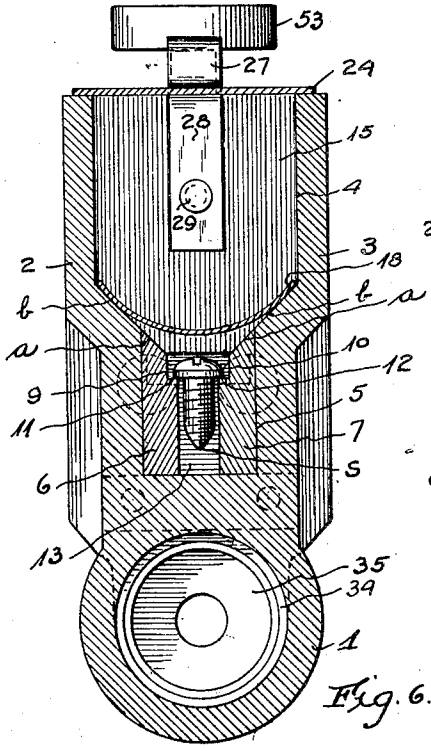


Fig. 6.

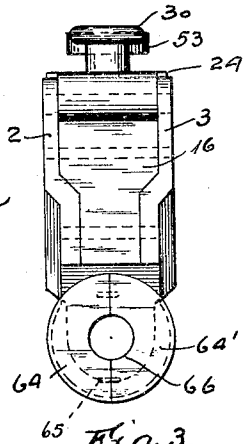


Fig. 3.

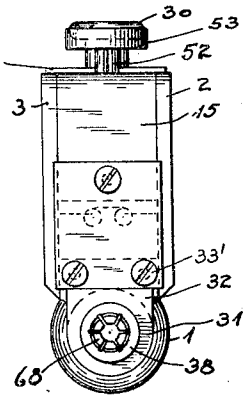


Fig. 4.

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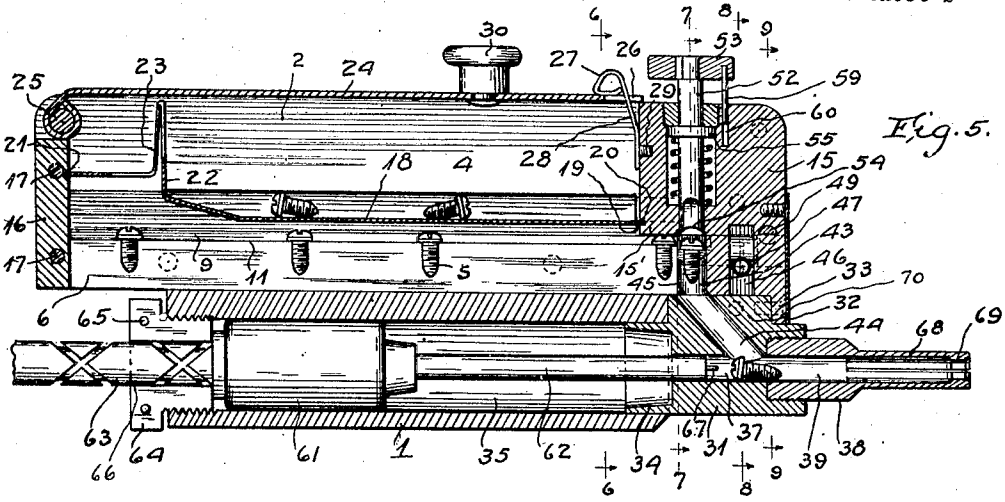


Fig. 5.

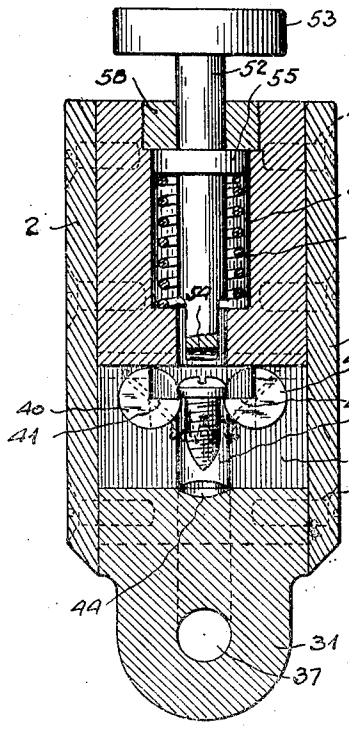


Fig. 7.

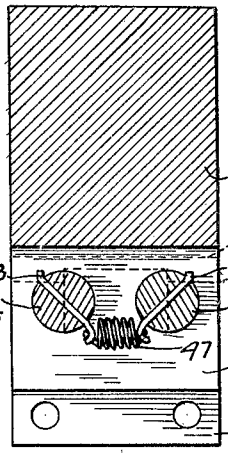


Fig. 8.

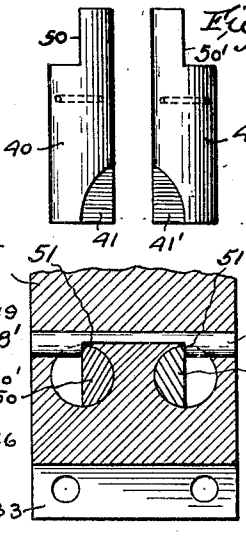


Fig. 9.

Fig. 10.

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UNITED STATES PATENT OFFICE.

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SCREW-DRIVER ATTACHMENT.

Application filed September 22, 1924. Serial No. 739,041.

My invention relates to an attachment or accessory for screw drivers, particularly screw drivers of the automatic spiral type, the attachment or accessory being in the form of a structure for holding a charge of screws and which is operable to feed the screws one at a time into the path of the screw driver to be ejected by the screw driver and driven into place. The object of the invention is to produce a light and simple structure which is adapted to readily receive and support the chuck end of an automatic screw driver and which can be conveniently held in one hand and operated to feed screws into the path of the screw driver bit, while the other hand operates the screw driver to eject the fed screws and drive them under direction and guidance of the structure. My improved accessory and its cooperation with a screw driver is clearly illustrated on the accompanying drawing on which

Fig. 1 is a side elevational view of the accessory,

Fig. 2 is a plan view,

Fig. 3 is a rear end elevational view,

Fig. 4 is a front end elevational view,

Fig. 5 is a sectional view on plane 5—5 Fig. 2,

Fig. 6 is an enlarged sectional view on plane 6—6 Fig. 5,

Fig. 7 is an enlarged sectional view on plane 7—7 Fig. 5,

Fig. 8 is an enlarged sectional view on plane 8—8 Fig. 5,

Fig. 9 is an enlarged sectional view on plane 9—9 Fig. 5, and

Fig. 10 is an enlarged plan view of the escapement members which co-operate to position the screws in the feeding field and permit feeding thereof into the path of the screw driver by which they are to be ejected and driven.

The main frame or body of the accessory comprises the lower cylindrical barrel part 1, and the vertical side walls 2 and 3 extending upwardly therefrom. The upper ends of these walls form the side closures for the magazine or screw holding chamber 4. At their lower and rearward ends the walls are deflected inwardly to form a narrower, rectangular pocket 5 below the chamber 4, and at the sides of this pocket are secured the guide blocks 6 and 7 which guide the screws from the magazine to the screw feeding mechanism at the front end of the accessory, the blocks being held in place by screws 8. The upper surfaces *a* of the blocks are beveled to register with the beveled surfaces *b* of the side walls 2 and 3. At their inner upper corners the blocks have the rectangular recesses 9 and 10 respectively forming the ledges or shoulders 11 and 12 on which the heads of the screws *s* rest, the shanks of the screws extending downwardly into the space 13 between the blocks.

Secured between the front ends of the walls 2 and 3, as by means of screws 14 is the body 15 of the screw feeding mechanism, this body forming the closure for the front end of the screw magazine 4. Between the rear ends of the walls 2 and 3 is inserted the rear wall 16 forming the closure for the rear end of the magazine, and the wall 16 is shown held in place by pins 17 extending therethrough and the side walls. Before application of this rear wall the screw guide blocks 6 and 7 are inserted in the pocket 5 and secured in place, the blocks extending from the rear wall to the body 15 of the feed mechanism. To avoid piling up and confusion of the screws on the guide blocks a tray 18 is provided for first receiving the screws. This tray is transversely concave and is supported at its sides by resting on the beveled surfaces *b* of the side walls 2 and 3. At its front end the tray has the projection 19 extending in the slot 20 formed in the block 15, and at its rear end the tray extends into a slot 21 provided in the rear wall 16, the ends of the tray being thus rigidly supported. A short distance from the rear end of the magazine the tray is deflected upward to form a barrier wall 22 which has the passageway 23 through which screws may find their way from the tray on to the rear ends of the guide blocks 6 and 7, the screws then traveling forwardly along the guide blocks and below the tray to be eventually received by the feeding mechanism. A cover 24 is preferably provided

for the magazine, this cover being shown pivoted at its rear end on the pin 25 and having at its front end a notch 26 for receiving the locking head 27 of a spring latch 28 which is secured to the front of the feed mechanism body 15 by a stud or screw 29. A suitable knob 30 is provided for the cover. By slightly agitating or shaking the attachment a number of screws may be readily thrown from the tray through the passageway 23 onto the guide blocks.

Directly below the body 15 of the feed mechanism is the ejector head 31 whose rectangular top 32 engages between the side walls 2 and 3 of the magazine body. At its rear end the top 32 abuts against the front end of the barrel part 1, and against the front end of the top abuts the flange 33 of the feed mechanism body 15. The cylindrical flange 34 at the rear end of the discharge head fits into the front end of the bore 35 of the barrel part 1. By means of screws 36 extending through the side walls 2 and 3 and screws 33′ extending through the flange 33 the discharge head is securely held in its position. The head 31 has the discharge passageway 37 concentric with the barrel bore 35, and detachably secured in the front end of the head is the discharge nozzle 38 which has the passageway 39 registering with the bore 37.

The rear part 15′ of the body 15 of the feed mechanism overhangs the front ends of the guide blocks 6 and 7 and its sides are beveled to fit the surfaces *a* and *b* as clearly shown in Fig. 6. The part 15′ terminates above the screw supporting shoulders 11 and 12 of the guide blocks and closes an entrance passageway for confining and accurately directing the screws to the feed mechanism. Extending through the body 15 opposite the ends of the guide block 6 and 7 are the escapement members 40 and 40′. These members are cylindrical and at their front ends have their inner upper quarter sections cut away to leave the diametral seats 41 and 41′. The escapement members are normally held with the seats in a horizontal plane a short distance below the plane of the guide block shoulders 11 and 12 and the escapement members are spaced apart so that the space between the seating surfaces registers with the space 13 between the guide blocks and forms a continuation thereof. The screws *s* shift from the guide shoulders 11 and 12 to the seats 41 and 41′ and are then in position to be fed to the discharge head. The escapement members extend rearwardly to the front ends of the guide blocks and at their rear ends journal in the ledge 42 through which is the guide passageway 43 leading to the passageway 44 which extends diagonally downwardly and forwardly to communicate with the bore 37 of the discharge head 31. The ledge 42 has the slot 45 connecting the end of the passageway 13 with the passageway 43 so that the screws may travel into the passageway 43 on to the escapement seats 41, 41′.

Intermediate their ends the escapement members extend through a transverse vertical slot 46 in the body 15 of the feed mechanism and in this slot is the spring 47 connecting between the ends of the pins 48 and 48′ in the escapement members, the spring tending to rotate the escapement members to hold their seating surfaces 41 and 41′ horizontal. Through the body 15 and across the front ends of the escapement members extends the pin or bar 49. At their front ends the members are cut away to leave vertical abutment surfaces 50 and 50′ which by force of the spring 47 are normally held against the abutment shoulders 51 and 51′ on the bar 49, and in such position the seating surfaces 41 and 41′ at the rear end of the escapement members will be in their normal horizontal plane ready to receive a screw preparatory to a feed operation. A plate 70 is held against the front end of the body 15 by the screws 33′ and covers the front ends of the escapement members.

Slidable vertically in the body 15 of the feed mechanism and above the passageway 43 is the feed plunger 52 which has the operating head or button 53. At its lower end the plunger has its opposite sides cut away to reduce its width sufficiently so that it may pass down between escapement members (Fig. 7). The lower surface of the plunger is convex as indicated at 54 to correspond with the curvature of the heads of the screws *s* with which the surface engages to affect feeding. On the plunger is the collar 55 which engages in the pocket 56 in which is the compression spring 57 interposed between the collar and the bottom of the pocket to normally hold the plunger up. The plug 58 surrounding the upper end of the plunger forms an abutment for limiting the upward movement of the plunger. To keep the plunger from rotating a pin 59 extends therefrom into the passageway 60 in the head 15. When the plunger is depressed it will engage with the screw held on the seats 41, 41′ and such engagement will cause rotation of the escapment members to swing their seating surfaces downwardly until the screw head is released from the surfaces whereupon the screw will drop down through the passageways 43 and 44 to the bore 37 of the ejector head 31 ready to be engaged by the screw driver to be ejected and driven. Immediately upon release of the screw from the escapement surfaces the spring 47 will return the escapement members to normal position with their seats horizontal. The passage of the lower end of the feeding plunger between the escapement

surfaces will hold back the other screws on the guide blocks 6 and 7 but immediately upon release of the plunger and upward movement thereof another screw will drop from the guide blocks to the escapement surfaces, screws being thus fed accurately one by one.

In Fig. 5 I have shown my improved feed mechanism associated with the ordinary automatic screw driver comprising the chuck 61, the screw driver blade 62, and the spiral shank 63, the handle of the screw driver not being shown. The rear end of the barrel 1 is threaded to receive a confining plug structure for holding the chuck 61 within the barrel. As shown this plug member comprises the halves 64 and 64' detachably held together by pins 65. The plug structure has the passageway 66 for receiving the screw driver shank. The chuck end of the screw driver is first inserted into the barrel 1 and then the halves of the plug structure are applied around the shank and threaded into the barrel, the plug structure then forming a bearing for the screw driver shank, the chuck also fitting quite snugly in the barrel so that the screw driver structure is accurately aligned.

The length of the screw driver bit 62 is such that its front end will project a distance into the rear end of the discharge head bore 37 while the chuck abuts against the plug structure. The driving point 67 will then be behind a fed screw ready for the ejection and driving operation. The feeding accessory will usually be held in the left hand so that the thumb can operate the feed plunger, and the screw driver handle is held in the right hand. Aftter the plunger has been depressed to feed a screw, as indicated in Fig. 5, the screw driver handle is pushed forwardly in the ordinary manner and the driving point 67 will encounter the screw and the said screw will be shoved forwardly into the discharge nozzle. The outer end of the discharge nozzle has a thin wall which is slitted to form the flexible tongues 68, and at the outer end the inner diameter is slightly decreased to form the ridges 69 at the ends of the tongues. The diameter at these ridges is less than the diameter of the screw head so that when encountered by the screw head the ridges will resist travel of the screw and if the screw driver point has not already become engaged in the screw slot it will do so before the head can pass the retarding ridges and the screw will then be ejected in accurate alignment from the nozzle. The end of the nozzle is applied to the point where it is desired to drive the screw and the final movement of the screw driver will then accurately drive the screw into place. After one screw has been thus driven the screw driver handle is fully withdrawn to bring the bit behind the passageway 44 and then the plunger is then again depressed to feed another screw to the ejector head bore in front of the bit. A slight agitation of the accessory will keep the screws traveling along the guide block shoulders 11 and 12 so that a screw will always be at the end of the block ready to drop onto the escapement members. At intervals a little more violent agitation of the accessory will throw a few more screws from the tray through the passageway 23 onto the rear ends of the guide blocks so that there will always be sufficient screws on the guide block for delivery to the feeding mechanism. The operation of a screw driver in conjunction with my feeding accessory is thus as simple as the operation of the screw driver itself in the ordinary manner. Instead of holding the chuck 61 with the left hand and operating the screw driver shown in the right hand as in using the ordinary screw driver, with my arrangement the accessory is held in the left hand and the shank of the screw driver operated with the right hand, the thumb of the right hand controlling the feed mechanism and the screws being directed into place by the ejector nozzle.

It is apparent that the magazine structure could readily be adapted for feeding tacks or small nails instead of screws. The driver would then be a bar reciprocated in the barrel to eject and drive the fed tacks or nails.

I do not desire to be limited to the exact construction, arrangement and operation shown and described as changes may be made which would still come within the scope of the invention.

I claim as follows:

1. In a screw driving device, the combination of a frame forming a reservoir for screws, feed mechanism at one end of said frame having a feed passageway, guideways for guiding screws from said reservoir to said feed passageway, a pair of rotary escapement members projecting into said feed passageway opposite said guideways and having opposed supporting surfaces for receiving screws from said guideways, a plunger over said feed passageway operable to release the screws from said supporting surfaces, an ejector head below said feed passageway for receiving the released screws, said head having a discharge passageway, and a support below said reservoir for receiving a screw driver with its blade projecting into said discharge passageway for engaging with and ejecting screws from said discharge passage and driving them.

2. In a screw driving device, the combination of a frame forming a reservoir for screws, feed mechanism comprising a body part at the front end of said reservoir, said body part having a feed passageway, guideways at the bottom of said reservoir for guid-

ing screws to said feed passageway, rotary escapement members projecting into said feed passageway and having supporting surfaces for receiving screws from said guideway, means tending to hold said escapement members with their supporting surfaces in position to support a screw thereon with its shank depending into said feed passageway, an ejector head below said feed mechanism body having a discharge passageway, a plunger for said feed mechanism above said feed passageway adapted when operated to engage with a screw on said escapement members to cause rotation of said escapement members and release of the screw from the supporting surfaces, the released screw falling into said discharge passageway, and a barrel below said reservoir for receiving and guiding a screw driver with its blade engaging in said discharge passageway, the screw released by said plunger falling into said discharge passageway in front of the screw driver blade whereby upon operation of the screw driver the screw will be ejected from said discharge passageway and driven.

3. In a screw driving device, the combination of a structure providing a reservoir for screws, feed mechanism comprising a body part located at the front end of said structure, guide blocks at the bottom of said reservoir for receiving screws from the reservoir and guiding them toward the feed mechanism, said feed mechanism body part having a vertical feed passageway at the end of said guide blocks, a pair of cylindrical escapement members extending through said feed mechanism body part parallel with said guide blocks and having supporting surfaces opposed to said guide blocks for receiving screws therefrom and supporting them by their heads with the shanks depending in said feed passageway, said feed members being axially rotatable, means tending to hold said escapement members with their supporting surfaces in position to support a screw, a plunger above said feed passageway adapted when depressed to engage with the screw on said seating surfaces and to cause rotation of said escapement members to release the screw therefrom, an ejector head below the feed mechanism having a discharge passageway communicating with said feed passageway, the screw released by the plunger falling down into said discharge passageway, a barrel below said reservoir concentric with said discharge passageway, and means for supporting the front end of a screw driver in said barrel with its bit engaging in said discharge passageway behind the screw fed into said passageway whereby said screw driver may be operated to eject the screw from said discharge passageway and to drive it.

4. In a screw driving device, the combination of a structure having a reservoir for screws, feed mechanism at the front end of said structure having a vertical feed passageway, guide blocks at the bottom of said reservoir for guiding screws toward said feed passageway, escapement members projecting into said passageway and having supporting surfaces positioned to receive a screw from said guide blocks and to support it with its shank depending in said feed passageway, said escapement members being rotatable, means tending to hold said escapement members with their supporting surfaces in screw receiving position, a plunger above said feed passageway adapted when depressed to engage the screw on said escapement members to cause rotation of said members and release of the screw therefrom, said plunger when releasing a screw from said escapement members being in position to prevent screws from leaving said guide blocks, a discharge head below said feed mechanism having a discharge passageway communicating with said feed passageway and receiving the screw released by said plunger, a guide barrel below said reservoir, and a screw driver guided in said barrel with its bit in said discharge passageway whereby said screw driver may be operated to engage with a fed screw and discharge it from said discharge passageway and drive it.

5. In screw driving apparatus, the combination of a magazine structure providing a reservoir for screws and adapted to be held in one hand, a barrel below the reservoir, a discharge head at the front of said barrel having a discharge passageway for screws, an automatic screw driver having its chuck and bit confined in said barrel with the spiral shank extending outwardly therefrom to be operated by the other hand, the bit of said screw driver engaging in said discharge passageway to reciprocate therein when said screw driver handle is operated, feed mechanism above said discharge head having a feed passageway communicating with the discharge passageway, guide blocks at the bottom of said reservoir for receiving screws from the reservoir and guiding them toward said feed passageway, escapement members projecting into said feed passageway and having supporting surfaces opposite the ends of said guide blocks for receiving a screw from the blocks and supporting it with its shank depending in said feed passageway, means normally holding said escapement members with their surfaces in screw receiving position, a plunger above said feed passageway adapted to be depressed by the thumb of the hand holding said magazine structure, depression of said plunger causing engagement thereof with a screw on the escapement members and rotation of said escapement members to release

the screw from the supporting surfaces, the plunger during such escapement operation projecting in front of the guide blocks to hold back the screws thereon from said feed passageway, the released screw falling into said discharge passageway in front of the screw driver bit whereby operation of the screw driver will cause ejection of said screw from said discharge passageway and driving thereof.

In witness whereof, I hereunto subscribe my name this 18th day of September A. D., 1924.

WILLIAM H. KLEPPINGER.