July 31, 1923. 1,463,338

S. E. SCHROEDER

SCREW FEEDING DEVICE

Original Filed Jan. 3, 1919 3 Sheets-Sheet 1

Fig. 1

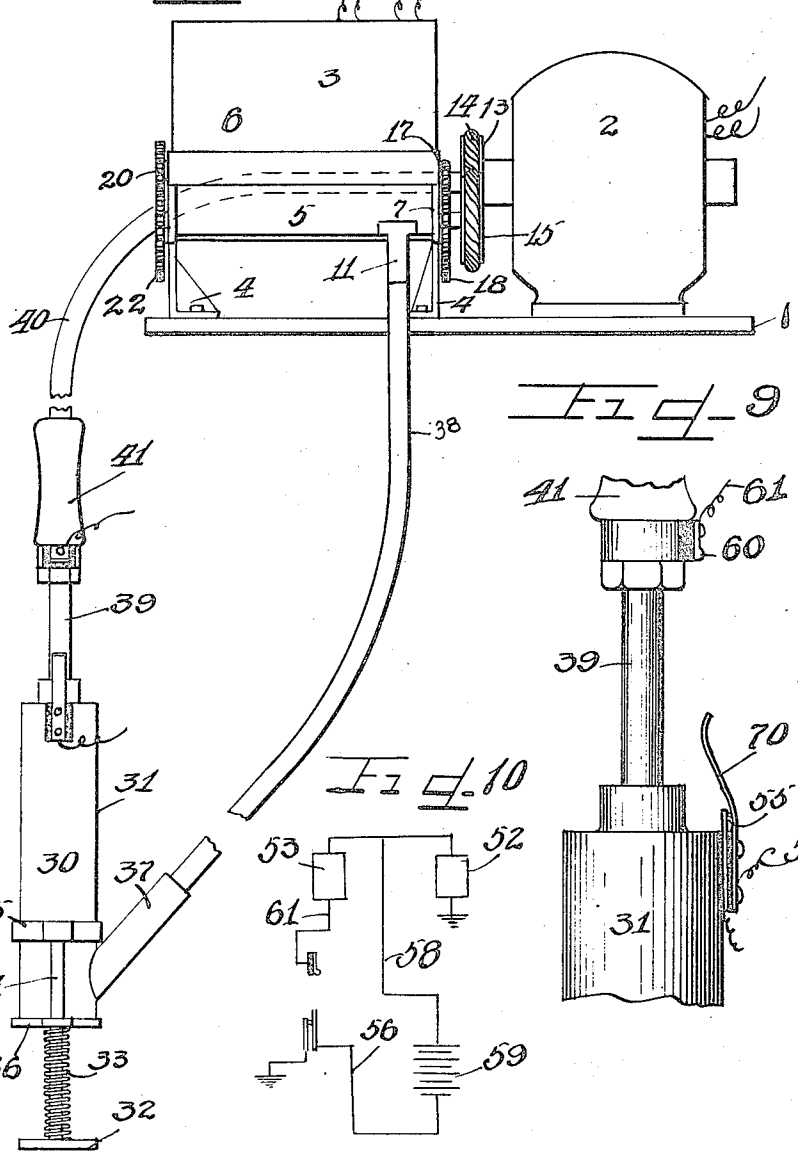


Fig. 9

Fig. 10

Witnesses
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SCREW FEEDING DEVICE

Original Filed Jan. 3, 1919 3 Sheets-Sheet 2

Fig. 2

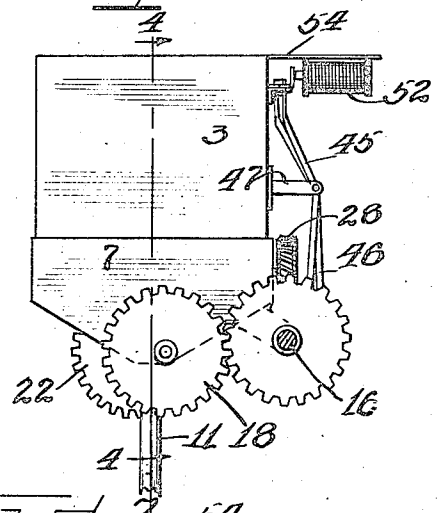


Fig. 3

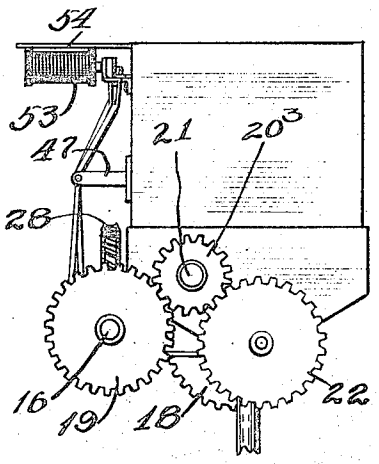


Fig. 7

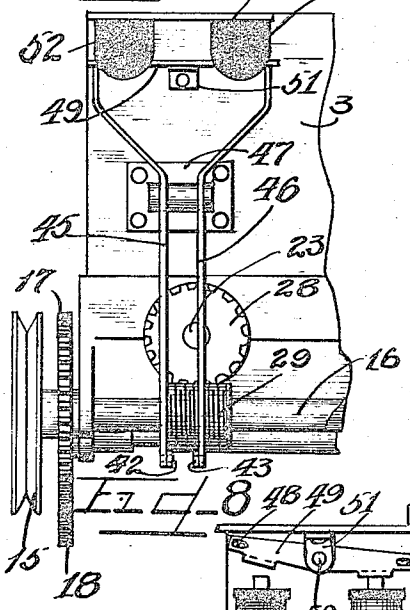


Fig. 8

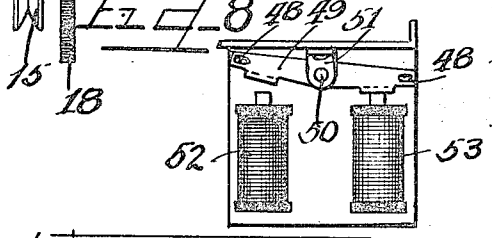
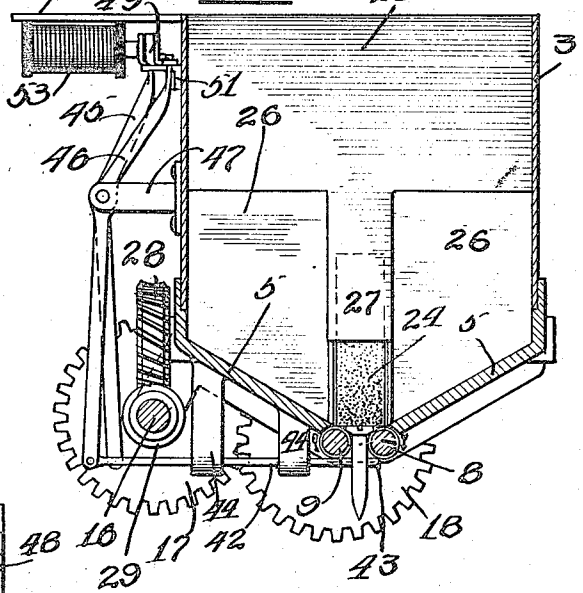


Fig. 6



Witnesses

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S. E. SCHROEDER

SCREW FEEDING DEVICE

Original Filed Jan. 3, 1919 3 Sheets-Sheet 3

Fig. 4

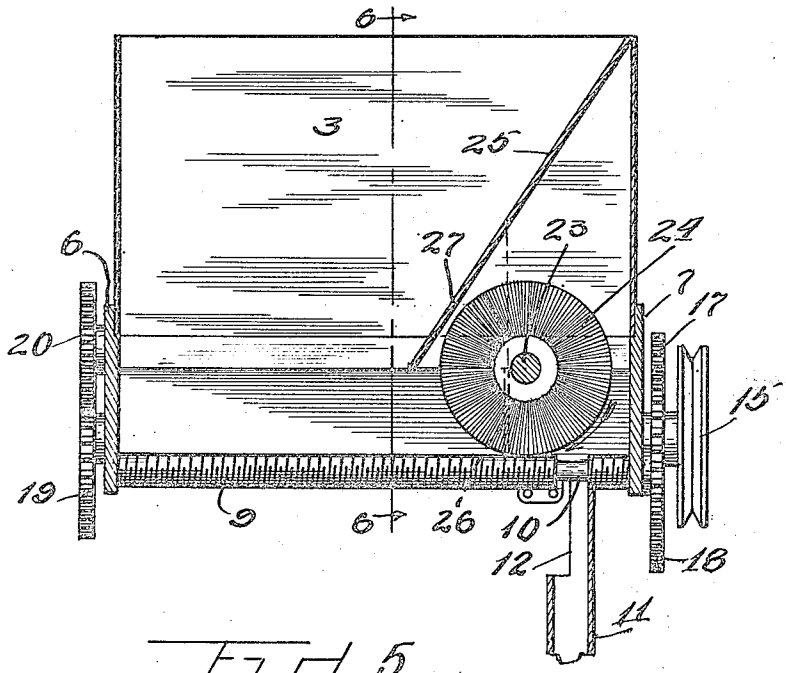
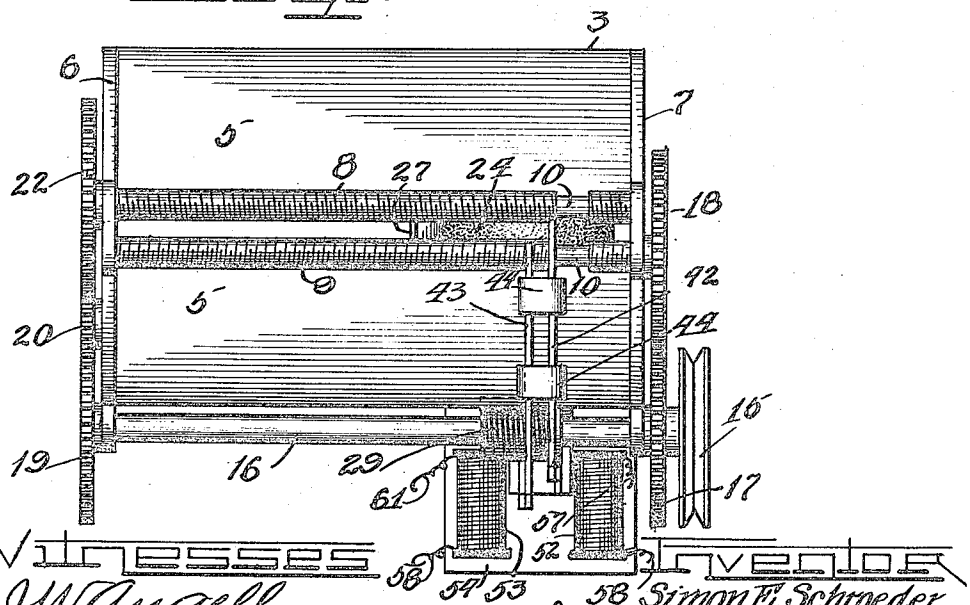


Fig. 5



Witnesses

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Charles W. Phillips.

Inventor

Simon E. Schroeder

by Charles W. Phillips Atty

Patented July 31, 1923. 1,463,338

UNITED STATES PATENT OFFICE.

SIMON E. SCHROEDER, OF OAK PARK, ILLINOIS.

SCREW-FEEDING DEVICE.

Application filed January 3, 1919, Serial No. 269,510. Renewed September 2, 1922. Serial No. 586,050.

To all whom it may concern:

Be it known that I, SIMON E. SCHROEDER, a citizen of the United States, and a resident of the village of Oak Park, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in a Screw-Feeding Device; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings and to the numerals of reference marked thereon, which form a part of this specification.

My invention has reference more particularly to a device for feeding screws from a magazine to a screw driver or other machine or tool utilizing the screws.

An object of my invention is to provide a magazine for containing a quantity of screws and mechanism for feeding the screws as required to a machine or tool utilizing the screws.

Another object of my invention is to provide mechanism for feeding screws from a magazine or receptacle one at a time and positioned in a predetermined manner.

Another object of my invention is to provide mechanism for feeding screws successively from a screw receptacle or magazine and wherein the feeding of the screws is under the control of the operator.

Another object of my invention is to provide screw feeding mechanism for supplying screws one at a time from a receptacle or magazine and for discharging same point foremost therefrom.

Another object of my invention is to provide a screw receptacle or magazine with mechanism feeding the screws therefrom successively and wherein the supply of screws therefrom is under the control of the operator at a point distant from the magazine or receptacle.

A further object of my invention is to provide an automatic screw driver and a screw magazine with mechanism for feeding the screws, one at a time, to the automatic screw driver, and whereby the screw is delivered point foremost from the magazine to a point in front of the screw driver in proper position to be operated upon by the screw driving mechanism.

My invention also has other important objects that will appear from the following specification and the accompanying drawings, in which I have described and illustrated my invention in a preferred form.

On the drawings:

Figure 1 is a side view of the complete device including screw feeding mechanism, automatic screw driver connected therewith, and motor.

Figure 2 is a view of the screw magazine and feeding mechanism, looking at the right hand end thereof, as shown in Figure 1, which end is hereinafter, for the sake of convenience, referred to as the rear end.

Figure 3 is a front end view of the screw magazine and feeding mechanism.

Figure 4 is an enlarged sectional view on the line 4—4 of Figure 2.

Figure 5 is a bottom view of the screw magazine and feeding mechanism.

Figure 6 is a sectional view on the line 6—6 of Figure 4.

Figure 7 is a fragmentary side view of the screw magazine showing the mechanism for controlling the release of the screws.

Figure 8 is a bottom view of the coils and armature for operating the screw releasing mechanism.

Figure 9 is an enlarged fragmentary view of the screw driving device showing the switch mechanism for controlling the feed of the screws from the magazine.

Figure 10 is a diagrammatic view of the circuits controlling the screw releasing mechanism.

As shown on the drawings:

In the structure illustrated the screw feeding magazine and operating motor are mounted on a fixed support and the screw driving mechanism has flexible connections therewith which enable the screw driving mechanism to be moved about to the various places where the screws are to be driven.

However, I contemplate that the principles of this invention may be embodied in a single unit including the screw driving mechanism and screw magazine and feed, or the screw magazine and feed and screw driving mechanism may be combined, and the motor mounted in a stationary position and provided with a flexible connection with the screw driving mechanism and screw feeding mechanism.

The reference numeral 1 indicates a support, preferably above the position where the screw driving mechanism is to be used, and upon this support is mounted the driving motor 2, and the screw magazine 3, the latter having brackets 4, whereby it is mounted on the top of support 1. The screw maga-

zine 3, may be of any convenient shape and size, and in the construction illustrated has a detachable bottom with bottom walls 5, and front and rear end walls 6 and 7, respectively. The bottom walls 5, converge downwardly and the lower edges are separated to afford a slot therebetween so that the screws fall by gravity down to the slot into the bottom of the magazine. Journaled in the front and rear end walls 6 and 7, respectively, near the bottom thereof, is a pair of screw threaded rolls 8 and 9, one of which has a left hand thread and the other a right hand thread. These rolls 8 and 9 are arranged parallel and spaced sufficiently to receive the stems of the screws therebetween, but engage under the head of the screw so as to support same in the position shown in Figure 6, said rolls being set up close against the lower ends of the bottom walls 5, which latter are formed at their lower edges to fit close to the periphery of the rolls, so that the slot between the rolls is the only opening in which the screws may engage. These rolls are operated in the directions indicated by the arrows in Figure 6, and the threads upon the rolls 8 and 9 are in the proper direction to advance a screw or screws supported on the rolls, from the front end of the magazine to the rear end thereof. Adjacent the rear end of the magazine, each roll is correspondingly turned down or reduced in diameter as at 10, to afford an increased distance between the rolls sufficient to allow the head of the screw to pass therebetween, and at this point the screw is therefore permitted to drop from the rolls into a tube 11, which is secured to the bottom of the magazine directly below the point at which the screws are released from the rolls. The side of tube 11, at the upper end towards the front wall of the magazine is cut away as at 12, to permit entrance of the suspended screw laterally into the upper end of the tube 11.

The motor 2, which in the present structure serves to operate the screw driving mechanism as well as the screw feeding mechanism, is set at one side of the screw magazine and has a pulley 13, which is connected by the belt 14, with a pulley 15, on a shaft 16, extending from end to end of the screw magazine, and journalled in bearings on the end plates 6 and 7. A gear 17, is secured on this shaft at one end and meshes with a gear 18, on the end of the roll 9, for operating the latter, and a similar gear 19, on the opposite end of the shaft 16, meshes with an idler gear 20, mounted on a stud 21, projecting outwardly from the end plate 7, and this idler gear 20 meshes with a gear 22, on the outer end of the roll 8, and it will be noted that this manner of connecting the rolls 8 and 9 with the shaft 16, imparts a simultaneous rotation to the rolls in opposite directions, and to insure the screws being held in proper position between the rolls 8 and 9 for discharge into the tube 11, and to prevent the other screws than those seated between the rolls, being carried to the point of discharge, a shaft 23, is journalled transversely of the screw magazine immediately in front of the point of discharge of the screws, and has a brush wheel 24, secured thereon, with the periphery thereof close to the upper face of the feed rolls 8 and 9, and this brush is rotated in the direction indicated by the arrow in Figure 4, so that any screws which are improperly seated on the rolls will be forced backwardly thereby towards the screw magazine. An inclined shield 25, is secured in the screw magazine at the rear end as shown in Figure 4, and has straight up and down portions 26, at each side of the brush wheel 24, and immediately in front of shaft 23. Between the side portions or walls, the shield 25, has a nose projecting portion 27, extending downwardly and around the front of the wheel 24, to prevent screws from the magazine from resting on the brush.

The shaft 23, is journalled in the side walls of the screw magazine, and projects therebeyond at one side over the shaft 16, and is provided with a worm wheel 28, connecting with a worm 29, on the shaft 16, whereby the brush 24, is rotated.

The screw driving device is indicated as a whole at 30, in Figure 1, the detail construction thereof being shown in my application filed January 3, 1919, Serial No. 269,509. This device has a casing 31, which is resiliently supported on a base plate 32, by means of springs 33, which are coiled around stems 34, said stems being slidably engaged in rings 35 and 36, with which the casing 31, is provided. An upwardly extending tubular extension 37, at the lower end of the casing 31, carries the screws to the lower end of the screw driving device into the proper position to be operated upon by the screw driving mechanism, and a flexible tube 38, connects the discharge pipe 11, of the screw magazine with the tubular extension 37, so that the screws as they are discharged into the pipe 11, are carried into the tube 38, by gravity to the screw driving device. A rotatable and reciprocable shaft 39, is mounted in the casing 31, and connected by means of a flexible shaft 40, with the drive shaft of the motor 2, and there is a handle or grip 41, immediately above the shaft 39, whereby the operator holds the screw driver mechanism in an upright position and depresses the shaft 39, in the operation of driving the screw.

Obviously it is desirable to control the feed of screws from the screw magazine to the screw driving device so that they may

be supplied one at a time at the will of the operator, or automatically after the screw which was previously supplied has been driven into the work. For this purpose a pair of fingers 42 and 43, are slidably mounted in brackets 44, depending from the bottom of the screw magazine, and are adapted to be projected alternately across and below the slot between the rolls 8 and 9, at a point directly in front of the reduced portion 10, of the rolls, and these fingers are separated from one another substantially the width of a screw. A pair of levers 45 and 46, are pivoted to a bracket 47, at the side of the screw magazine and are pivotally connected at their lower ends with the fingers 42 and 43 respectively. The upper ends of the levers 45 and 46, are bent outwardly to increase the distance between their upper ends as shown in Figure 7, and the extreme upper ends are engaged in slotted openings 48, at opposite ends of an armature 49, which latter is pivoted centrally at 50, to a bracket 51, mounted on the side of the screw magazine. Separate electro-magnets 52, and 53, are mounted on the under side of a bracket plate 54, attached to the screw magazine 3, one adjacent each end of armature 49, to control the oscillation of the armature and thereby the operation of the fingers 42 and 43, and thereby control the discharge of the screws from the screw feeding mechanism, and the electro-magnet 52, is normally energized so as to draw the adjacent end of the armature 49, thereto and thereby hold the finger 42 projected across the slot between the rolls 8 and 9 as shown in Figure 5 and prevent discharge of screws from the screw feeding mechanism. For releasing a screw the circuit to the electro-magnet 52 is broken, and the electromagnet 53 is energized whereupon the armature 49, is swung on its pivot, the end thereof adjacent to the electro-magnet 53, being drawn thereto, and this operation of the armature, through the levers 45 and 46, projects the finger 43 across the slot between the rolls 8 and 9, separating the screw in the slot which is against the finger 42, from the rest of the screws in the slot and at the same time the finger 42 is released or withdrawn from the position across the slot between the rolls 8 and 9, so that the screw which is now separated by the finger 43, may be moved by the rolls into position to drop down through the tube 11, to the screw driving mechanism.

For automatically controlling the feeding of a screw by the operation of the screw driving mechanism, I have provided a contact member 55 on the casing 31, of the screw driving mechanism, which member is normally engaged by a spring contact 70 mounted in an insulated manner on the casing. A wire 56 connects the spring contact 70 with one terminal of a battery 59, or other source of electrical energy, and the other terminal of the battery 59, is connected by the wire 58 with one terminal of each electro-magnet 52 and 53. The other terminal of the magnet 52 as well as the member 55, are grounded on the machine to complete the circuit through the magnet 52, while the other terminal of the magnet 53 is connected by the wire 61, to an insulated contact member 60, on the lower portion of the handle 41.

The contact member 60 is so positioned that when the handle 41 and shaft 39 are depressed, at the end of its downward movement it engages the spring contact 70, closing the circuit through the electro-magnet 53, and at the same time separates the spring contact 70 from the contact member 55 so as to interrupt the circuit through the electro-magnet 52. When the handle 41, and shaft 39, are elevated after the screw driving operation the contact member 61, is disengaged from the spring contact 70 and the latter immediately springs into engagement with the contact member 55.

The operation is as follows:

A quantity of screws is placed in the screw magazine, 3, and the motor 2, is set in operation, and through the flexible shaft connection 40, operates the screw driving mechanism of the screw driving device 30, and the motor also, through connection 14, operates the rolls 8 and 9, and the brush 24. Some of the screws at the bottom of the receptacle will drop downwardly to the position between the rolls 8 and 9, shown in Figure 6, with the stem of the screw projecting between the roll and the head engaged by the roll, which as they operate carry the screws forwardly to the discharge position until their movement is interrupted by the finger 42 or 43. The continuous operation of the rolls 8 and 9, and the advance of the screws from time to time tends to agitate the screws in the receptacle sufficiently so that others will continually drop down between the rolls as screws are discharged therefrom, and the continuously operating brush 24, which fits down close enough to the rolls 8 and 9, to sweep over the head of a screw when properly seated between the rolls will straighten up any screws that are improperly seated between the rolls, or carry them backwardly so that only the screws which are properly carried by the rolls are permitted to pass under the brush wheel 24.

With the arrangement of the switches as shown for controlling the circuits which energize the electro-magnets 52 and 53, the fingers 42 and 43 normally occupy the positions shown in Figure 5, and at the end of each screw driving operation of the device 30, a screw is released to fall down through

the flexible tube 38, in position for the next operation by the screw driving device. This results from the fact that the circuit through the magnet 52 is continually closed except at the time when the handle 41 is depressed nearly to its lowermost position. When so depressed, the contact member 60 engages the spring contact 70, closing the circuit through the magnet 53 and at the same time disengaging the spring control 70 from the contact member 55, and interrupting the circuit through the magnet 53 so that the armature 49 is oscillated by the magnet 53 to reverse the position of the fingers 42 and 43, whereby the finger 43 is inserted between the last screw in the slot between the rollers 8 and 9, and the finger 42 is withdrawn so as to release the last screw so that it may be carried forward by the rolls 8 and 9 and drop through the space between the cut away portions 10 of the rolls.

After the screw driving operation is completed the handle 41, and shaft 39, are raised and whereupon the contact members 70 and 60 are separated, and the member 70 then contacts with the projection 55, whereupon the circuit is established through the electromagnet 52, which operates the levers 45 and 46, to return the finger 42 across the slot between the rolls 8 and 9, and at the same time withdraws the finger 43, to permit another screw to be advanced to the position to be released when the finger 42 is again withdrawn.

The construction which I have shown herein for releasing the screw has the advantage that it is entirely automatic and permits a screw to be advanced to a position of release while the screw driving device is operating upon a screw, and upon the completion of the screw driving operation and the return of the handle 41, to the normal position, effects a release of a screw so that the delivery of the screw to the automatic screw driving device is properly timed to furnish a screw immediately following the completion of the operation of driving the preceding screw. However, other switch mechanisms or devices either automatic or under the direct control of the operator may be substituted for that shown, and various other changes and modifications may be made, without departing from the principles of my invention as defined in the appended claims, and I therefore do not purpose limiting the patent granted hereon otherwise than necessitated by the prior art.

I claim as my invention:

1. In a device of the class described, the combination of a screw receptacle, threaded rolls for conveying the screws from the receptacle to a point of discharge, means for holding the screws at the point of discharge, and means operable at a distance therefrom for controlling the release of the screws one at a time at the point of discharge.

2. In a device of the class described, the combination of a screw receptacle, a pair of threaded rolls suitably spaced to engage the head of a screw and permit the stem of the screw to hang downwardly therebetween, means for operating the rolls in opposite directions so as to carry screws therebetween to a point of discharge, a rotary brush having the periphery thereof adjacent the top of the rolls to sweep back screws improperly seated on or between the rolls, and a chute extending downwardly from the rolls to a point beyond the brush and adapted to receive the screws discharged from the rolls.

3. In a device of the class described, the combination of a screw receptacle, a pair of threaded rolls in the bottom of the screw receptacle, means for operating the rolls in opposite directions so as to convey screws one at a time lengthwise of the rolls, with the head rested on the rolls, a brush operable adjacent the upper face of the rolls, for sweeping back screws improperly seated on the rolls, means beyond the brush permitting disengagement of the screws from the rolls, and a pair of fingers for controlling the discharge of the screws from the rolls and operable to release the screws therefrom one at a time.

4. In a device of the class described, the combination of a screw receptacle, means for carrying screws successively from the receptacle to a point of discharge, a pair of fingers for releasing the screws one at a time from the screw carrying means at the point of discharge, and an electromagnet for controlling the operation of said fingers.

5. In a device of the class described, the combination of a screw receptacle, a pair of threaded rolls suitably spaced to engage the head of a screw and permit the stem of the screw to hang downwardly therebetween and means for operating the rolls in opposite directions so as to carry screws therebetween to a point of discharge.

6. In a device of the class described, the combination of a screw receptacle, a pair of threaded rolls suitably spaced to engage the head of a screw and permit the stem of the screw to hang downwardly therebetween, said rolls having annular cut away portions to allow the head of the screw to pass between the rolls at the point of discharge and means for operating the rolls in opposite directions so as to carry screws therebetween to said point of discharge.

7. In a device of the class described, the combination of a screw receptacle having a bottom inclined downwardly from each side inwardly towards a slot adjacent the center, a pair of threaded rolls adjacent the slot suitably spaced to engage the head of a screw and permit the stem of the screw to hang

downwardly therebetween, and means for operating the rolls in opposite directions so as to carry screws therebetween to a point of discharge.

8. In a device of the class described, the combination of a screw receptacle, a pair of threaded rolls suitably spaced to engage the head of a screw and permit the stem of the screw to hang downwardly therebetween, a shaft parallel to the rolls having gears adjacent each end of the receptacle, one gear engaging a gear on one of the rolls and the other gear driving a gear on the other roll through an idle pinion whereby the rolls are driven in opposite directions so as to carry screws therebetween to a point of discharge.

9. In a device of the class described, a pair of members suitably spaced to engage the head of a screw and permit the stem of the screw to hang downwardly therebetween, said members having cut away portions to allow the head of the screw to pass between the members at the point of discharge, means for moving the screws along the members towards the cut away portions, a pair of fingers extending transversely of the members for restraining movement of the screws toward the point of discharge, means for withdrawing one finger to allow a screw to enter the space between the fingers and subsequently projecting such finger to separate said screw from the other screws and simultaneously withdrawing the other finger to allow said screw to pass to the point of discharge.

In testimony whereof I have hereunto subscribed my name in the presence of two subscribing witnesses.

SIMON E. SCHROEDER.

Witnesses:
DORENE W. LOWER,
C. W. BIRD.