A. C. LA MAY.

MACHINE FOR DELIVERING AND OPERATING SCREWS.

APPLICATION FILED NOV. 16, 1909.

Patented July 2, 1912.

1,031,348.

4 SHEETS—SHEET 1.

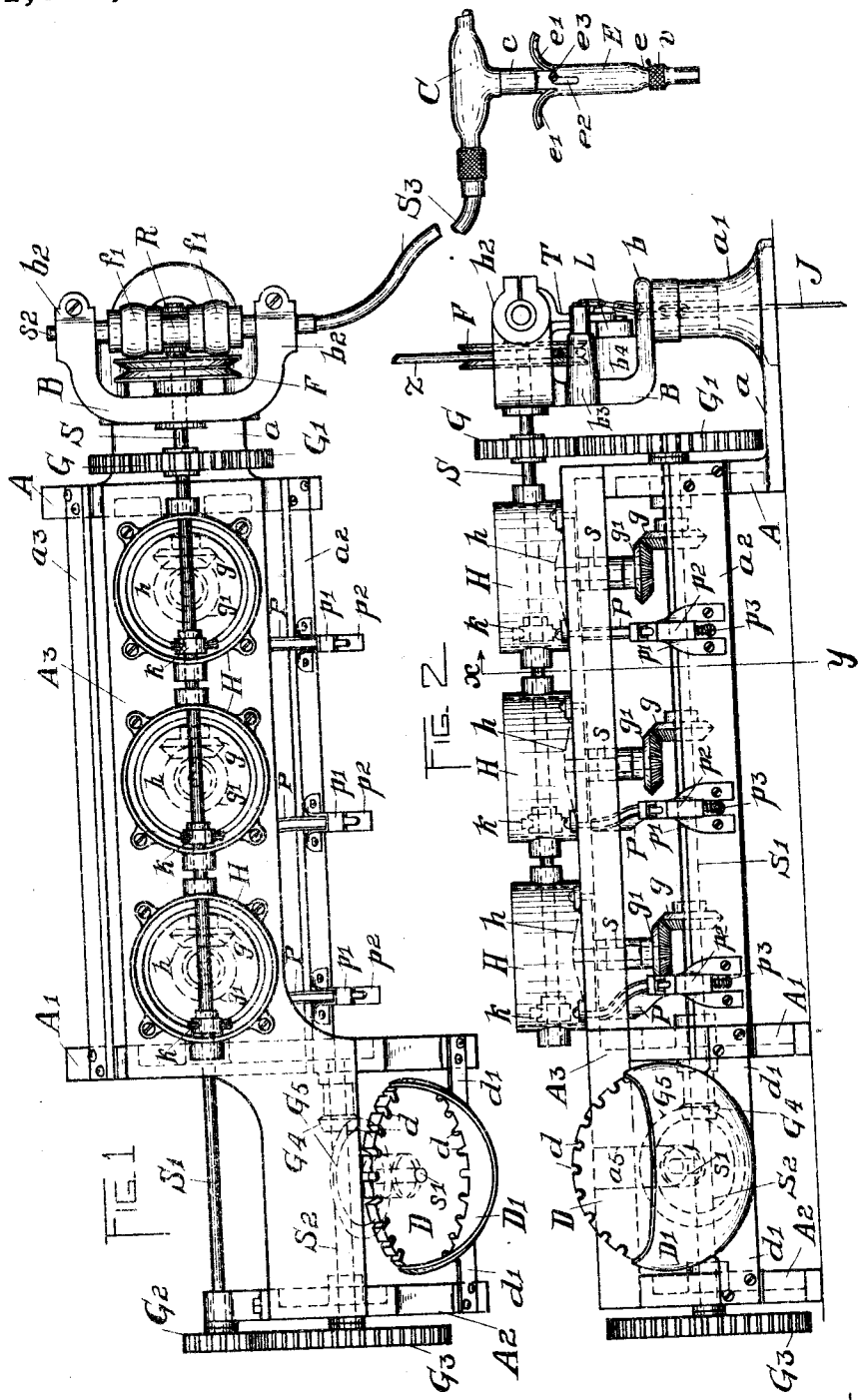


FIG. 1

FIG. 2

WITNESSES:

Louise Frey

Osborne F. Gurney

INVENTOR:

Arthur C. La May

BY W. H. Cooley ATTY.

A. C. LA MAY.

MACHINE FOR DELIVERING AND OPERATING SCREWS.

APPLICATION FILED NOV. 16, 1909.

Patented July 2, 1912.

1,031,348.

4 SHEETS—SHEET 2.

FIG. 3

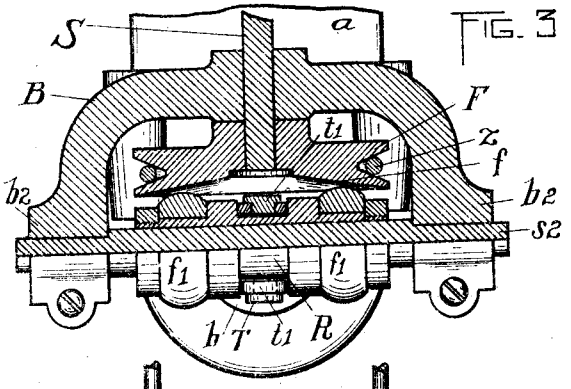


FIG. 4

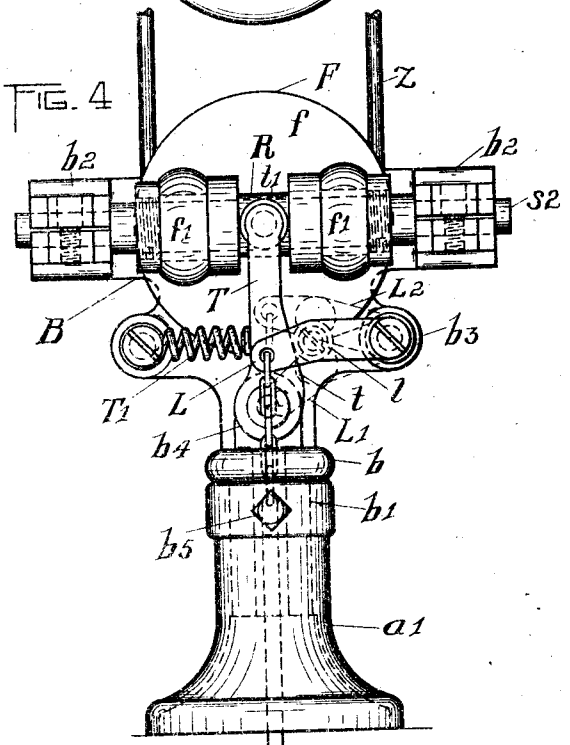
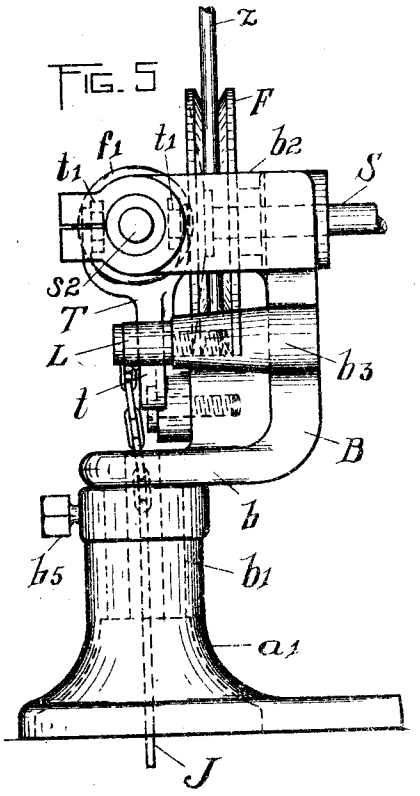
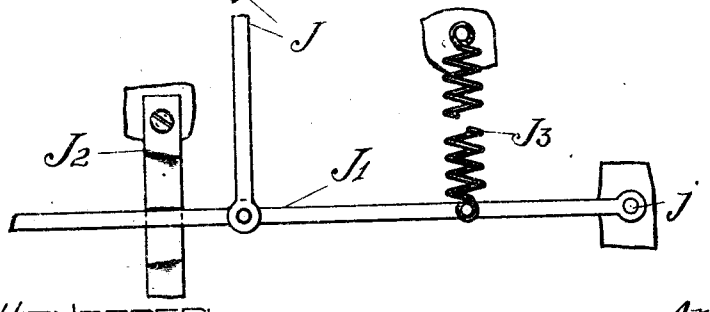


FIG. 5





WITNESSES:

Louis Frey

Osborne F. Gurney

INVENTOR:

Arthur C. La May

BY W. H. Cooley

ATTY.

A. C. LA MAY.

MACHINE FOR DELIVERING AND OPERATING SCREWS.

APPLICATION FILED NOV. 16, 1909.

Patented July 2, 1912.

1,031,348.

4 SHEETS—SHEET 3.

FIG. 8

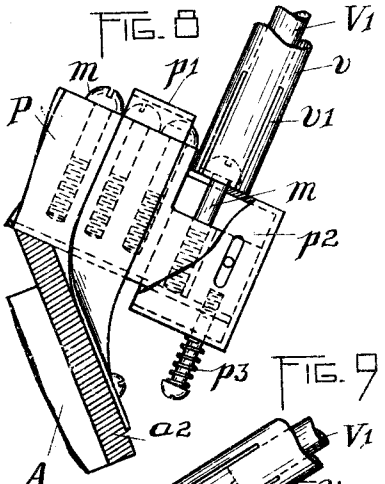


FIG. 9

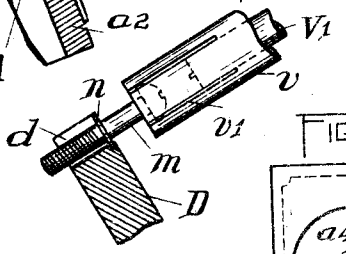


FIG. 6

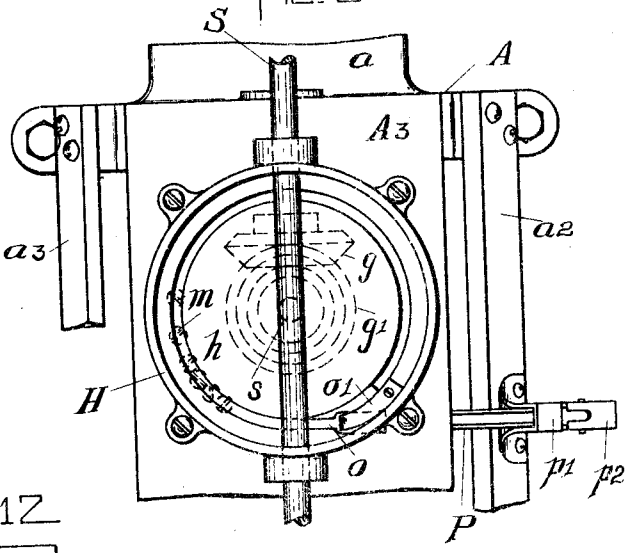


FIG. 12

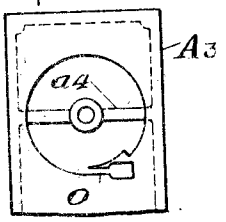


FIG. 10

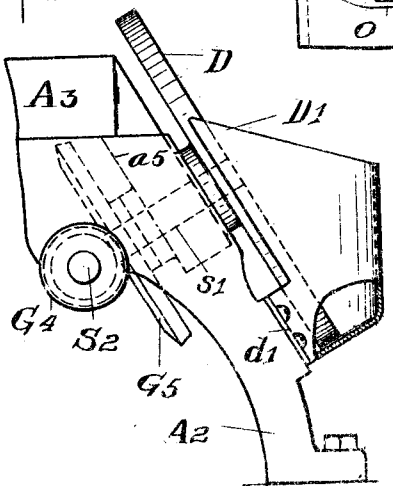


FIG. 7

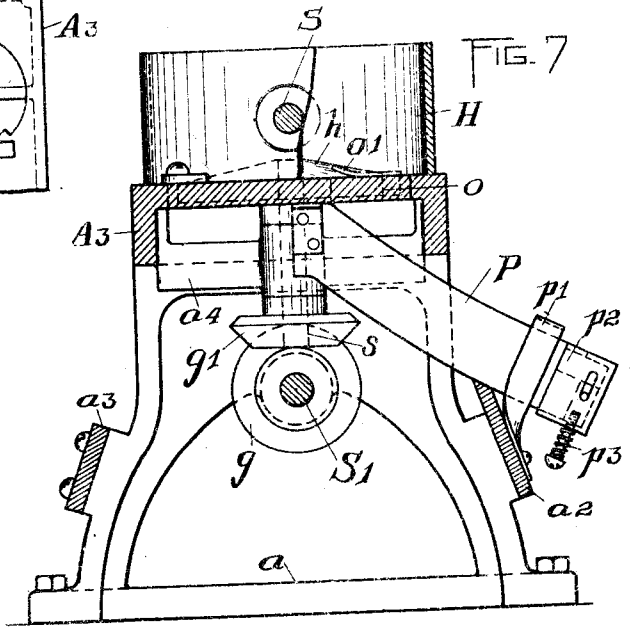
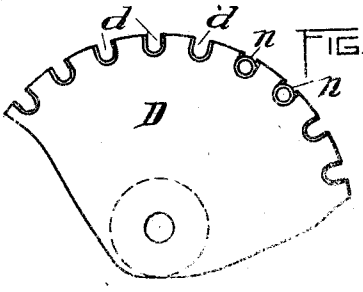


FIG. 13

FIG. 11



WITNESSES:

Louis Fry

Osborne F. Gurney

INVENTOR:

Arthur C. La May

By [illegible] Atty

A. C. LA MAY.

MACHINE FOR DELIVERING AND OPERATING SCREWS.

APPLICATION FILED NOV. 16, 1909.

Patented July 2, 1912.

1,031,348.

4 SHEETS—SHEET 4.

FIG. 15

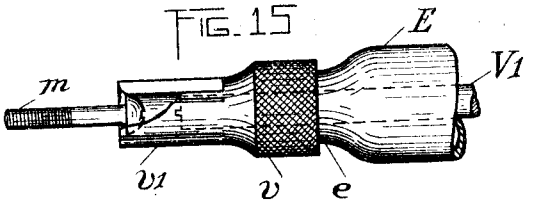


FIG. 14

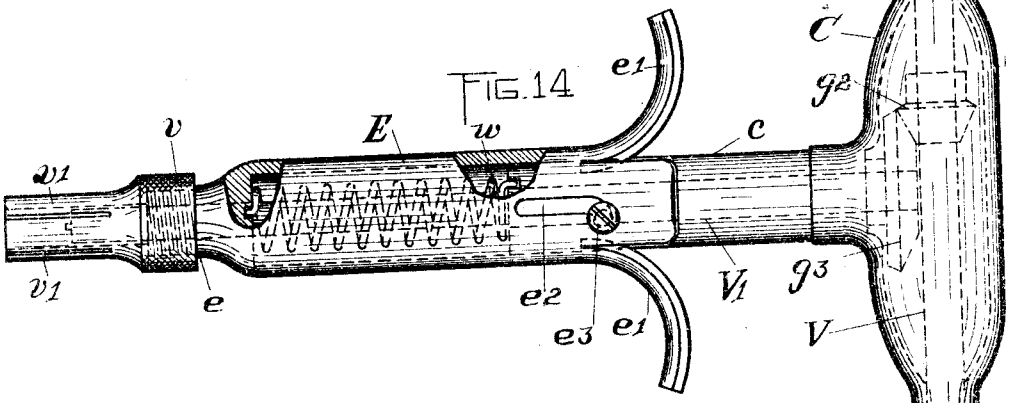


FIG. 16

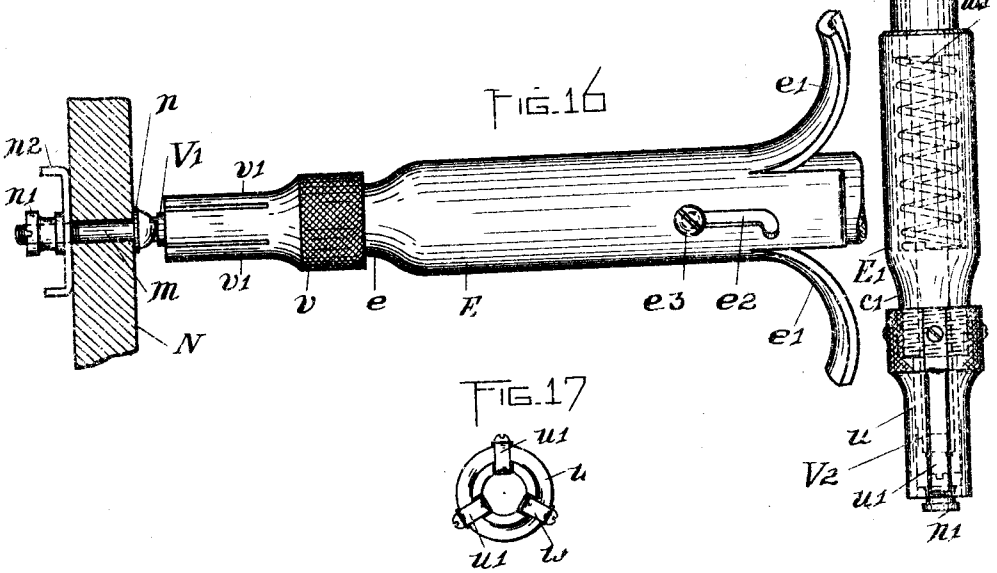
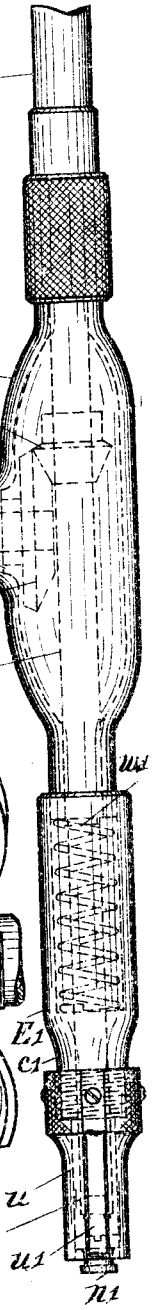


FIG. 17



INVENTOR:
Arthur C. La May
BY Wm. Corby
ATTY

WITNESSES:
Louise Fay.
Osborne F. Gurney

UNITED STATES PATENT OFFICE.

ARTHUR C. LA MAY, OF ROCHESTER, NEW YORK.

MACHINE FOR DELIVERING AND OPERATING SCREWS.

1,031,348. Specification of Letters Patent. Patented July 2, 1912.

Application filed November 16, 1909. Serial No. 528,374.

To all whom it may concern:

Be it known that I, ARTHUR C. LA MAY, a citizen of the United States, and a resident of Rochester, in the county of Monroe and State of New York, have invented a new and Improved Machine for Delivering and Operating Screws, of which the following is a specification.

The object of my present invention is to provide a means for operating screws in either direction as desired by means of a screw driver and coöperatively connected therewith mechanism adapted to deliver the screws and hold them in a suitable support from which they may be readily engaged and held by the mechanism of the screw driver and coöperatively connected with such mechanism there is also provided a washer delivering means adapted to so deliver the washers for the screws, one at a time, that such screws, when held by the screw driver may be readily inserted, one at a time, through the washers and such screws then inserted in the threaded opening therefor and driven to place by means of the screw driver which may also be actuated in either direction to set the screws or to remove them.

The accompanying drawings illustrating my invention are as follows:—

Figure 1 is a top or plan view of the machine and Fig. 2 is a front elevation of the machine but with the flexible shaft for operating the screw driver removed. Fig. 3 shows partially in horizontal section and partially in plan view the reversing and clutching mechanism for driving the flexible shaft to which the screw driver proper is connected. Fig. 4 is an end view and Fig. 5 is a rear side view of the mechanism for driving the flexible shaft and for reversing the direction of the rotation thereof. Fig. 6 is a plan view of the right hand screw delivering mechanism, while Fig. 7 shows the parts seen in Fig. 6 in vertical central section taken along the line x—y of Fig. 2. Fig. 8 is an enlarged detail view of the end of the screw delivering mechanism and a screw therein as engaged by the clutch of the screw driver. Fig. 9 is an enlarged detail view of a part of the washer delivering mechanism and shows a screw as held by the screw driver with the threaded end of the screw inserted through the washer preparatory to removing the same. Fig. 10 is an end view of the washer delivering mechanism with a part of the case therefor removed. Fig. 11 is a face view of a part of the washer delivering disk. Fig. 12 is a plan view of a part of the bed A^3 showing one of the openings therethrough within which a screw delivering disk is revolubly supported and Fig. 13 shows such a disk in side view. Fig. 14 is a side view of the screw driver and Fig. 15 shows a screw as engaged and held by the end of the screw driver. Fig. 16 shows a screw as having been actuated to final position by means of the screw driver. Fig. 17 is an end view of the nut engaging means carried by the screw driver head.

Similar letters refer to similar parts throughout the several views.

In my machine I make use of three pairs of connected supporting legs,—A, A^1 and A^2, all connected at their upper ends to a common bed piece A^3. The lower ends of the right hand legs A extend horizontally as seen at a, into a standard a^1 upon the upper end of which is pivotally supported the yoke carrying member B. This yoke carrying member B has at its lower end a horizontal member b carrying a stud b^1 engaging within the hollow standard a^1 and held therein by means of a set screw or bolt b^5 as seen in Figs. 4 and 5. This yoke member B carries at its upper end bearings b^2 for the shaft s^2 and also a bearing for the shaft S. On that end of the shaft S extending through the bearing therefor, is seen a pulley F, which in the case shown in the drawings is peripherally grooved to receive an actuating round driving belt z. The outer face of this pulley F is rendered conical at f and is adapted to be engaged by either one of the friction rolls f^1 which are each secured against rotation upon the sleeve R which in turn is splined upon the shaft s^2, but is longitudinally slidable thereon. This sleeve R has a central peripheral groove adapted to be engaged by the rollers t^1 revolubly mounted in the ends of the clutch yoke T, which in turn is pivotally supported at its lower end on the boss b^4 on the yoke member B, in such a way as to be free to swing in a plane parallel with the axis of the shaft s^2. The compression spring T^1 is supported from the yoke member B and operates nor-

mally to force and hold the clutching yoke T to the right in Figs. 3 and 4, that is the side of the machine opposite the operator.

A link L is pivotally supported upon an ear b^3 on the yoke member B and is arranged to be actuated by means of the vertically moving rod J flexibly connected as seen, with the outer or free end of this link L, and on this link L there is revolubly supported a roller 1 whereby, by the operation of the rod J, by means of the lever J^1 pivoted at j, the link L and the roller 1 may, by engaging the cam t on the lever T, cause such lever to occupy either the neutral position shown in Figs. 3 and 4 or its operative position to the left thereof, while when the lever J^1 is moved to its uppermost position, the lever T is forced by the spring T^1 to the right in Figs. 3 and 4 to its operative position, for which extreme operative positions of the lever T^1 the lever L is caused to occupy the positions indicated in Fig. 4 in dotted lines at L^1 and L^2 respectively.

Means are provided for locking the rod in any desired position of vertical adjustment, such means preferably comprising the notched bar J^2 adapted to engage and hold the lever J^1, a spring J^3 normally holds lever J^1 in its uppermost position.

From the foregoing description it will at once be seen that by the actuation of the clutch lever T the shaft s^2 may be permitted to remain at rest when the parts are in the relative positions indicated in Fig. 3 or such shaft may be caused to be driven in either direction according as the right or left hand friction roll f^1 is brought into engagement with the outer face f of the pulley F, whereby the flexible shaft S^3 connected with such shaft s^2 may be driven in either direction or remain at rest as desired. This flexible shaft S^3 extends within the screw driver head as seen in Fig. 14. This head consists of a central member C in which there is revolubly supported the shaft V carrying a bevel gear g^2 intermeshing with a similar bevel gear g^3 located upon a shaft V^1 having its bearings in the extension c carried by the head C. On this extension c there is carried a sleeve E secured thereon by a screw e^3 engaging through the slot e^2 in the sleeve E, such slot permitting a longitudinal movement of the sleeve E on the tubular extension c and a slight angular movement thereon when the sleeve E is at its extreme left hand or outermost position as seen in Fig. 14, to and in which position it is normally driven and held by means of the coiled spring w, the normal torsional tendency of which operates also to so turn the sleeve E upon the tubular extension c as to hold the same in the position indicated in Fig. 14, that is, with the sleeve E so rotated upon the tubular extension c as to hold the lateral extension at the right hand end of the slot e^2 in engagement with the screw e^3, whereby compression of the spring w in forcing the sleeve E to the position indicated in Fig. 16 is opposed by the screw e^3 engaging in the notch at the end of the slot e^2 and preventing the longitudinal movement of the sleeve E upon the extension c. On the outer end e of the sleeve E there is threaded a removable split clutch v, the bore of which is such as to permit the spring of the divided ends v^1 to engage over the head of a screw m and to hold the same.

On the sleeve E are formed extensions e^1 adapted to be engaged by the fingers of the operator when the member C is held in using the device. The normal positions of the parts for engaging a screw is shown in Figs. 14 and 15. After the screw has been inserted it is driven to place, by first engaging the extensions e^1 and slightly rotating the sleeve E, thereby permitting the sleeve E to be drawn to the position indicated in Fig. 16. On the extension c^1 through which the shaft V extends there is secured the tubular member E^1 which is spring actuated as indicated in the same way as the member E, to normally hold the same in the position indicated in Fig. 14 and on the outer end of this member E^1 is secured the nut engaging clutch u having thereon the yielding jaws u^1 the ends of which are adapted to engage within the peripheral groove on a nut such as n^1 while the end of the shaft V carries a screw driver V^2 bored out to receive the end of a screw such as m to permit it to engage the slot in the outer end of a nut such as n^1 when in place on a screw in order to remove the nut, as it is frequently desirable to remove the nuts from the screws by operating the nuts by means of the mechanism shown at this end of the operating head of my screw driver.

In Fig. 16, the position of the parts is shown after the screw such as m has been turned to place thereby. Such screw being shown as engaging through a washer n and through a base piece N and then through a member n^2 to be clamped thereto and having been screwed into the nut n^1.

Refer now to Figs. 1, 2, 6, 7, 8, 9, 10, 12 and 13. On the bed member A^2 is secured any desired number of circular hoppers such as H. In the side walls of these hoppers H are formed bearings for the shaft S upon which are located the brushes k. On this shaft S near the right hand end of the machine, as seen in Figs. 1 and 2, there is a spur gear G intermeshing with the spur gear G^1 on the right hand end of the shaft S^1, the bearings for which are carried by the supporting standards A, A^1 and A^2. On this shaft S^1 are seen bevel gears g intermeshing with bevel gears g^1 carried on the lower ends of vertically arranged shafts s having elon-

gated bearings in the cross arms a^4 extending transversely underneath the circular openings in the bed piece A^3. On the upper ends of these shafts s are secured the disk heads h having conically formed upper surfaces. The diameter of these heads h is such relative to the openings therefor in the bed piece A^3 that there is left a circular channel of a size sufficient to permit the bodies of the screws m to fall freely therein but not to receive the heads of such screws and permit them to fall through. The heads of the screws rest upon the upper surface of the disk h and the upper surface of the bed piece A^3. The conical upper surface of the head of the disk h together with the rotation of such disk and the revolving brushes k cause the screws to be forced outwardly to the slot between the head h and the side of the opening therefor in the bed piece A^3 as seen in plan view in Fig. 12 and from this channel the screws pass through the slot o in the bed piece A^3 and thence under the spring o^1 and into the guide-way P comprising two plates supported at such an inclination and distance apart that the screw heads slide downwardly thereon and to the right as seen in Figs. 7 and 8 under the cap piece p^1 and into the terminal and delivering portion thereof p^2 comprising a slidably supported shell inclosing the lower end of the guide way P and normally held in its uppermost position as shown in Fig. 7 by means of the spring p^3 which in turn is held in place by a suitable screw threaded into the connecting member on the bottom of the guide P at its outer end. The top of this delivering mechanism p^2 has a slot extending downwardly therein of sufficient width to receive the body of the screws m and support the screws by their heads engaging over the top of such member p^2 which is normally held by the spring p^3 so as to be flush with the top of the guide P.

When the screw is to be removed from the guide way the sleeve E on the screw driver head is adjusted, to engage the screw, to the position indicated in Fig. 14 and the clutch member v is forced downwardly over the head of the screw, the spring members v^1 firmly engaging the screw as indicated in Fig. 8 with sufficient force to hold the same as it is withdrawn from the member p^2 and then the screw is inserted through one of the washers n in the washer delivering disk D, in doing which the screw driver head with the screw m therein is operated in the manner indicated in Fig. 9, showing a portion of the washer delivering disk D and a washer n delivered thereby during which operation the screw m is forced through the washer as indicated and into one of the open slots d in the periphery of the disk D.

Between the lower ends of the standards A and A^1 at the front and rear sides of the machine respectively are secured cross bars a^2 and a^3. The cross bar a^2 serving as a support for the guides P and for the members p^1 engaging over the tops thereof as already described, but a sufficient distance above the upper surface of such guides p to permit the heads of the screws m to pass thereunder.

At the left hand end of the shaft S^1 is seen a spur gear G^2 meshing with a large spur gear G^3 which latter is located on the left hand end of a shaft S^2 having bearings in the standards A^1 and A^2. This shaft S^2 has on its right hand end a bevel gear G^4 meshing with a bevel gear G^5 on the inner and lower end of the short shaft s^1 having a bearing in the member a^5 extending obliquely downward from the bed A^3 and carrying on its upper and outer end the disk D which is caused by the connection just described to revolve within the washer hopper D^1. This disk D has open slots d in its periphery and is recessed around such open slots as indicated in Figs. 2, 9 and 11 to receive the washers and support the same. The washers are placed in the hopper D^1 and the rotation of the disk D engages the washers n and causes them to fall into the recesses therefor at the slots d and they are carried upwardly and around by this disk D and thus brought into a position to be readily engaged and removed by a screw m in the clutch v as already fully described.

Between the standards A^1 and A^2 on the front side of the machine and secured thereto are seen extensions d^1 formed integrally with the hopper D^1 and by which the same is supported.

In operating my machine a sufficient quantity of the washers n are put into the hopper D^1 to secure the proper operation of the disk D and the screws to be used are put into the hoppers H, of which there may be any desired number and the rotation is communicated to the pulley F from any desired source of power, the operation of the lever J^1 controls the direction of the rotation of the screw driver head in the manner already described,—and the screws are forced into the delivering mechanism p^2 and removed therefrom by the screw driver head in the manner indicated and then the screw is inserted through a washer on the delivering disk D in the manner already described and such screw is then inserted in the opening therefor in the parts to be secured thereby and the screw driven to place as seen in Fig. 16 and already clearly described.

It will be understood of course, in removing a screw from its place the operation is the reverse from that of inserting the screw. When it is desired to remove one of the peripherally grooved nuts such as n^1, that end of the screw driver head is made use of on which the clutch u is located.

The lever J^1 is operated to secure at all times the desired direction of the rotation of the screw driver or to allow such driver to remain at rest in the manner already fully explained.

From the foregoing description of the construction and operation of my machine for delivering and operating screws, it is believed that the method of using the same is sufficiently clear to call for no further explanation herein.

What I claim is:—

1. The combination with a manually controllable screw driver having a clutch adapted to yieldably engage the head of a screw and movable longitudinally on the screw driver to permit the latter to force the screw out of said clutch, of a source of supply for screws and a delivering guideway therefor terminating in a member exposed to engagement by said clutch and depressible thereby and means for restraining the screw from depression with such depressible member whereby the screw head is caused to protrude and be engaged by said clutch.

2. The combination with a manually controllable screw driver having a clutch adapted to yieldably engage the head of a screw and movable longitudinally on the screw driver to permit the latter to force the screw out of said clutch, of a source of supply for screws and a delivering guideway therefor terminating in a member exposed to engagement by said clutch and depressible thereby, means for restraining the screw from depression with such depressible member whereby the screw head is caused to protrude and be engaged by said clutch; a main shaft and a flexible shaft connected therewith and with the screw driver and means operatively connected with the main shaft for delivering the screws from the source of supply therefor to the guideway.

3. The combination with a manually controllable screw driver having a clutch adapted to yieldably engage the head of a screw and movable longitudinally on the screw driver to permit the latter to force the screw out of said clutch, of a source of supply for screws and a delivering guideway therefor terminating in a member exposed to engagement by said clutch and depressible thereby; means for restraining the screw from depression with such depressible member whereby the screw head is caused to protrude and be engaged by said clutch; a main shaft and a flexible shaft connected therewith and with the screw driver; means operatively connected with the main shaft for delivering the screws from the source of supply therefor to the guideway; a revolubly supported and obliquely disposed washer delivering disk; a hopper for the washers partially inclosing the disk; recessed slots in the periphery of the disk adapted to receive the washers in the recesses at said slots, said disk obliquely supported to receive and retain the washers in the recesses and means for rotating said disk from said main shaft.

ARTHUR C. LA MAY.

Witnesses:
MARTHA NELSON,
OSBORNE F. GURNEY.