

E. J. & D. SMITH.
PRONGED FASTENER SETTING MACHINE.
APPLICATION FILED SEPT. 10, 1913.

1,118,312.

Patented Nov. 24, 1914.

3 SHEETS—SHEET 1.

Fig. 1.

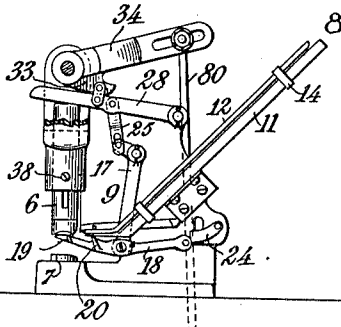


Fig. 12.

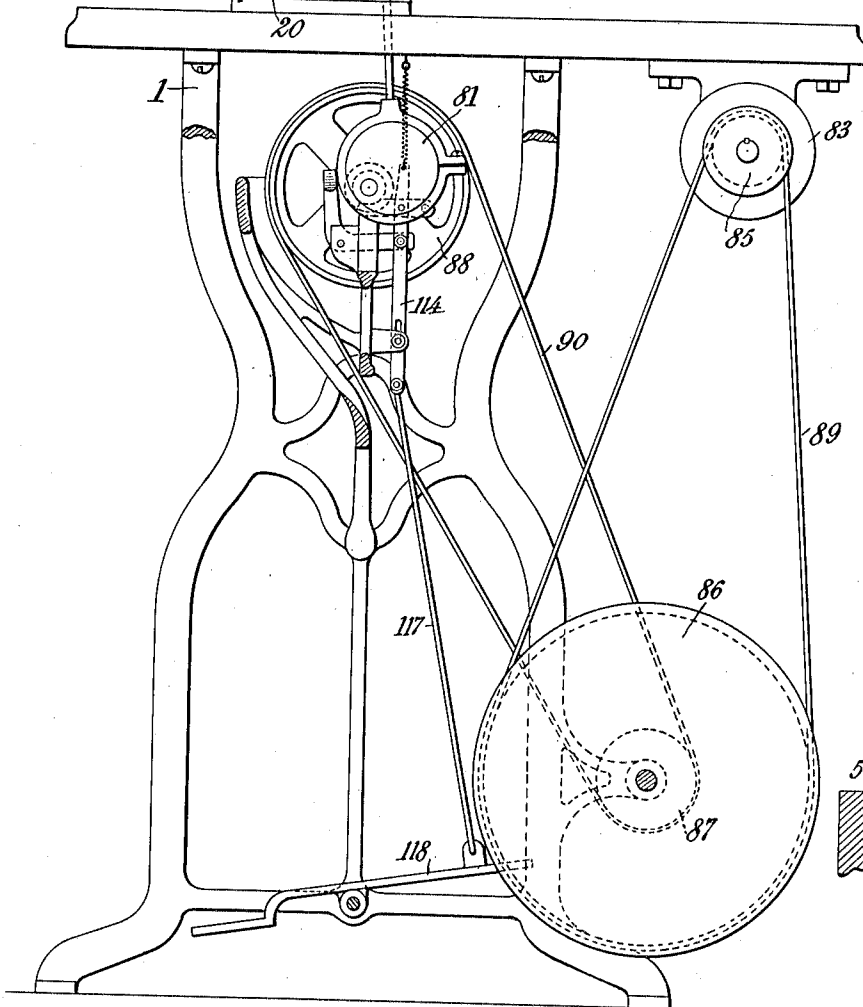
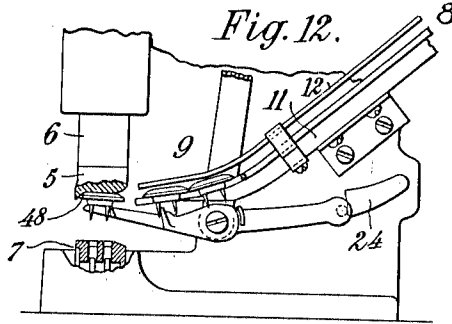


Fig. 13.

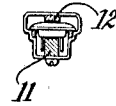
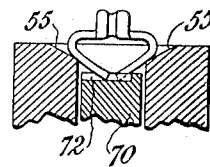


Fig. 14.



Fig. 15.



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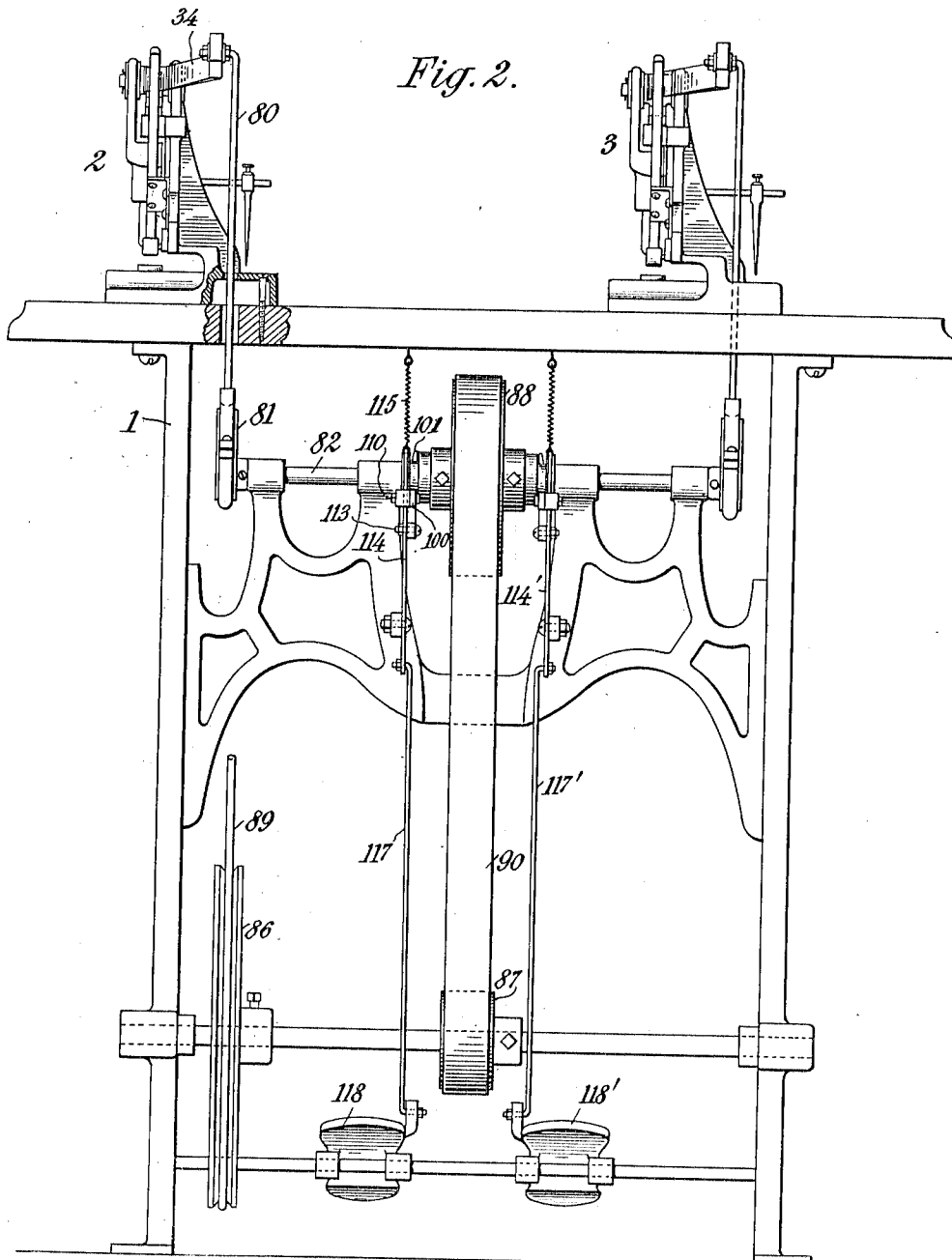
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3 SHEETS—SHEET 2.



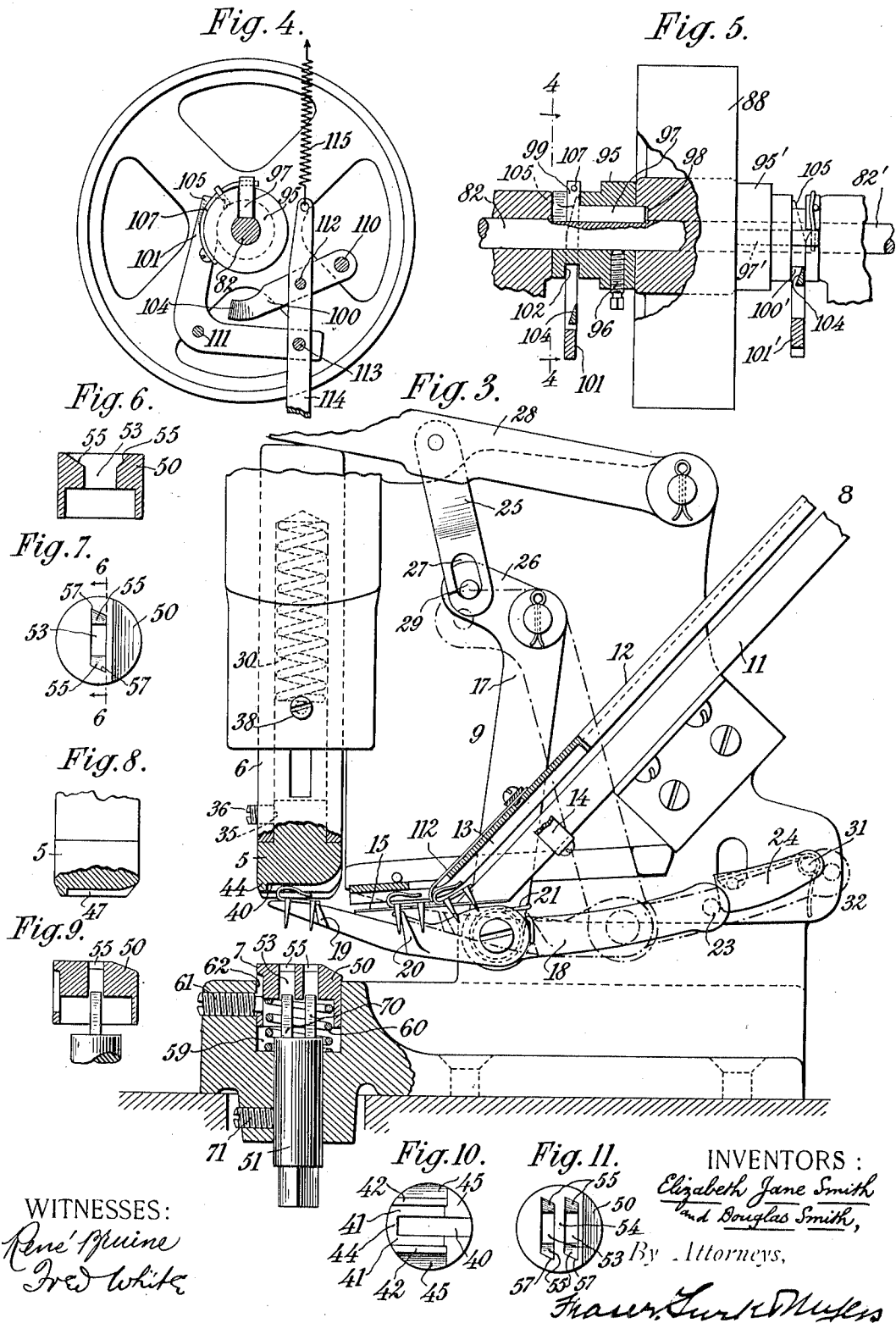
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3 SHEETS-SHEET 3.



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UNITED STATES PATENT OFFICE.

ELIZABETH JANE SMITH AND DOUGLAS SMITH, OF LARCHMONT, NEW YORK.

PRONGED-FASTENER-SETTING MACHINE.

1,118,312.

Specification of Letters Patent.

Patented Nov. 24, 1914.

Application filed September 10, 1913. Serial No. 789,075.

To all whom it may concern:

Be it known that we, ELIZABETH JANE SMITH and DOUGLAS SMITH, citizens of the United States of America, residing in Larchmont, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Pronged-Fastener-Setting Machines, of which the following is a specification.

This invention relates to improvements in machines for setting pronged fasteners and the like, and aims to provide improvements therein, whereby pronged fasteners may be rapidly, economically, reliably and securely fastened in place on the goods to which they are to be applied.

Other objects and features of improvement will be hereinafter set forth.

Several embodiments of the invention are set forth herein.

Referring to the drawings: Figures 1-11 inclusive illustrate an embodiment of a machine for setting a separable fastener, such as a hook and eye fastener, and Figs. 12 and 13, parts of a machine for setting a pronged button. Fig. 1 is a side elevation of the machine for setting hook and eye fasteners. Fig. 2 is a rear elevation thereof. Fig. 3 is a side elevation, with parts in section, showing the setting mechanism proper, on an enlarged scale. Figs. 4 and 5 are respectively a side and top plan view of the clutch mechanism of the machine with parts of the latter view in section. Figs. 6 and 7 are respectively a sectional view and top plan view of a die for setting a fastener having a single pair of prongs, as for instance an eye fastener. Figs. 8 and 9 are respectively side elevations, with parts in section of an upper and lower die for setting pronged fasteners. Figs. 10 and 11 are respectively top and lower plan views of an upper and lower die for setting a fastener having a double pair of prongs, as for instance a hook fastener. Fig. 12 is a side elevation of part of a machine constructed according to the present invention, for setting pronged button fasteners. Fig. 13 is a sectional view of a button magazine. Fig. 14 is a detail view of the top of a part of one of the dies. Fig. 15 is an enlarged detail sectional view of one of the dies.

In said drawings, 1 designates a table or

stand on which the setting mechanisms proper 2, 3, and the parts of the actuating and controlling mechanisms are mounted.

In setting separable pronged fasteners, as for instance, hook and eye fasteners, it is preferable to provide two mechanisms, one for setting the eye and the other for setting the hook on each table, so that one operator may conveniently perform the operation of setting both hook and eye fasteners.

The setting mechanisms proper 2, 3, preferably comprise an upper die 5 carried by a suitable reciprocating plunger 6, a lower die 7, a magazine 8 and a feed device 9 for feeding fasteners from the magazine to a position between the dies 5 and 7.

Magazine 8 preferably comprises a tilted bar 11 which is adapted to be straddled by the prongs of the fasteners, and a plate 12 above said bar 11 having a suitable channel or recess 13 in its under side adapted to conform to the contour of the upper side of the fastener.

As shown in Fig. 3, the plate 12 is provided with a plain groove 13 adapted to receive the bill of the hook fastener. A bracket 14 attached to the under side of the bar 11 may be provided for holding the plate 12 in position. The lower end of the bar 11 is also preferably provided with an approximately horizontal shelf 15, on which the fasteners are adapted to rest in proximity to the dies, from whence they are adapted to be fed to a position between the dies by the feed mechanism 9. A spring stop 112 may be provided for preventing fasteners from passing out of the magazine, except when fed therefrom by the feed mechanism.

The feed mechanism 9 preferably comprises a bell crank lever 17 having a pivotally mounted feed arm 18 thereon. The front end of the arm 18 is provided with projections 19, which are adapted in its rear position to engage behind the prongs of the pronged fasteners, and feed them from the shelf 15 to a position between the dies. The front end of the arm 18 is also preferably provided with projections 20, which, in the rear position of the arm 18, are adapted to engage behind the prongs of the pronged fasteners and feed the fasteners from the magazine onto the shelf 15.

A spring 21, having one end fastened to

the arm 17 and the other end to the arm 18, is provided, the tendency of which spring is to press the front end of the arm 18 up and the rear end down. The rear end of the arm 18 is provided with a pin 23 adapted to cooperate with a pivoted cam piece 24. The pin 23 abuts the front end of the cam piece to hold the arm 18 in its forward position. The spring 21, in the forward position of the arm 18, presses the forward end of the arm upwardly and presses the fastener carried thereby against the lower face of the upper die 5. As the upper die 5 descends, the rear end of the arm 18 is lifted, and during the course of the downward movement of the die 5, the pin 23 on the rear end of the arm 18 is lifted above the front face of the cam piece 24. At about this moment the rearward movement of the arm 18 is initiated. This movement is effected by a link 25 connected to the arm 26 of the bell crank lever 17, and to an arm 27, which is oscillated by the mechanism for reciprocating the plunger 6 carrying the die 5. The link 25 is provided with an elongated slot 27, which permits loose play between the link 25 and arm 26 during the major portion of the downward oscillation of the arm 28. Just prior, however, to the arm 27 reaching the lower limit of its oscillation, the upper end of slot 27 strikes the pin 29, and causes the lever 17 to move to the rear, carrying with it the arm 18, the pin 23 (upon release of the front end of the arm 18 from the under side of the upper die) coming into contact with the upper side of the cam piece 24 and the front end of the lever 18 being thereby prevented from rising. The pressure of the spring 21 upon the cam 18, causes a resultant motion of the pin 23 upwardly and rearwardly along the upper side of the cam piece 24. The pin 23 slides until it passes beyond the rear end of the cam piece 24. The front end of the arm 18, which up to this time has been held depressed, rises under the force of the spring 21. The depression of the front end of the arm 18 during the backward movement thereof, enables it to clear the ends of the prongs upon the fasteners in the magazine. When the front end of the arm rises, as just explained, the projections 19 and 20 thereon engage behind prongs of the fasteners which are upon shelf 15 and at the bottom of the magazine 11, in position to move the fasteners forward at the next feed operation of the arm. After the front end of the arm 18 has arisen and engaged the pronged fasteners, it is moved forward by the link 25 which engages the arm 26 of the bell crank lever and which is connected to the arm 28 which oscillates upwardly under the influence of a spring 30 within the plunger head 6, at

each reciprocation of the plunger head. The cam piece 24 is pivotally mounted at 31, to enable the same to rise as the pin 23 passes forwardly along its under surface. When the arm 18 is in its forward position, the cam piece 24 drops behind the pin 23, the cam piece being assisted in this motion by the spring 32.

The plunger head 6 and the oscillating arm 28 are actuated by suitable means as for instance, a cam 33 (Fig. 1) for removing them in one direction, and a spring for moving them in the other direction. The cam 33 is preferably provided with an arm 34 by which it may be moved. The plunger head 6 is preferably provided with a socket 35, which is preferably extended for a considerable distance within the plunger head. The spring 30 is housed in this socket. The end of the socket constitutes an abutment for the upper end of the spring and the screw 38 an abutment for the lower end of the spring.

The tendency of the spring 30 is to raise the plunger head. The arm 28 preferably has its end interposed between the cam 33 and the upper end of the plunger head. Rotation of the cam 33 causes a simultaneous motion of the arm 28 and the plunger head 6.

The die 5 may be mounted in the lower end of socket 35, and a set screw 36 may be provided for holding the die in place therein.

The under side of an upper die for a pronged hook fastener is illustrated in Fig. 10. The face of this die is provided with a slot 40 adapted to receive the bill of the hook. At each side of this slot are lands or pressure surfaces 41, against which the portions of the fasteners at the bases of the prongs are adapted to bear. Ribs 42 may be provided at the edges of the lands 41, for the purpose of preventing lateral movement of the fastener upon the die. An abutment 44 may be provided at the end of the slot 40 for limiting the transverse movement of the fastener across the face of the die. The edges of the die are also preferably cut away at 45 to give greater clearance to the goods around the edges of the die. In the case of an eye, the under side of the die 5 is provided with a simple groove 47, as shown in Fig. 8. In the case of a button fastener, the under side of the die 5 is provided with a somewhat broadened recess 48 (Fig. 12) having approximately the cross-sectional contour of a button.

The pronged fasteners, according to the present invention, are set by having the prongs thereof bent over and pressed flatwise and side by side, without crossing, along the under side of the goods to which

the fasteners are attached. For this purpose the die 7 is provided with a part 50 adapted to bend the prongs inwardly, to a greater or less extent, across the under side of the goods, without over-lapping in a vertical plane of the prongs, and with a part 51 adapted to press the bent-over prongs firmly and securely against the under side of the goods.

10 The part 50 of the lower die 7 is provided with one or more slots 53 (Figs. 6, 7 and 11,—according to the number of pairs of prongs on the pronged fastener to be set). It is not essential that there be a wall of
15 metal 54 Fig. 11 between any two slots 53, but the die is preferably formed in this manner. The die part 50, adjacent the upper end of the slot 53, is provided with inclined die faces 55. These die faces are
20 formed at a suitable inclination to bend the prongs of the pronged fastener inwardly in such manner that the bend is distributed substantially the length of the prong and in such manner that the major portion of
25 the bend occurs at or near the base of the prong; that is, all "curling" of the ends of the prongs is avoided, and the prongs fold against the goods in substantially extended position. The inclination of the faces 53
30 is such that a bending stress is produced in the prongs, substantially from the point of contact of the prongs with the die to the base or shoulders of the prongs on the fastener. The slot 53 provides a clearance
35 space in which the ends of the prongs may pass as they are bent inward. The prongs of the fastener are bent in such manner that they do not cross or interfere with one another as they are bent inwardly: that
40 is, they are bent in planes which do not intersect between the base and points of the prongs. For assuring this manner of bending the inclined faces 55 of the die part 50 are cut deeper at one side than at the other,
45 as at 57, corresponding parts 57 of the faces 55 at each side of the die being diagonally opposite one another, instead of directly opposite. The effect of this construction is to maintain or direct opposite prongs of a pair
50 into planes, which are substantially parallel to one another, thereby preventing any crossing of the prongs as they are bent inwardly as a result of which the prongs might interfere with one another or be
55 superposed when pressed flat against the under side of a piece of goods to which the fastener is attached.

60 The part 50 of the die 7 is resiliently mounted in a socket 59 in the base piece of the machine. A somewhat stiff spring 60 bears against the bottom of the socket 59 and the under side of the die part 50. A set screw 61 is preferably provided for limiting the movements of the die part 50, a

slot 62 being conveniently formed in the die part for engagement with the end of the set screw.

The die part 51 of the die 7 preferably enters the socket 59 from the under side, and is provided with one or more projections 70 (corresponding to the number of slots 53 of the die part 50) which projections 70 register with, and are adapted to move within, the slots 53 as the die part 50 is moved downwardly against the tension of the
75 spring 60.

The inward bend of the prongs is first accomplished by the die faces 55 of the die part 50. When this inward bending has progressed to a suitable extent (the bending
80 pressure upon the die part 50 meanwhile increasing) the die part 50 yields, and the bent-over prongs are brought against the upper ends of the projection 70, and pressed with a maximum degree of firmness against
85 the under side of the goods to which the fasteners are attached, the face of the upper die 5 acting, of course, as an anvil upon which the fastener rests.

As explained above, the faces 55 of the die-part 50 bend the prongs inwardly substantially across the under side of the fastener, without, however, permitting any crossing of the prongs on the under side of the goods, and when this stage of the bending
95 is reached or approximated the projections 70 of the die part 50 come into operation, and flatten and press the bent-over prongs flatly and forcibly against the under side of the goods to which the fastener is attached, the attachment being very firm and
100 secure.

In order to further insure a proper guiding of the prongs during the bending thereof the upper side of the projections 70 may
105 be provided with diagonal grooves 72 (Figs. 14 and 15) adapted to receive the prongs of the fastener as they pass off of the inclined faces 55 of the die-part 50. These grooves receive and guide the prongs into a side by
110 side position on the face of the goods. With the die thus constructed, the spring 60 is preferably adapted to yield at about the time the prongs pass off of the faces 55 of the die-part 50, so that after the prongs have
115 been initially bent inwardly to a considerable extent, the projections 70 of the die-part 51 come into action so that during a portion of the bending period there is a simultaneous inward and upward bending
120 of the prongs by the die faces 55 and the projections 70.

A set screw 71 is preferably provided for fixing the die part 51 in position. The die part 51 may be adjusted in height, and the
125 set screw 71 will act to hold it in the adjusted position.

The plunger 6 and the arm 28 may be ac-

uated by cam 33 having an arm 34 attached thereto as hereinbefore explained. The arm 34 may be operated by hand, but as herein shown it is preferably mechanically operated.

As shown in Figs. 1 and 2, the arm 34 may be connected by a rod 80 connected to an eccentric 81 on a shaft 82. Reciprocations of the rod 80 and movements of the eccentric 81 produce oscillation of the arm 34 and an operation of the plunger 6 and arm 28, and parts connected thereto, as hereinbefore explained. The shaft 82 may be conveniently rotated by an electric motor through a suitable transmission, as for instance the pulleys 85, 86, 87, 88 and belts 89 and 90.

The rotations of the shaft 82 are preferably controlled through suitable controlling mechanism. In the embodiment herein shown the pulley 88 is mounted loosely on the shaft 82 (see Fig. 5). A clutch mechanism is provided between the pulley 88 and the shaft 82. This clutch mechanism may comprise a collar 95 fixed by means of a set screw 96 or the like upon the shaft 82 and having a pin 97 therein adapted to engage within a hole or slot 98 in the side of the pulley 88. The pin 97 has a part 99 adapted to be engaged by fingers 100 and 101 for withdrawing the pin from clutching engagement with the hole 98 in pulley 88 (Fig. 4).

The collar 95 is preferably provided with an annular slot 102 in which the fingers 100 and 101 are adapted to enter to engage the part 99 of the pin 97. The ends of the fingers 100 and 101 are beveled as shown at 104, 105, in order that they may enter beneath the part 99 and lift the pin 97 out of clutching engagement with the pulley 88. A spring 107 (attached at one end to the collar 95 and at its other end to the part 99 of the pin 97) is provided for normally pressing the pin 97 into engagement with the pulley 88.

The finger 100 is pivoted at 110, and the finger 101 is pivoted at 111 to the suitable part of the frame or stand 1 of the machine (Figs. 1 and 4). The finger 100 is also pivoted at 112, and the finger 101 is pivoted at 113 to a slide bar 114 having a spring 115 attached to its upper end, the normal tendency of which spring is to pull the finger 100 into the slot 102 and consequently into position to withdraw the pin 97 from engagement with the pulley 88. The upward movement of the slide 114 at the same time withdraws the finger 101 from its pin engaging position in the slot 102. The lower end of the slide is connected by a rod 117 with a treadle 118. Pressure upon the treadle 118 pulls the slide 114 down in such manner as to withdraw the finger 100 from the slot 102, and to throw the finger 101 into

position to withdraw the pin 97 from engagement with the pulley 88.

Pulley 88 is normally constantly rotated by the motor 83. The finger 100 is normally drawn by the spring 115 into position to withdraw the pin 97 from engagement with the pulley 88. Under normal conditions therefore the pulley 88 will be disconnected from the shaft 82, and there will be no rotation of the shaft 82 and consequently no actuation of the fastener setting mechanism. When it is desired to operate the fastener setting mechanism, the treadle 118 is pressed, pulling down the slide 114, consequently withdrawing the finger 100 from engagement with the part 99 of the pin 97, and allowing the pin 97 to drop into engagement with the hole 98 in the pulley 88. The shaft 82 and the pulley 88 are therefore thrown into clutch, and the shaft 82 is rotated. It is preferable, however, that the rotation of the shaft 82 shall not be continuous, in such manner as to operate the setting mechanism to set more than one fastener at each operation of the treadle, even though the treadle be maintained depressed. This result is accomplished by the finger 101 which moves into position to engage the part 99 of the pin 97 at the same time that the finger 100 is withdrawn. Before the shaft is able to complete a revolution the pin 97 is withdrawn by the finger 101. When the treadle is released the finger 100 again moves into position to withdraw the pin 97, so that the shaft 82 will not be clutched with the pulley 88 until the treadle is again depressed.

As hereinbefore stated separate mechanisms are preferably provided for setting the two parts of a separable fastener. In this case the shaft 82 may be made in two parts 82, 82' with their ends preferably abutting inside the hub of the pulley 88. The parts of the clutch mechanism and the clutch operating mechanism are duplicated at 95', 97', 100', 101', 114', 117', 118', etc. When it is desired to operate one of the setting mechanisms, as setting mechanism 2, the treadle 118 is pressed; when it is desired to operate the other setting mechanism, as the setting mechanism 3, the treadle 118' is pressed. The operation of one or the other of these setting mechanisms 2 or 3 may be effected by operating one or the other of the treadles 118, 118'.

While certain embodiments of the invention have been illustrated and described, the invention is not to be understood to be limited thereto, as various modifications and changes may be made therein without departing from the spirit of the invention, and as the invention may have other embodiments.

What is claimed is:—

1. In a pronged fastener setting machine

having two setting dies, a die comprising two relatively movable parts, one of which has inclined faces for first bending the prongs inwardly across a face of the material to which the fasteners are being attached, and being constructed and arranged to guide said prongs out of opposition in their bending movements, whereby interference with one another and superposition on the face of the goods is avoided, and the other of said two relatively movable parts being arranged to press said bent-over prongs flatly and forcibly against said material.

15. 2. In a pronged fastener setting machine, having two setting dies, a die having faces having longitudinal and lateral inclinations adapted to bend the prongs in substantially extended position inwardly across a face of the material to which the fasteners are being attached, and to guide said prongs in their bending movements, whereby interference with one another and superposition on the face of the goods is avoided, and means for pressing said bent-over prongs flatly and forcibly against said material.

3. In a pronged fastener setting machine, having two setting dies, a die comprising two relatively movable parts, one of which has die faces with a space between them for first bending the prongs inwardly across a face of the material to which the fasteners are being attached, and the other of said parts having a projection adapted to enter the space between the die-faces of said first part for pressing said bent-over prongs flatly and forcibly against said material; said projection having means for guiding said prongs out of opposition during the bending thereof.

4. In a pronged fastener setting machine, having two setting dies, a die comprising two relatively movable parts, one of which has die faces with a space between them for first bending the prongs inwardly across a face of the material to which the fasteners are being attached, and the other of said parts having a projection adapted to enter the space between the die-faces of said first part for pressing said bent-over prongs flatly and forcibly against said material, said die faces and said projection having means for guiding said prongs out of opposition during the bending thereof.

55 5. In a pronged fastener setting mechanism, the combination of setting dies, and means for feeding fasteners between said dies, comprising a feed arm adapted to engage a fastener and feed it to a position between said dies, means for pressing said feed arm upwardly against the face of one of said dies, means for retaining said feed arm in forward position, said feed arm being released from said retaining means by

the approaching movement of said dies, and means for withdrawing said feed arm, and means for retaining said feed arm depressed during such withdrawing movement.

6. In a pronged fastener setting mechanism, the combination of setting dies, and means for feeding fasteners between said dies, comprising a feed arm adapted to engage a fastener, and feed it to a position between said dies, means for pressing said feed arm upwardly against the face of one of said dies, a cam stop adapted to engage said feed arm for retaining it in forward position, said feed arm being released from said cam-stop by the approaching movement of said dies, and means for withdrawing said feed arm from between the dies, said cam-stop having a portion for holding said feed arm depressed during its withdrawing movement.

7. In a pronged fastener setting mechanism, the combination of setting dies, and means for feeding fasteners between said dies, comprising a feed arm adapted to engage a fastener and feed it to a position between said dies, means for pressing said feed arm upwardly against the face of one of said dies, a pivoted cam stop adapted to engage said feed arm for retaining it in forward position, said feed arm being released from said cam-stop by the approaching movement of said dies, and means for withdrawing said feed arm from between the dies, said cam stop having a portion for holding said feed arm depressed during its withdrawing movement, and moving on its pivot to permit said feed arm to move forward to perform a feed operation.

8. In a pronged fastener setting mechanism, the combination of setting dies, a magazine, and means for feeding fasteners between said dies, comprising a feed arm adapted to engage a fastener in said magazine and feed it to a position between said dies, means for pressing said feed arm upwardly against the face of one of said dies, means for retaining said feed arm in forward position, said feed arm being released from said retaining means by the approaching movement of said dies, means for withdrawing said feed arm, and means for retaining said feed arm depressed during such withdrawing movement.

9. In a pronged fastener setting mechanism, the combination of setting dies, and means for feeding fasteners between said dies, comprising a feed arm adapted to engage a fastener and feed it to a position between said dies, means for pressing said feed arm upwardly against the face of one of said dies, a cam stop adapted to engage said feed arm for retaining it in forward position, said feed arm being released from said cam-stop by the approaching movement of

said dies, and means for withdrawing said feed arm from between the dies, said cam-stop having a portion for holding said feed arm depressed during its withdrawing movement, said arm bearing on said portion of said cam-stop during its withdrawing movement and having motion imparted thereto as a resultant of the pressure of said arm thereon.

In witness whereof, we have hereunto 10 signed our names in the presence of two subscribing witnesses.

ELIZABETH JANE SMITH.
DOUGLAS SMITH.

Witnesses:

GUSTAVE R. THOMPSON,
FRED WHITE.