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MACHINE FOR INSERTING FASTENINGS.  
APPLICATION FILED AUG. 8, 1906.

978,297.

Patented Dec. 13, 1910.

3 SHEETS-SHEET 1.

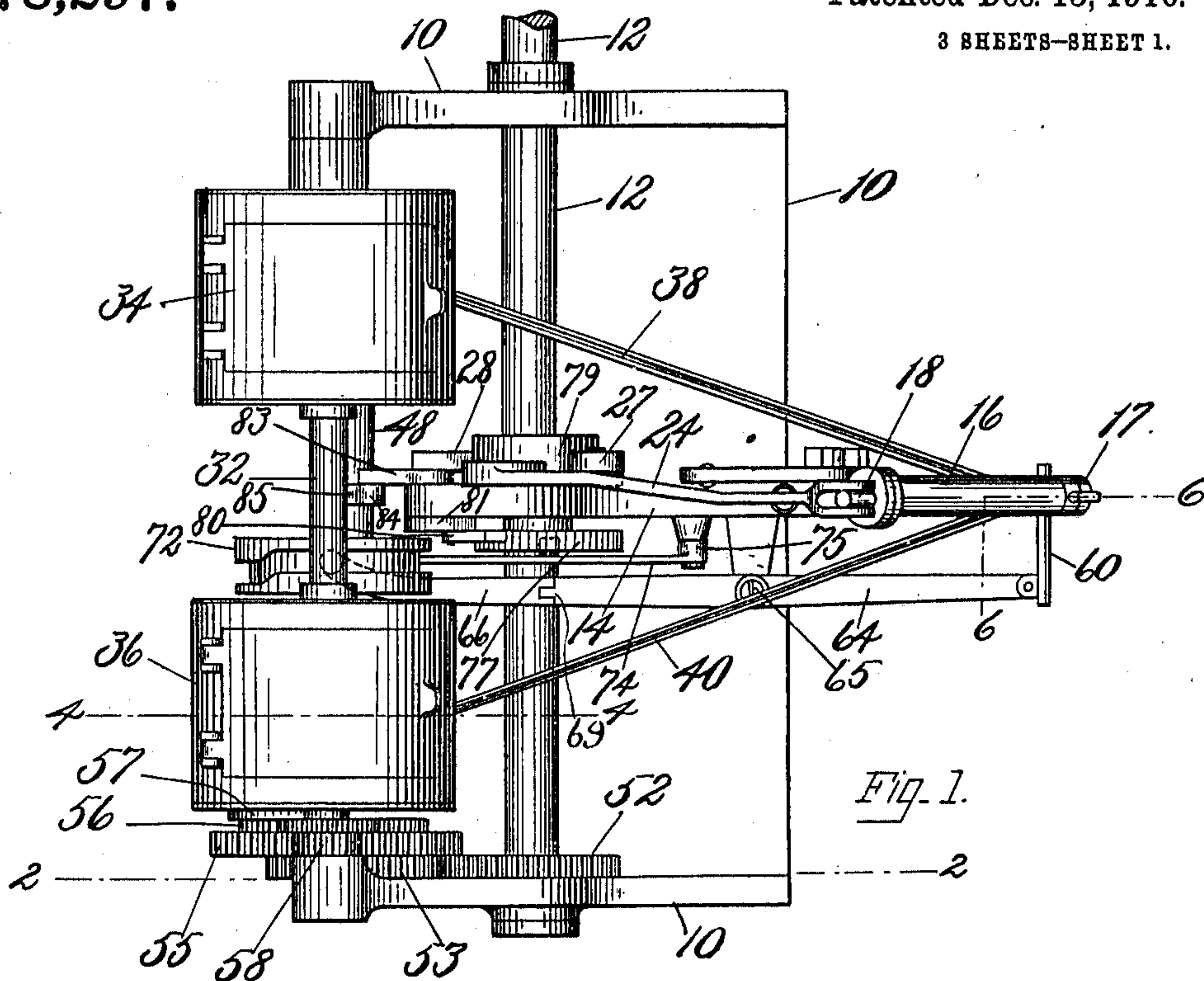


Fig. 1.

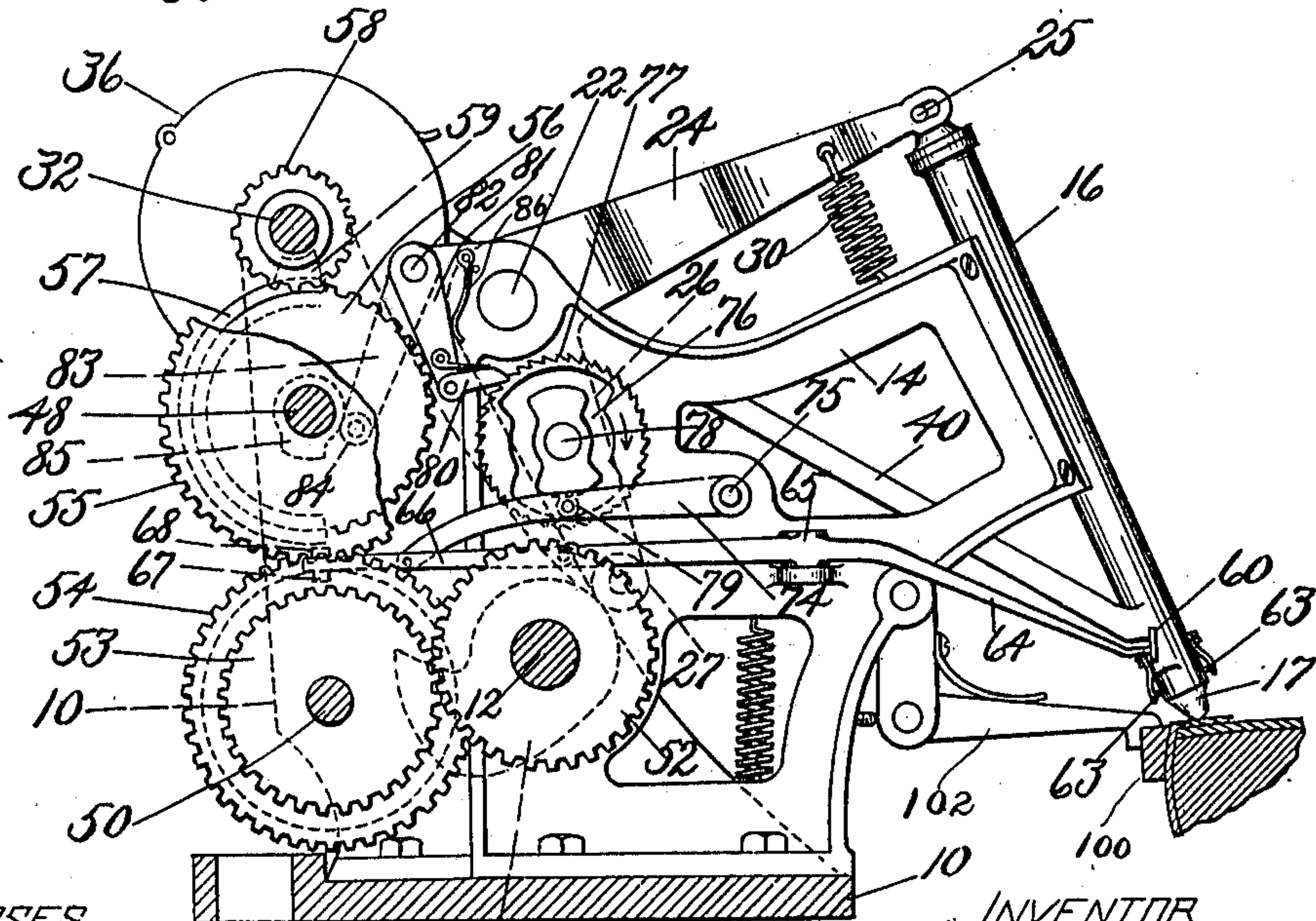


Fig. 2.

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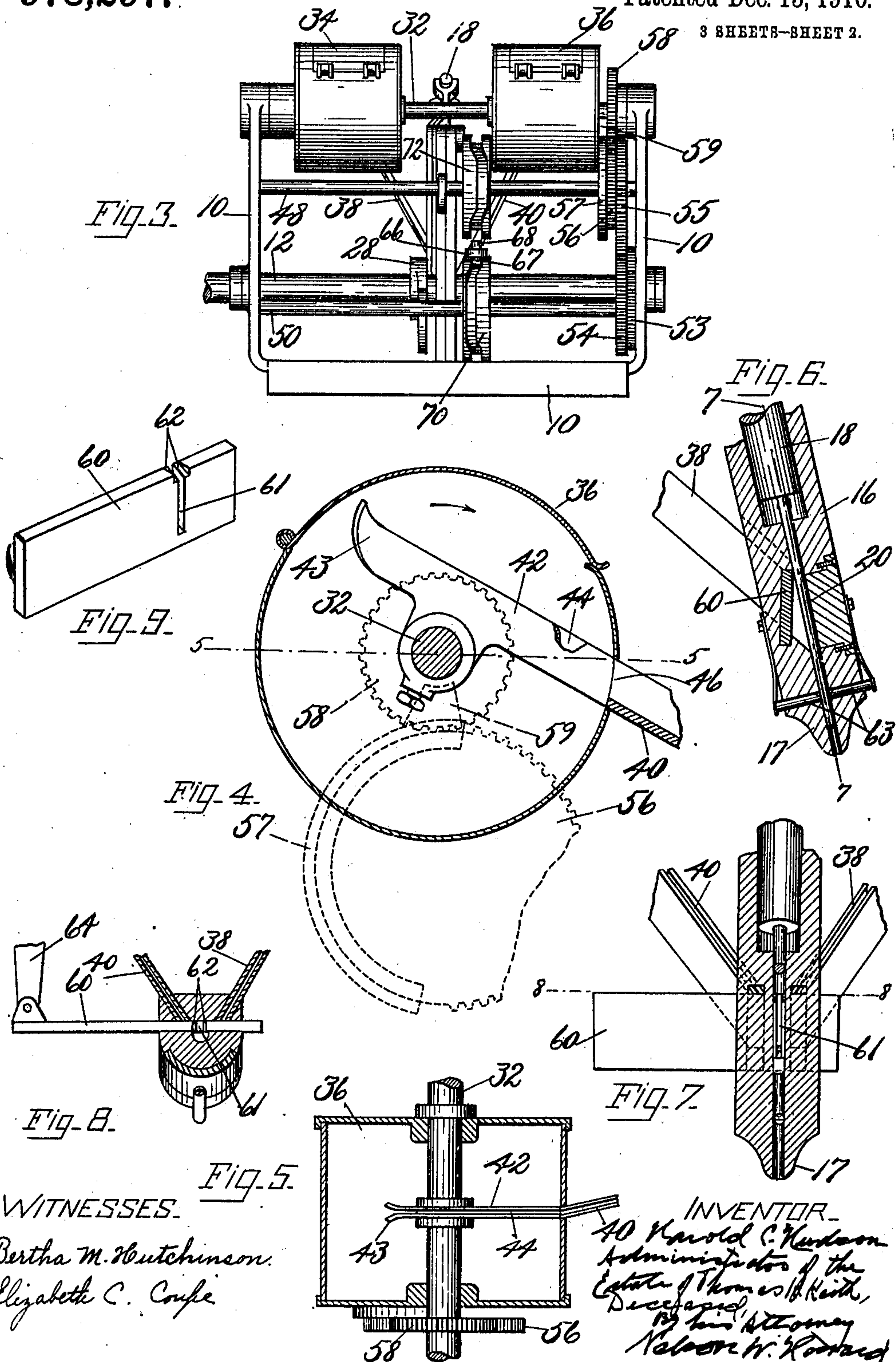
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Estate of Thomas K. Keith  
Deceased, By his Attorney  
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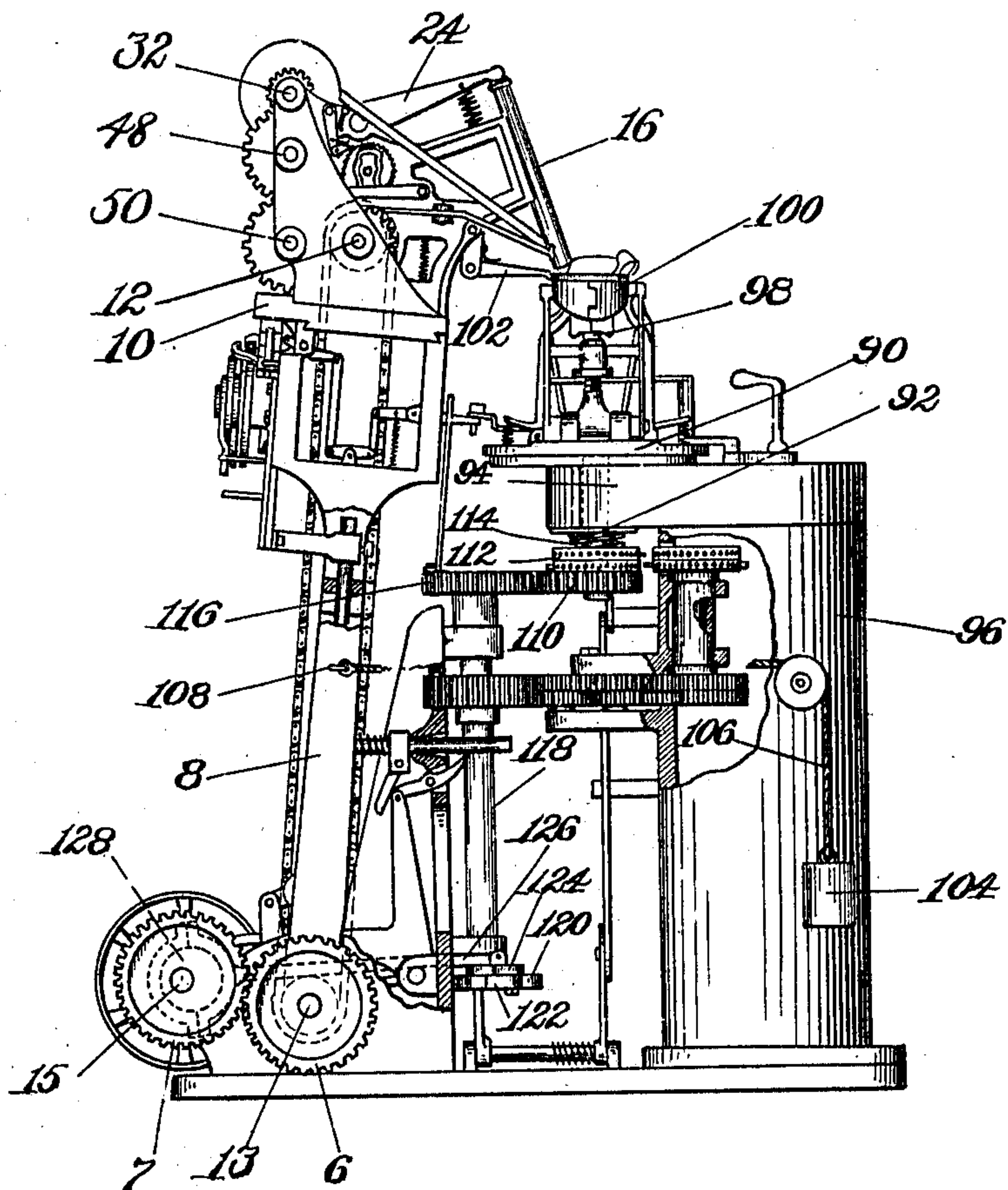


Fig. 10.

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# UNITED STATES PATENT OFFICE.

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MACHINE FOR INSERTING FASTENINGS.

978,297.

Specification of Letters Patent.

Patented Dec. 13, 1910.

Original application filed March 29, 1902, Serial No. 100,556. Divided and this application filed August 8, 1906. Serial No. 329,704.

*To all whom it may concern:*

Be it known that THOMAS K. KEITH, late of Boston, in the county of Suffolk and Commonwealth of Massachusetts, invented certain Improvements in Machines for Inserting Fastenings, of which the following description, in connection with the accompanying drawings, is a specification, like reference characters on the drawings indicating like parts in the several figures.

This invention relates to machines for inserting fastenings, and its object is to provide a mechanism capable of performing automatically certain operations, peculiar to the particular work to be done, which heretofore have been achieved only by mechanism under control of the operator.

Broadly stated the invention comprehends a type of machine which includes fastening-inserting mechanism, a plurality of sources of fastening supply therefor, and means for presenting fastenings from the sources of supply to a fastening receiver operatively associated with the inserting mechanism, the presenting means and receiver being relatively movable, all of which is old, in combination with automatic means controlling the movement of one of the relatively movable parts, preferably said presenting means, so as to cause the presentation of a selection of one or more fastenings from one of the sources of supply for insertion in any desired prearranged order with a similar or different selection from another of the sources of supply. It is obvious that with such a construction the means for controlling the presentation of any desired selection of fastenings to the inserting mechanism is entirely independent of the particular construction or nature of the source of fastening supply used and therefore may readily be combined with the source of supply of any machine of the general type described.

One embodiment of the invention, in combination with a machine of this general type used for driving lasting tacks, is illustrated in an application for Letters Patent of the United States, Serial Number 100,556, filed March 29, 1902, from which this application is a division.

It is frequently found desirable in various classes of work for which this general type

of machine is used to utilize fastenings of different kinds in the same row. For example, in boot and shoe lasting machines a series of longer tacks may be used around the ends of the last where the upper has been folded and a series of shorter tacks along the sides of the last where there is but a single layer of the upper to secure to the innersole. Thus, for this and other similar classes of work, if each of the sources of fastening supply used is furnished with a different kind of fastening, a predetermined number of fastenings of one kind may be inserted automatically in a prearranged order with a similar or different number of fastenings of a different kind, the mechanism controlling the movement of the means used for presenting the fastenings to the inserting mechanism being constructed to repeat the order chosen, if desired, until the insertion of the entire row of fastenings in the article being operated upon is completed.

The machine is particularly desirable for use in inserting fastenings during the various operations, when such a step is needed, in the manufacture of boots and shoes, and in the illustrated embodiment the invention is used in combination with a plurality of hoppers provided with suitable fastening guides, for example slotted raceways when headed fastenings are used, leading therefrom which are adapted to supply fastenings of different kinds to an inserting mechanism.

The inserting mechanism may be of any convenient construction. As herein shown it comprises a casing forming a throat, which serves as a fastening receiver within which a driver bar reciprocates. The fastening presenting means is connected to operate between the lower ends of the fastening guides and the casing. The working portion of the presenting means is here shown in the form of a movable gate, although any other movable part may be readily used to this end, and is preferably secured to one end of a pivoted lever which end may be given a reciprocatory movement between any one of the fastening guides and the throat or receiver. This movement may be attained by engaging the free end of the lever with a suitably designed cam. In this embodiment of the invention there



is shown a separate cam for each of the guides and as long as the free end of the presenter lever engages a particular cam, fastenings will be fed to the inserting mechanism from the guide for which that cam is designed. Means are provided for governing the movement of the free end of the presenter lever with relation to the feed cams without disturbing its reciprocatory movement. This may be done by providing the free end of the presenter lever with a jointed finger, said finger being operatively connected to a pattern-controlling device for automatically moving said finger into engagement with the various feed cams. The pattern-controlling device is here shown as a cam, a certain part of its path governing the output from each of the fastening guides according to the particular feed cam with which the finger is then in engagement. Obviously the pattern-controlling device may be so designed that fastenings may be selected from the various raceways in any prearranged order and any number desired, within reasonable limits, may be selected successively from one raceway before proceeding to the next in order according to the requirements of the work to be done.

In the accompanying drawings, which illustrate the preferred form of the invention,—Figure 1 is a plan view of the improvements combined with suitable hoppers and raceways for inserting different kinds of fastenings during the process of lasting a boot or shoe; Fig. 2 is a vertical sectional view on line 2—2 of Fig. 1 showing, in addition, a portion of a shoe in position under the inserting mechanism; Fig. 3 is a rear elevational view of Fig. 1; Fig. 4 is an elevational view in section on line 4—4 of Fig. 1 showing one of the hoppers and associated mechanism; Fig. 5 is a horizontal sectional view on line 5—5 of Fig. 4; Fig. 6 is a vertical sectional view on line 6—6 of Fig. 1 showing the lower end of the inserting mechanism in detail; Fig. 7 is a vertical sectional view on line 7—7 of Fig. 6 with the driver bar partially broken off; Fig. 8 is a horizontal sectional view on line 8—8 of Fig. 7; and Fig. 9 is a detail view in perspective of the fastening presenter. Fig. 10 is a side elevation of a machine embodying the inserting mechanism of this application and showing especially a work feeding mechanism which may be used therewith.

Referring to the drawings, 8 is a pivoted standard upon which is supported the main frame 10 in which is suitably journaled a driving shaft 12 connected by a sprocket and chain connection with a shaft 13 mounted in the base and driven from the main driving shaft 15 through gears 6 and 7.

Mounted in a bracket 14, preferably sit-

uated centrally on frame 10, is a casing 16 within which operates a reciprocatory plunger 18 carrying a driver 20 which, on the downward stroke of the plunger, extends to the lower end or nose 17 of the casing. A bell-crank lever is pivoted to bracket 14 at 22, one arm 24 having a loose pivotal connection 25 with the upper end of plunger 18 and the other arm 26 carrying a roller 27 adapted to bear on a cam 28 carried by shaft 12. A spring 30 connects the arm 24 to bracket 14. As cam 28 rotates, arm 24, and with it driver 20, is raised against the force of spring 30. Owing to the shape of the cam the force of the spring is allowed to force the driver downward again at each revolution to insert a fastening.

In the embodiment of the invention illustrated in the drawings, which show one form of a tacking machine, a rotatable shaft 32 is journaled in frame 10 preferably above shaft 12. On this shaft are mounted suitable stationary hoppers 34 and 36 for the reception of fastenings, which are preferably of different kinds; for instance, the hopper 34 may contain fastenings which are shorter than those contained in hopper 36. These hoppers are similar in construction and preferably consist, respectively, of a cylindrical drum provided with the usual door through which the drum is loaded. From hoppers 34 and 36 extend stationary raceways 38 and 40, respectively, both leading to a transverse passage provided in the casing 16 for the reception of a fastening presenter, shown separately in Fig. 9, to be hereafter described. Within each hopper is a short section of raceway 42 fast on shaft 32 so as to rotate therewith and within the hopper. One end of this movable raceway 42 is preferably made hook-shaped, as at 43, so as to better pick up in quantity the fastenings which lie in bulk on the bottom of the hopper. Some of the fastenings thus gathered up by the hooked end of the raceway 42 fall with their shanks in its slot 44, while others which are not correctly positioned are dropped again into the mass in the bottom of the hopper to be again picked up on a subsequent rotation of the raceway. As the raceway rotates in the direction of the arrow, Fig. 4, the fastenings which fall with their shanks in the slot 44 and with their heads resting on the top of the raceway slide by gravity down the raceway, and on its reaching the position shown in Fig 4 pass therefrom out through an opening 46 in the side of the hopper and into the correspondingly constructed stationary raceways 38 and 40. Preferably below shaft 32 and substantially in the same vertical plane are shafts 48 and 50 also journaled in the frame 10. The three shafts 32, 48 and 50 are rotated from the driving shaft



12 in any convenient manner as by means of the following train of gears. Gear 52 on driving shaft 12 meshes with gear 53 on shaft 50. A second gear 54 on shaft 50 meshes with gear 55 on shaft 48. A second gear 56 on shaft 48 meshes with gear 58 on shaft 32. Shafts 48 and 50 are given a continuous rotation from the driving shaft but gears 56 and 58 are constructed in such manner as to provide a short dwell or period of rest for the rotating raceway sections just at the moment they become alined with the stationary raceways to which they are to deliver the fastenings, thus insuring a proper flow from one portion of the raceway to the other. To accomplish this, the present embodiment of the invention is constructed substantially like the well known Geneva stop motion, the gear 56 being provided with teeth for a portion only of its circumference, said gear having a long untoothed portion or segment 57 located at one side the path of motion of, and extending beyond the teeth of gear 58, said segment at times coacting with a depression 59, (see dotted lines Fig. 4), in a flange or portion of the gear 58 at one side of its full set of teeth. When the teeth of gears 56 and 58 intermesh, the shaft 32 within the hoppers will be rotated, but whenever the long untoothed portion 57 is in contact with the flange portion of the gear 58 said shaft will not be rotated. The gears 56 and 58 are so proportioned and the flange 57 and depression 59 are so positioned relatively, that as the toothed portion of gear 56 runs out of mesh with gear 58, flange 57 will ride into depression 59, stopping the rotation of shaft 32, at which period of time the moving raceway 42 has just reached its alinement with the stationary raceway leading to the inserting mechanism. Fastenings may then be delivered by gravity from one portion of the raceway to the other until the teeth of the two gears again intermesh.

The fastening presenter or gate 60 which is adapted to reciprocate across the ends of the raceways 38 and 40 is provided, intermediate its ends, with a vertical slot 61 of a size proper to receive the shank of the longest fastening used, and the said slot at the upper edge of the gate has its edges chamfered off to present downwardly inclined rests or shelves 62, the inclination of which conforms substantially to the downward inclination of the raceways 38 and 40. Obviously, if this presenter or gate 60 be moved in one direction until its slot 61 registers with the slot in one of the raceways, the lowermost fastening in the latter will gravitate into the slot of the gate, with its head resting upon the inclined shelves 62, while the solid portion of the gate will close the outlet to the other raceway, and vice versa. Having received a fastening in this

manner, the gate is returned to its central position with the slot 61 in line with the driver passage in the casing 16, when the fastening held in the slot of the gate will gravitate into said driver passage down which it will fall until stopped by the usual yielding stop blocks 63. The subsequent descent of the driver 20 forces the fastening downwardly between the stop blocks, which latter separate automatically as the fastening passes, further descent of the driver acting to drive the fastening into the material upon which the nose 17 may for the time being rest. Obviously, when the gate is moved from its middle position where its slot registers with the driver passage toward one or the other of the raceways, fastenings will be taken from that raceway alone and delivered to the inserting mechanism. To provide these necessary movements for the fastening presenter, in the present embodiment of the invention the free end of the gate is connected with one end of a lever 64, fulcrumed to bracket 14 at 65 so as to have movement in a horizontal plane and provided at its opposite end with a finger 66 which is jointed at 69 to the end of the lever 64, so that while it moves with the lever 64 as the latter moves about its fulcrum 65, said finger may nevertheless have a rising and falling movement independently of the lever 64 and without reference to the horizontal vibrations of said lever. The free end of the finger 66 is provided at its lower and upper sides with rollers 67 and 68, the roller 67 being arranged to travel in the groove of a path cam 70 fast on the shaft 50, while the roller 68 is arranged so that it may travel in the groove of a path cam 72 fast on the shaft 48.

When the finger 66 is dropped into its lowermost position, as shown in Figs. 2 and 3, the roller 67 will travel in the cam 70, enabling the said cam to govern the movements of the gate 60, causing it to reciprocate from the driver passage always in one direction, viz., to raceway 38 which conveys fastenings from the hopper 34 to the inserting mechanism. When, however, the finger 66 is lifted to withdraw the roller 67 from engagement with its cam 70, the roller 68 at its upper side is placed in engagement with the cam 72 which will then govern the reciprocations of the gate 60, causing the latter to move from the driver passage always in an opposite direction from before, viz., to raceway 40 conveying fastenings from the hopper 36 to the inserting mechanism. Thus the fastening presenter is made to deliver different kinds of fastenings to the inserting mechanism, according as its reciprocations are governed by the cam 70 or the cam 72.

To determine the length of time during which the rollers 67 and 68 are in engagement with their respective cams, and there-



fore the length of time during which the different kinds of fastenings are respectively delivered to casing 16 and inserted, there is provided a lever 74 fulcrumed at 75 on the bracket 14 and having its free end connected with the finger 66, which shifts the rollers into and out of engagement with their respective cams. The movement of lever 74 and consequently of finger 66 is governed by a pattern-controlling device, preferably in the form of a cam groove 76 which for convenience is cut in the face of a ratchet wheel 77 rotatably mounted on a stud 78 on the bracket 14. Lever 74, intermediate its ends, is provided with a roller 79 which travels in cam groove 76. The pattern-controlling device is shaped so as to raise and lower the lever 74 and with it the finger 66 to throw the rollers 67 and 68 into and out of engagement with their respective path cams at such times as will deliver the necessary and proper kinds of fastenings to the inserting mechanism, the period of time during which each kind of fastening is delivered being determined by the particular shape of the cam 76.

The ratchet wheel 77 has imparted to it a step-by-step rotation in the direction of the arrow thereon (Fig. 2) by means of a spring-controlled pawl 80 on one end of a crank 81 fast on a rock-shaft 82 mounted in the bracket 14, said rock-shaft carrying a second crank 83 provided with a roller 84 running in contact with an actuating cam 85 fast on shaft 48. Rotation of the shaft 48 thus communicates a reciprocatory motion to the pawl 80 for a step-by-step rotation of the ratchet wheel referred to, a spring 86 acting on the arm 81 to hold the roller 84 always in operative contact with its cam.

Any suitable work feeding mechanism may be used with the inserting mechanism of this application. The work feeding mechanism illustrated is substantially that shown in the co-pending application, No. 100,556, filed March 29, 1902, of which this application is a division. This feeding mechanism comprises a rotatable table 90, having a depending pivot or journal stud 92, mounted in a head 94 upon a standard 96 at the side of the machine. Upon the table is carried a pin 98 designed to enter the socket in the heel part of the last, and a last clamp 100. For a more detailed description of these parts, reference may be had to the co-pending application cited. An edge gage 102 engages the last clamp 100 and determines the distance from the edge of the last at which the nails shall be inserted. A weight 104 upon a cord 106 attached to the pivoted standard 8 at 108 brings the edge gage into contact with the clamp 100, and at the same time moves the inserting mechanism into proper relation with the edge of the last, which relation is

determined by the edge gage. A gear 110 is mounted upon the lower end of the pivot 92 and upon the same pivot is carried a pin disk 112, between which and the head 94 is a spring 114 designed to hold frictionally the table 90 in whatever position it may stop in its rotative movement. The gear 110 and with it the table 90 is rotated to feed the work under the inserting mechanism through a gear 116 mounted upon a vertical shaft 118 carrying at its lower end a ratchet wheel 120. The ratchet wheel 120 has imparted to it a step-by-step rotation by means of a pawl 122 mounted upon a pawl carrier 124 surrounding loosely the shaft 118. The pawl carrier 124 is actuated through an eccentric rod 126 extending to an eccentric 128 upon the main driving shaft 15. It will thus be seen that the table 90 is rotated one step with each rotation of the main shaft 15, and as the main shaft 15 rotates once for each operation of the inserting mechanism, the table 90 is rotated one step after each fastening is inserted.

Obviously the number of kinds of fastenings which may be used in the machine may be varied by mere multiplication or modification of the parts herein shown and described. In lasting boots and shoes it is convenient to use but two kinds of fastenings although others are found convenient in certain other classes of work.

By the term "kinds" of fastenings is meant fastenings varying in length, size, quality, type, material configuration, etc., and thereby adapted to the varying requirement of the particular class of work for which the machine is to be used.

As the particular kind of device inserted is immaterial to a proper operation of machines embodying this invention, the term "fastening" in the specification and claims should be understood as including any kind of device which may be successfully utilized in performing the classes of work hereinbefore designated.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:—

1. The combination with fastening inserting mechanism means for feeding the work between successive inserting operations to cause a row of inserted fastenings to be formed and a plurality of sources of fastening supply, of automatic means for causing fastenings to be presented in such order to the inserting mechanism from said sources for insertion in a single row that the resultant design contains a series of fastenings from at least one of the sources of supply.

2. The combination with fastening inserting mechanism means for feeding the work between successive inserting operations to cause a row of inserted fastenings to be



formed and a plurality of sources of fastening supply, of automatic means for causing fastenings to be presented in such order to the inserting mechanism from said sources  
5 for successive insertion in a single row that the resultant design contains a series of fastenings from at least one of the sources of supply.

3. The combination with fastening inserting mechanism means for feeding the work between successive inserting operations to cause a row of inserted fastenings to be formed and a plurality of sources of fastening supply, of automatic means for causing  
10 series of fastenings to be presented to the inserting mechanism for successive insertion in the same row first from one source of supply and then from another.

4. The combination with a single fastening-inserting mechanism and a plurality of sources of fastening supply, of automatic means for causing series of fastenings to be presented to the inserting mechanism for insertion in succession first from one source  
20 of supply and then from another.

5. The combination with fastening-inserting mechanism, a plurality of sources of fastening supply and a fastening presenter, of automatic means for moving said presenter to and fro in such prearranged order between said sources of supply and the inserting mechanism, that several fastenings are taken successively from one at least of said sources of supply.

6. The combination with a single fastening-inserting mechanism and a plurality of sources of fastening supply, of automatic means for causing said inserting mechanism to operate upon fastenings from one of said  
40 sources of supply during successive operations and then upon fastenings from another of said sources of supply for a time.

7. A machine of the class described, having in combination, sources of fastening supply for different kinds of fastenings and automatic means for inserting fastenings constructed and arranged to insert a predetermined number of one kind of fastening and then insert a predetermined number of  
50 another kind of fastening in the same row, one at least of said predetermined numbers being a series.

8. The combination with a single fastening-inserting mechanism, a plurality of sources of fastening supply therefor, and movable means for presenting fastenings to the inserting mechanism from the sources of supply, of automatic means for controlling the movement of the presenting means whereby a predetermined plurality of fastenings from one of the sources of supply may be presented for insertion in prearranged order with a predetermined number of fastenings from another of the sources of  
65 supply.

9. The combination with a single fastening-inserting mechanism, a plurality of sources of fastening supply therefor, and movable means for presenting fastenings to the inserting mechanism from the sources of  
70 supply, of automatic means for controlling the movement of the presenting means whereby predetermined selections of one or more fastenings, each selection from a different source of supply, may be presented  
75 for insertion in prearranged order.

10. The combination with a single fastening-inserting mechanism, a plurality of sources of fastening supply therefor, and movable means for presenting fastenings to  
80 the inserting mechanism from the sources of supply, of devices to actuate said means to select a plurality of fastenings in succession from a chosen source of supply and present them to the inserting mechanism, and means  
85 for controlling automatically the number of fastenings taken consecutively from the source of supply chosen.

11. The combination with fastening-inserting mechanism, a plurality of sources of fastening supply to furnish fastenings of different kinds thereto, and a device to control the delivery of fastenings from said sources of supply to the inserting mechanism, of a pattern-controlling device constructed to cause a series of fastenings to be delivered from one at least of said sources, actuating means therefor, and means operated by said pattern-controlling device to insure the delivery of the proper kind of  
90 fastening at the desired times.

12. The combination with fastening-inserting mechanism, a plurality of sources of fastening supply to furnish fastenings of different kinds thereto, and a device to control the delivery of fastenings from said sources of supply to the inserting mechanism, of a cam constructed to cause a series of fastenings to be delivered from one at least of said sources, actuating means therefor, and means operated by said cam to insure the delivery of the proper kind of fastening at the desired times.

13. The combination with fastening-inserting means, a plurality of sources of fastening supply to furnish fastenings of different kinds thereto, and a fastening presenter controlling the delivery of the several kinds of fastenings to the inserting mechanism, of a plurality of actuating devices each arranged to move said presenter to deliver one particular kind of fastening, and automatic means for operatively connecting said presenter with one or another of said actuating devices according to the requirements of the work.

14. The combination with fastening-inserting means, a plurality of sources of fastening supply to furnish fastenings of different kinds thereto, and a fastening pre-  
130



senter controlling the delivery of the several kinds of fastenings to the inserting mechanism, of a plurality of cams each arranged to move said presenter to deliver one particular kind of fastening, and automatic means for operatively connecting said presenter with one or another of said cams according to the requirements of the work.

15. The combination with fastening-inserting mechanism, a plurality of sources of fastening supply to furnish fastenings of different kinds thereto, and a fastening presenter provided with a throat interposed between said sources of supply and inserting mechanism, of a lever connected with said presenter, a plurality of cams each of which may operate said lever, and means for automatically causing one or another of said cams to control the movement of said lever, whereby said throat may receive a fastening from the proper source of supply according to the changes of kind of fastening required for the work to be done.

16. The combination with fastening-inserting mechanism, a plurality of sources of fastening supply to furnish fastenings of different kinds thereto, and a device to receive fastenings from any one of said sources of supply, of means to actuate said device to take a plurality of fastenings in succession of any kind, and means to control automatically the number of fastenings of any kind taken consecutively.

17. The combination with a tack driving device, means to supply a plurality of kinds of tacks thereto, and a selecting gate controlling the delivery of the several kinds of tacks to said driving device, of a plurality of cams, each arranged to move said gate for one particular kind of tack, and means to connect automatically said gate operatively with and to be actuated by one or another of said cams according to the requirements of the work.

18. The combination with fastening-inserting means comprising a single driver tube and driver, a plurality of fastening guides leading thereto, a plurality of hoppers containing each its own kind of fastenings, and a device to receive fastenings from any one of said guides, of means to actuate said device to take a plurality of fastenings from any one guide in succession, and means to control automatically the number of fastenings of one kind taken consecutively from any one of said guides.

19. The combination with tack-inserting means comprising a driver tube and a single

driver, a plurality of hoppers containing each its own kind of tacks, a raceway to lead tacks from each hopper to said driver tube, and a device to control the delivery of tacks from either of said raceways into said driver tube, of a pattern cam constructed to cause a series of fastenings to be delivered from one at least of said sources, means to actuate it, and means actuated by said pattern cam to insure the delivery of said tacks at desired times.

20. A driver tube having a combined driver and tack passage, a plurality of raceways leading to said driver tube to furnish tacks of differing kinds, a tack carrying gate interposed between the delivery ends of said raceways and the driver passage, said gate having a throat, a lever connected with said gate, a plurality of cams each of which may operate said lever, and means for automatically causing one or another of said cams to control the movement of said lever and gate that the throat may receive a tack from one of said raceways according to the changes of kind of tack required for the work to be done.

21. In a machine of the class described, a single fastening-inserting mechanism, a plurality of sources of fastening supply, and automatic means for causing series of fastenings to be presented to the inserting mechanism from said sources respectively in prearranged order.

22. In a machine of the class described, a single fastening-inserting mechanism, a plurality of sources of fastening supply, and means for causing predetermined series of fastenings to be presented to the inserting mechanism for insertion in succession first from one source of supply and then from another.

23. In a machine of the class described, a single fastening-inserting mechanism, a plurality of sources of fastening supply, and automatic means for causing said inserting mechanism to operate upon fastenings from one of said sources of supply for a time and then upon fastenings from another of said sources of supply for a time.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HAROLD C. HUDSON,  
*Administrator of the estate of Thomas K. Keith, deceased.*

Witnesses:

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BENJAMIN F. MAYO.