No. 693,686. Patented Feb. 18, 1902.

L. A. CASGRAIN.

MACHINE FOR INSERTING FASTENINGS.

(Application filed Sept. 3, 1901.)

(No Model.) 4 Sheets—Sheet 1.

Fig. 1.

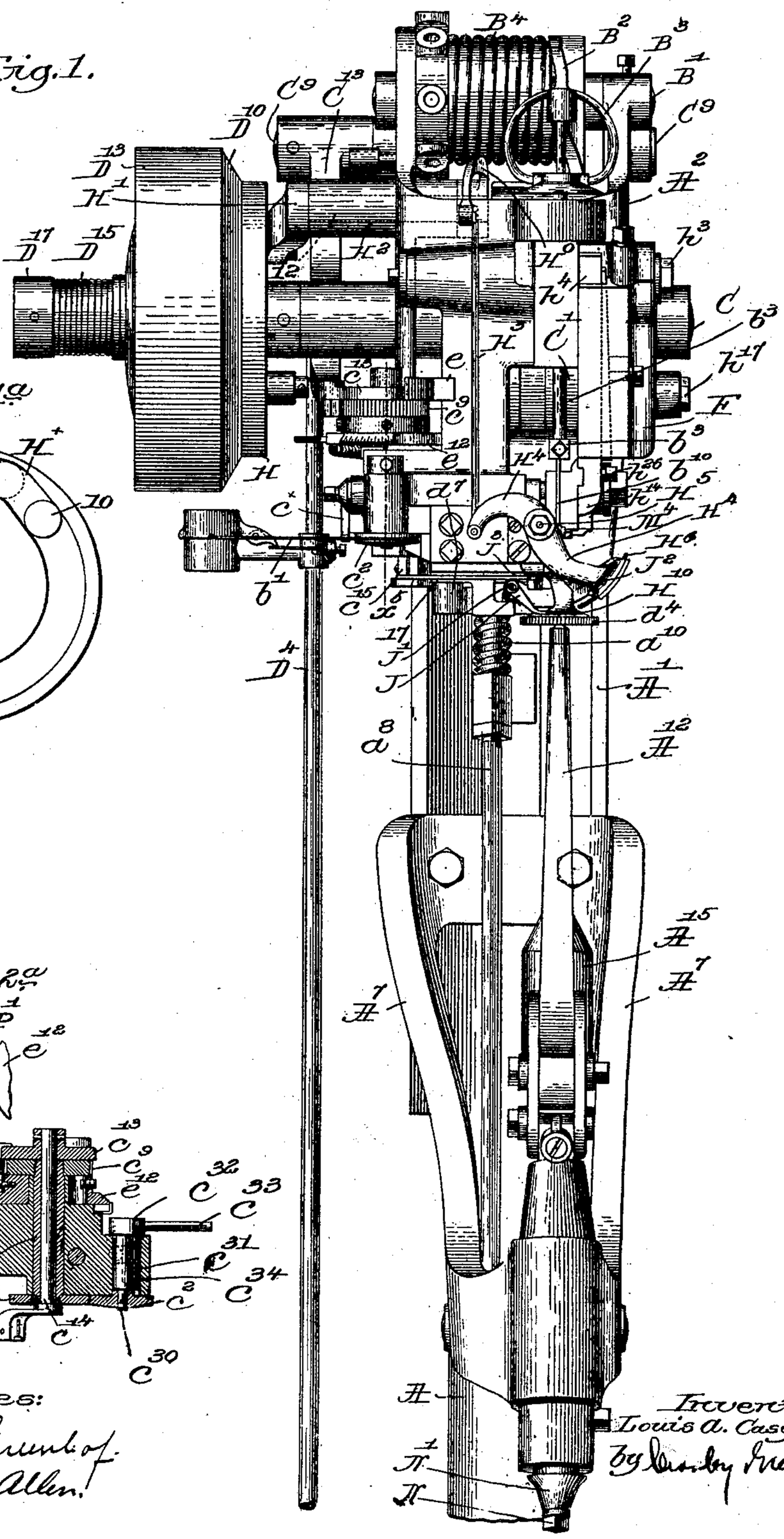

Fig. 1a.

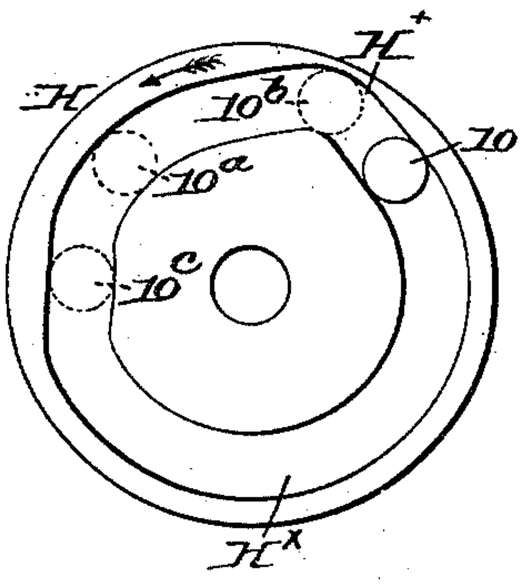

Fig. 2a.

Fig. 2.

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(No Model.) 4 Sheets—Sheet 2.

Fig. 3.

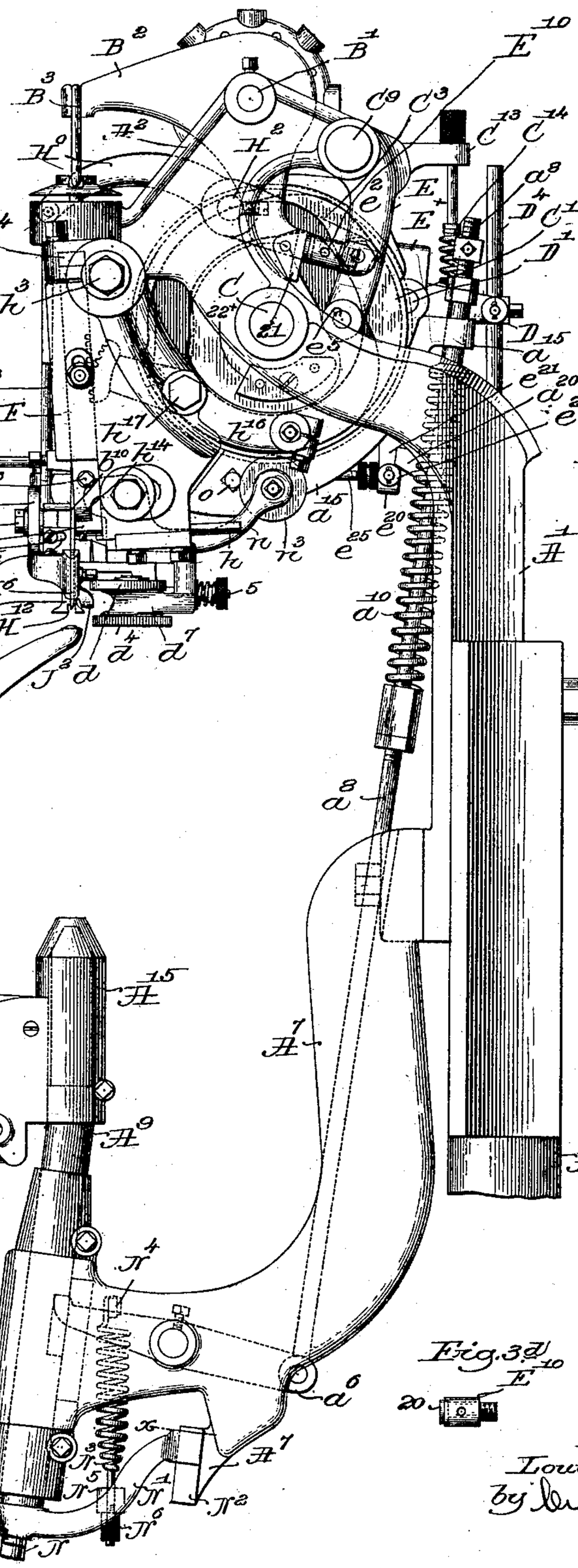

Fig. 3a.

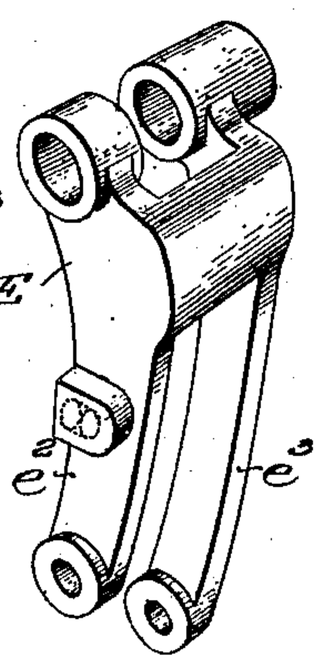

Fig. 3b.

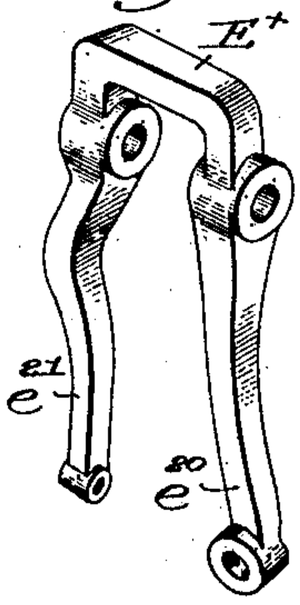

Fig. 3c.

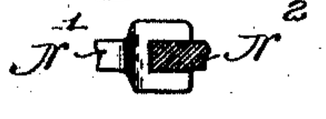

Fig. 3d.

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(No Model.) 4 Sheets—Sheet 3.

Fig. 4.

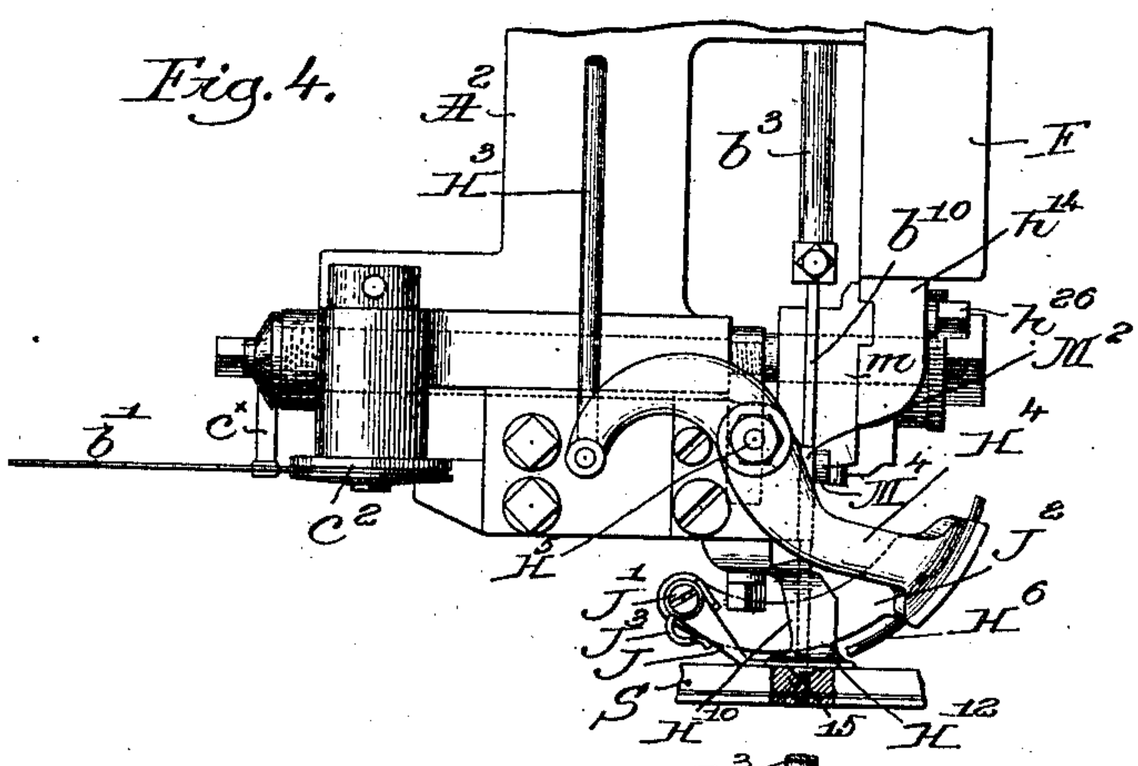

Fig. 6.

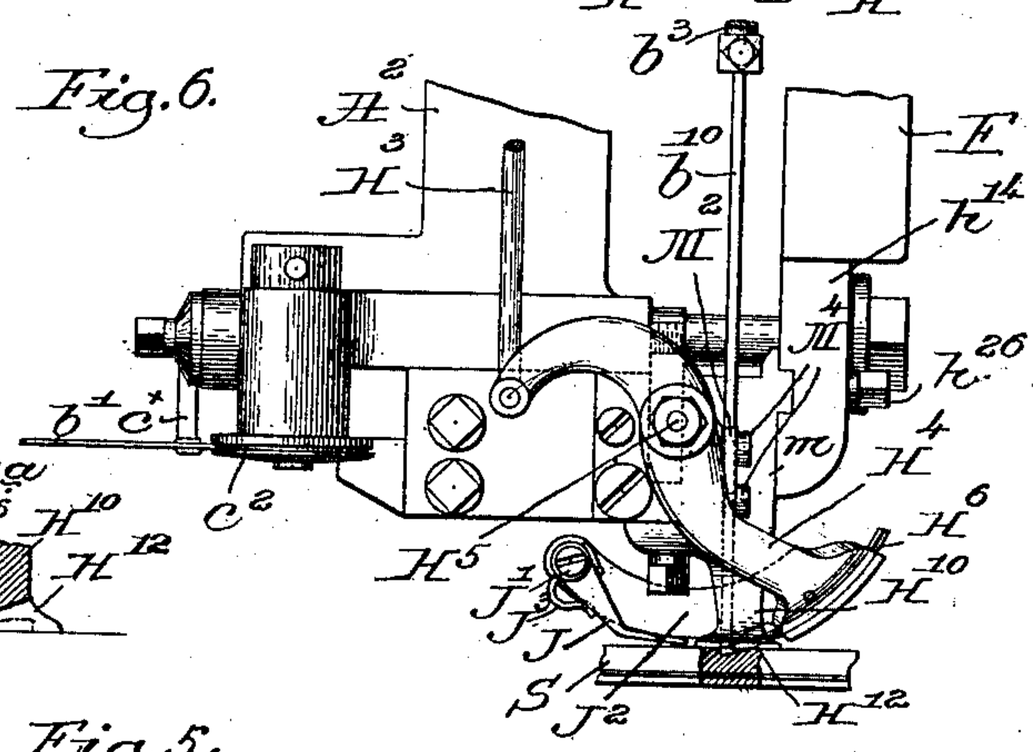

Fig. 6a

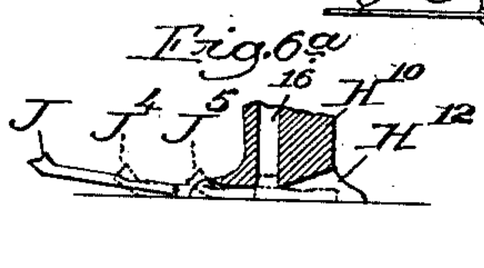

Fig. 5.

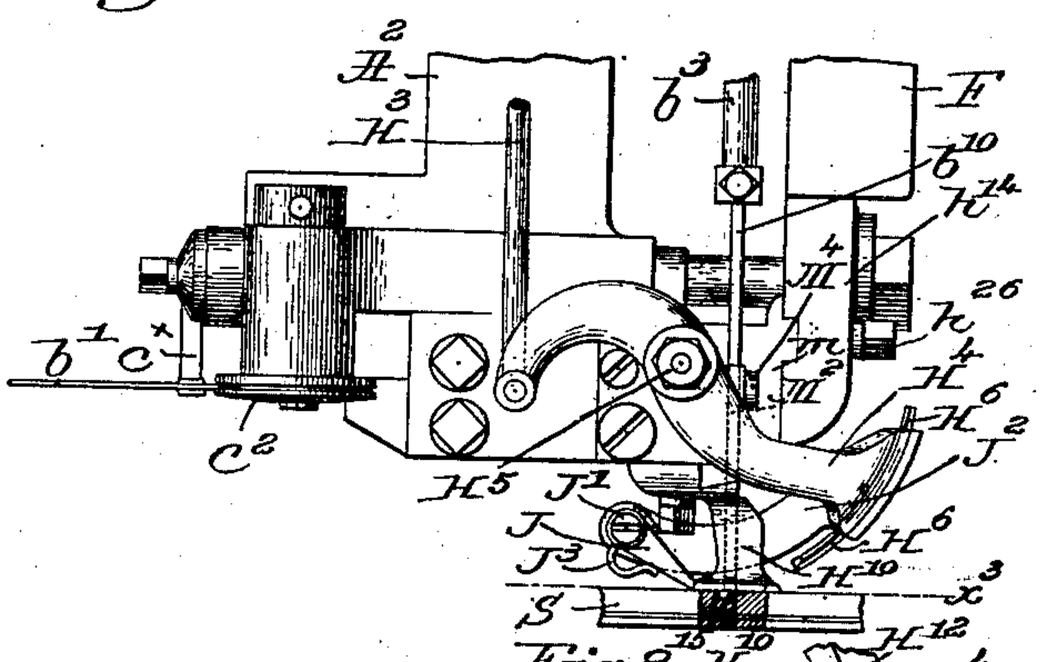

Fig. 6c

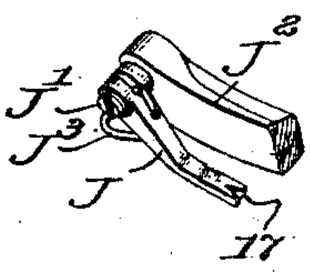

Fig. 6b

Fig. 6d

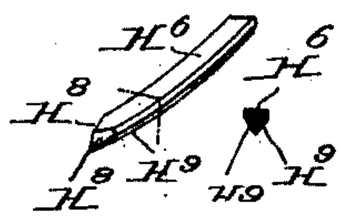

Fig. 8.

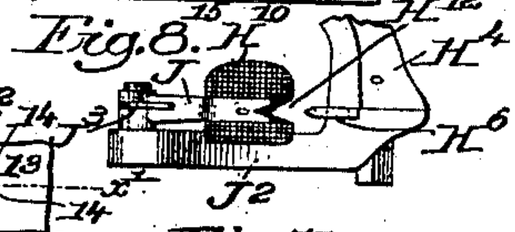

Fig. 7.

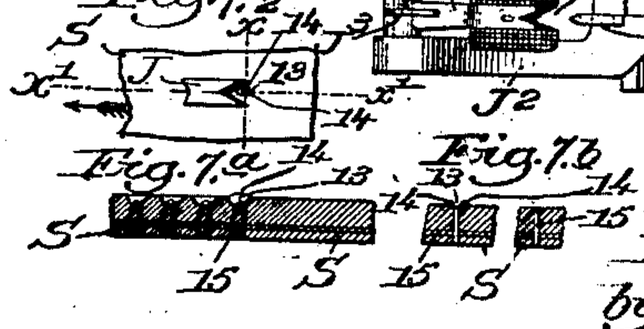

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Fig. 9.

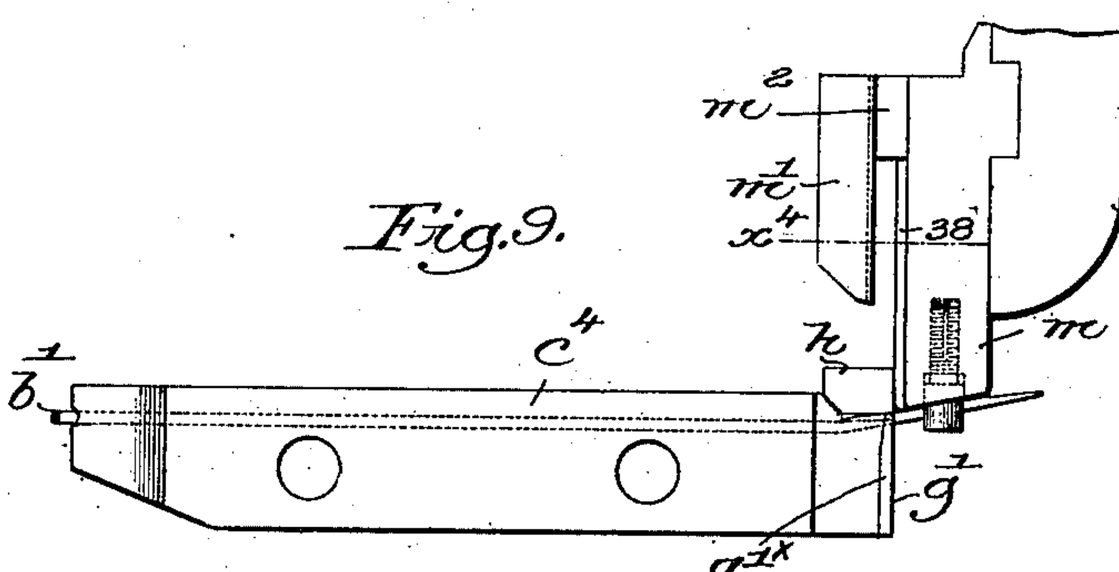


Fig. 10.

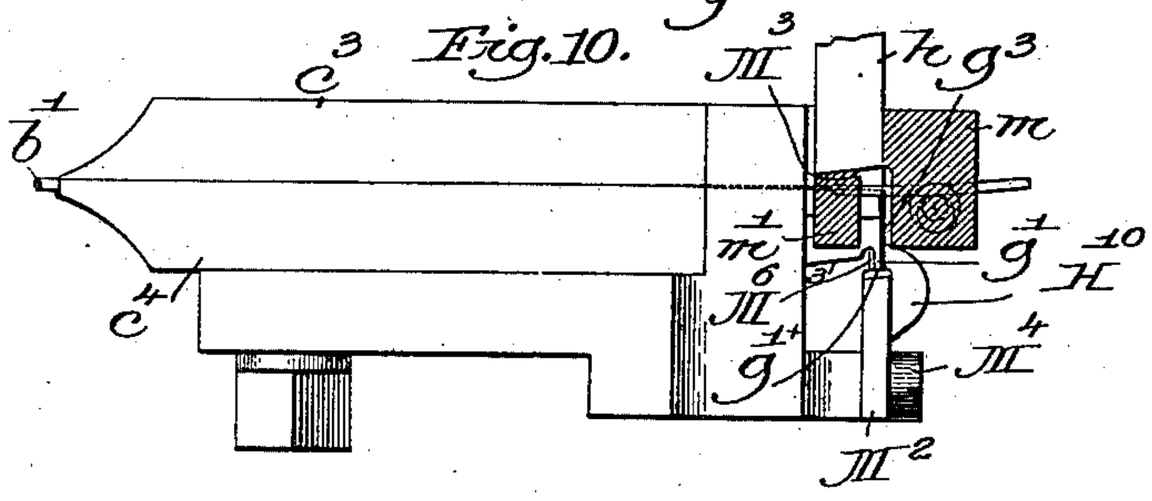


Fig. 11.

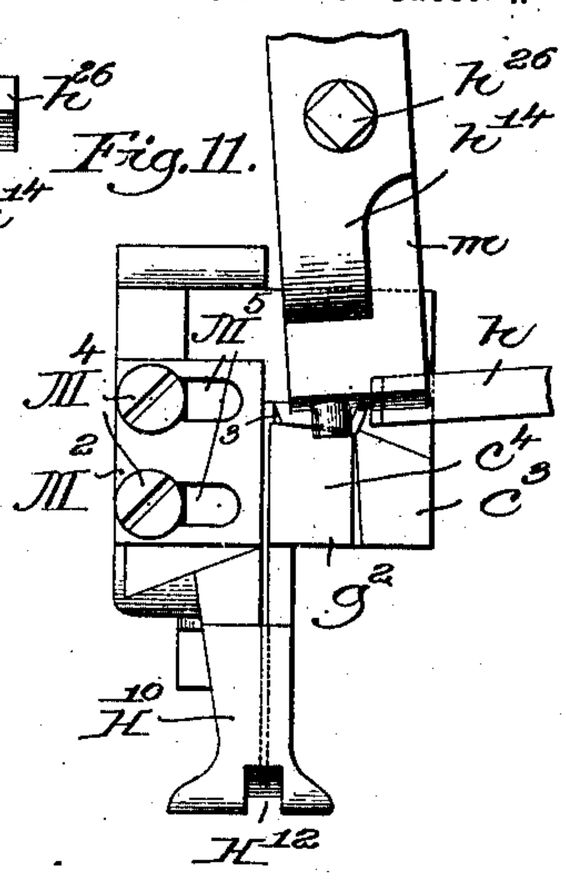


Fig. 11a.

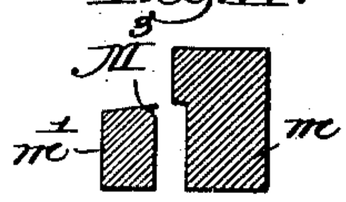


Fig. 12.

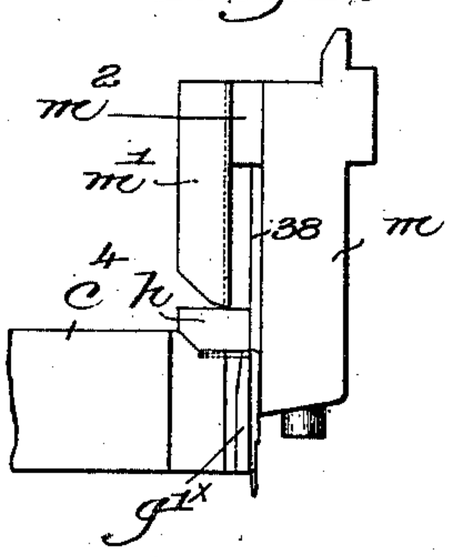


Fig. 13.

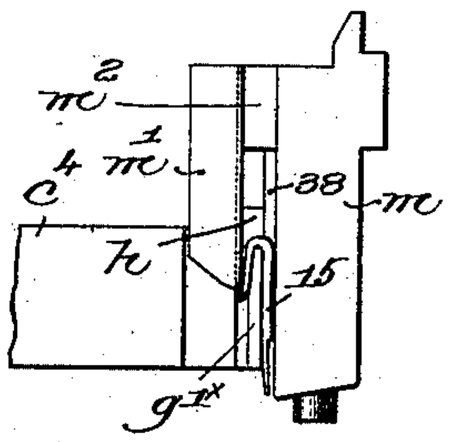


Fig. 14.

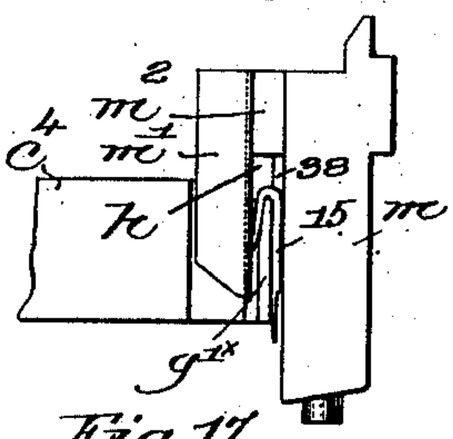


Fig. 15.

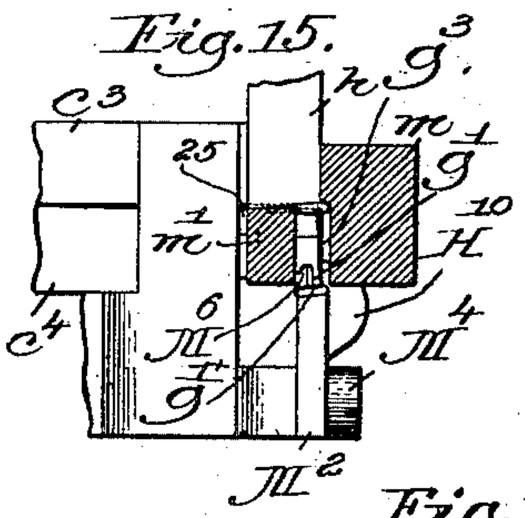


Fig. 16.

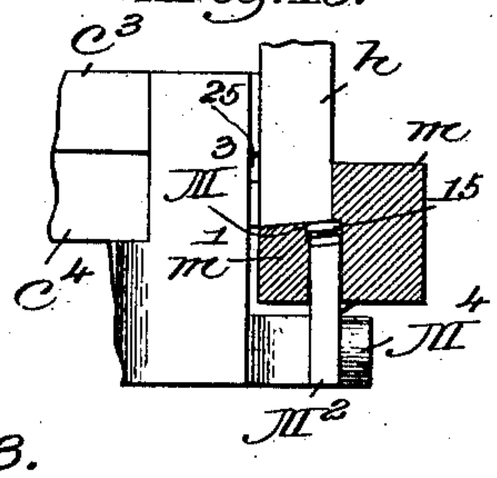


Fig. 17.

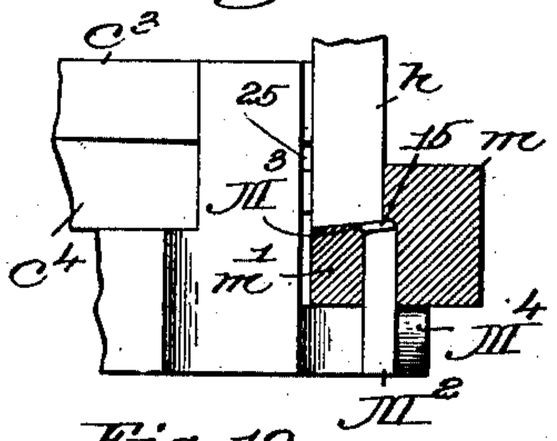


Fig. 18.

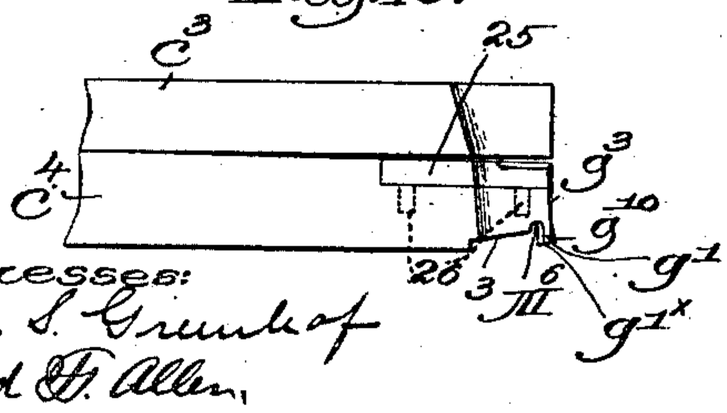
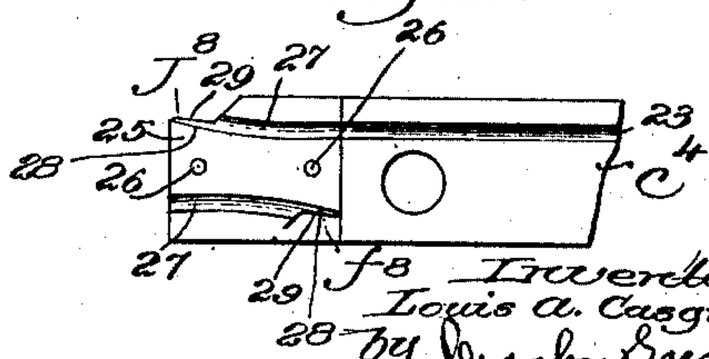


Fig. 19.



Witnesses:
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Edward G. Allen.

Inventor:
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by Dewey Gregory & Co. Atty's.

UNITED STATES PATENT OFFICE.

LOUIS A. CASGRAIN, OF WINCHESTER, MASSACHUSETTS, ASSIGNOR TO UNITED SHOE MACHINERY COMPANY, OF BOSTON, MASSACHUSETTS, AND PATERSON, NEW JERSEY, A CORPORATION OF NEW JERSEY.

MACHINE FOR INSERTING FASTENINGS.

SPECIFICATION forming part of Letters Patent No. 693,686, dated February 18, 1902.

Application filed September 3, 1901. Serial No. 74,178. (No model.)

To all whom it may concern:

Be it known that I, LOUIS A. CASGRAIN, a citizen of the United States, residing at Winchester, county of Middlesex, State of Massachusetts, have invented an Improvement in Machines for Inserting Fastenings, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention has for its object to improve machines for inserting fastenings, the improvements being herein shown as applied to a machine such as described in United States Letters Patent No. 669,023, dated February 26, 1901, said machine being adapted to drive a novel fastening of my invention. Many features of this invention are, however, applicable to any machine for inserting any kind of fastenings commonly employed to attach the soles of boots and shoes or to secure together layers of material.

One important feature of the invention herein shown and described is an attachment for a machine for uniting layers of material or attaching the soles of shoes, which consists in a device to form a cut or indentation in the stock, into which cut the fastening is inserted, said cut being subsequently closed to conceal the fastening. This device in the form herein shown operates intermittingly and forms a series of cuts or indentations in the stock, a separate cut for each fastening.

Hitherto in the manufacture of shoes in which an opening has been formed in the sole for the thread or fastenings by which the sole has been attached it has been the practice to form a continuous channel in the sole, the lip of leather formed in making this channel being afterward turned down to close the opening and conceal the fastenings. Forming a continuous cut or channel in the sole in this way of course greatly weakens the sole. By forming separate cuts or indentations in the stock and leaving solid leather between the cuts I obviate this weakening of the stock and preserve for the sole the original strength of the stock. There is also much less danger of the cuts opening in the wear of the shoe than when the channel is continuous. It is also the practice in forming continuous channels to make a wide cut from near the edge of the stock inwardly. When the edge is trimmed, the channel usually extends to or nearly to the edge of the sole, resulting in a considerable weakening of the edge. When separate cuts are made, as herein explained, the edge of the sole is untouched and will therefore stand up much better. This continuous channel is cut in the outer sole before the shoe comes to the machine employed to unite the sole to the shoe, and also by a separate operation the channel-lip is turned back, opening the channel to receive the fastening material. After the sole has been attached cement is applied by hand or by machine to the channel-lip, and subsequently the channel-lip is turned over by another machine or by hand to conceal the fastenings. Prior to this closing of the channel the channel-lip should again be moistened to put it again in temper for the closing operation, although this step is sometimes omitted.

An important feature of my invention consists in a device also constituting an attachment for a machine for uniting layers of material or attaching the soles of shoes, which is adapted to be actuated in connection with the operation of said machine and said cutting device to close the cuts or indentations after the insertion of the fastenings. Closing the cuts or indentations immediately after the insertion of the fastenings is of material advantage, because the stock is still damp or "in temper," as it must be when the cuts are closed, and therefore can readily be pressed back into its original condition. The operation is more effective and permanent than it would be if the stock were permitted to dry before the cuts were closed and then dampened again preliminary to the closing operation. Also closing the cuts immediately after inserting a fastening and while the stock is still damp obviates the expense of moistening the soles a second time, as should be done when the lip is closed at a subsequent operation by another machine or by hand. Of course, however, the greatest advantage of

combining the mechanism for opening and closing the cut for the fastenings with the machine for inserting the fastenings is the great economy which results from doing away with separate machines and separate operations for opening and closing a channel for the fastenings. I prefer so to organize the machine and its attachments that the cut will be closed after the insertion of each fastening and before the insertion of the next fastening or the formation of the next cut. When the mechanism is so arranged, the cut is formed, the fastening is inserted in it, and the cut is closed, all while the stock is clamped between the presser-foot and the work-support, and so held continuously under pressure throughout these operations and all before the stock is fed into position to receive the next fastening.

The machine to be herein described is also provided outside the end of the wire-guideway and beyond the point where the wire is cut in the formation of a fastening with a wire-curver, represented as an eccentric secured adjustably to the lower end of the shaper.

Other features of my invention will be hereinafter set forth and claimed at the end of this specification.

Figure 1, in front elevation, shows the upper part of a machine embodying my present invention in one of the best forms now known to me, the lower part thereof, which is omitted, being the same as fully shown in said Letters Patent. Fig. 1^a shows the cam H detached, indicating also different positions of the roller-stud which enters the cam-slot $H^\times$. Fig. 2 shows the wire-feeding means in vertical section on the line x^5, Fig. 1. Fig. 2^a is a detail of said wire-feeding means. Fig. 3 is a side elevation of the parts shown in Fig. 1. Figs. 3^a and 3^b are details of levers used in the machine, but shown detached. Fig. 3^c is a section in the dotted line x, Fig. 3. Fig. 3^d shows the projection E^{10} removed from the lever E. Figs. 4, 5, and 6 are detail views chiefly to show the device for forming cuts or indentations in the stock to receive the outer ends of the fastenings and the closing device for closing the cuts to conceal the fastenings. Fig. 6^a is an enlarged detail showing the presser-foot in section and the closing device in three different positions. Fig. 6^b shows the stud H^5 detached. Fig. 6^c is a detail in perspective of the closing device. Fig. 6^d is a detail, enlarged, of the end of the device for cutting or indenting the stock and a cross-section thereof. Fig. 7 shows the face of a piece of stock cut or indented for the reception of fastenings, one of the cuts being open and showing a fastening in it, this figure also showing the closer in position to be moved to close the cut and conceal the outer end of the fastening. Fig. 7^a is a partial longitudinal section of Fig. 7 in the dotted line x'. Fig. 7^b represents part of the stock in the dotted line x^2, Fig. 7, and also a piece of stock with the cut or indentation closed over the outer end of a fastening embedded therein. Fig. 8 is a view looking upwardly from the dotted line x^3, Fig. 5, showing part of the lever H^4 carrying the device for cutting or indenting the sole and for closing said cut or indentation and the under side of the presser-foot with its groove. Fig. 9 is an enlarged detail showing the wire guide, shaper, cutter, bender, and curver; Fig. 10, a section below the line x^4, Fig. 9, with the slide-bar h^{14} omitted; Fig. 11, a view of the parts shown in Fig. 9 looking at them from the right. Fig. 11^a shows the shaper and bender in cross-section and removed from all other parts chiefly to show the groove in the corner of the bender. Figs. 12, 13, and 14 show the wire guide, shaper, and bender in different positions that they will occupy while making a fastening. Figs. 15 and 16 show the wire guide, cutter, bender, and shaper in different positions they will occupy while making a fastening. Fig. 17 shows the same parts in the positions they will occupy when a fastening is to be driven. Fig. 18 is a plan view of the delivery end of the wire-guide, showing the anvil and the detachable steel block, the wire-guide being in its open position. Fig. 19 is a detail showing the face of the steel block secured to one of the bars of the wire-guide.

The column A, adapted to stand on the floor, the head A^2, having a shank A', vertically adjustable on or with relation to the said column, said head sustaining the main shaft C, provided with a cam-hub C', the arm A^7, extending from the head A^2 and receiving in it the horn-shaft A^9, provided with a tipping-horn A^{12}, the swinging head F, mounted on stud h^3, the arm a^6, connected with the rod a^8, the spring a^{10}, surrounding said rod, the lever a^{15}, extended from the swinging head and acting to compress said spring and cause the horn to clamp the stock while the wire is being cut and the fastening is being formed and driven, the controlling device having a cam a^{20}, movable with said rod a^8 and acting upon a roller or other stud e^{23}, connected with the leg e^{21} of the lever $E^\times$, (shown detached in Fig. 3^b,) said leg determining the length of wire projected beyond the wire-guideway by the feeding mechanism; the wire-feeding mechanism, comprising a positively-moved wheel c' (see Fig. 2) and a coacting wheel c^2, said feed-wheel c' being carried by a tubular shaft c^8, having an attached ratchet-wheel c^9, actuated by a pawl connected with a pawl-carrier c^{13}, deriving its movement from a suitable rack-bar e, (see Fig. 1,) connected with a leg e^3 of a double lever E, (shown detached in Fig. 3^a,) the other leg of said lever (marked e^2) having a stud e^5, provided with a roller entering a cam-groove C^3, the shield-carrier e^{12}; the shaft c^{14}, extended through the tubular shaft carrying the feed-wheel c' and having the cranked end c^{15}; the shoe-feeding device, consisting of a toothed wheel d^4, supported in an arm d^7 and deriving its movement from a clutch d, actuated by a link

17, connected with said crank c^{15}; the driver-bar b^3, carrying a driver b^{10}, said driver-bar being connected by a bail B^3 with one end of a lever B^2, having its fulcrum at B′ and actuated by a block $22^{\times}$ on the cam-hub C′ to lift the driver and the spring B^4 to depress the driver-bar and driver; the movable member h of the wire-cutting mechanism connected with the head F, the toothed bar h^{14}, sliding in a groove in said head and deriving its movement from a lever h^{16}, pivoted at h^{17} and having a roller or other stud entering a suitable groove in the cam C′, said slide-bar having connected with it by a suitable screw h^{26} a shaper m and a bender m', there being a suitable space m^2 between them to afford a passage-way for the driver and driver-bar: the starting-lever C^{13}, mounted on the stud C^9 and moved in one direction to start the machine in operation by or through a lever D, to which is connected a rod D^4, extended down to the floor, where in practice a treadle is attached to it, and in the opposite direction by a suitable spring, as C^{14}, to stop the machine after the operator has released the treadle; the wire-guide composed of two bars c^3 c^4, adapted to be forced one toward the other by a lever n to clamp the wire b' while the latter is being severed diagonally, one of said bars having an anvil g', over which the wire is bent in the formation of a fastening, and the pulley D^{10}, fast on the shaft C, the pulley D^{13}, loose on said shaft, the spring D^{15}, and collar D^{17} are and may be all as shown and designated by like letters in said Letters Patent, with the exception of the wire-feeding mechanism, the bender, the bars constituting the wire-guide, and the counterbalancing-spring for the horn, which are somewhat changed, as will be hereinafter described, some of the parts not specifically referred to above and shown in said Letters Patent having been designated by like reference-letters.

I will now describe specifically the novel features of my improved machine.

The fast pulley D^{10}, common to said Letters Patent, has been provided with a cam H, (shown detached in Fig. 1^a,) having at one side a cam-groove $H^{\times}$, in which enters a roller 1^0 of an arm H′, connected with a rock-shaft 12, sustained in a suitable bearing H^2. Said shaft has a forwardly-projecting arm H^0, to which is attached a rod H^3, joined at its lower end with one end of a lever H^4, mounted, as shown, on an eccentric stud H^5. (Shown detached in Fig. 6^b.) Said lever constitutes one form of means for carrying and moving a device H^6, (see enlarged detail, Fig. 6^d,) which is actuated at the proper times to cut or indent the stock S, said device in the form in which I have herein chosen to illustrate it forming a series of cuts or indentations, as 13, (see Figs. 7, 7^a, and 7^b,) in the face of the stock.

The stock is shown in Figs. 4 to 7^b as comprising part of a boot or shoe, the upper portion of the stock being the outer sole and the under portion of the stock being the inner sole, said soles having between them a portion of the upper of the boot or shoe.

The device H^6, preferably formed in the arc of a circle, as herein shown, has imparted to it a circular movement, and it is preferably shaped (see Fig. 6^d) to present a beveled end H^8 and a V-shaped under side H^9, so that said device as it enters the stock is made to cut or indent the stock, as represented in Figs. 7, 7^a, and 7^b, spreading the cut or indentation and leaving the stock displaced by it projecting above the surface of the stock on each side of the cut, as indicated at 14, Fig. 7^b.

I prefer, as herein explained, to close the cuts by means of a device attached to the machine for inserting the fastenings, and I have found it more convenient and satisfactory to have the stock which is displaced by the cutter raised on each side of the cut in the form of lips, which may easily be forced down and together by the closing device.

The movement of the device H^6 is represented as circular; but it may be moved in any other direction without departing from my invention. One advantage of moving the device in substantially the manner herein shown is that in case the work-feeding mechanism fails to advance the stock so as to take a nail already inserted away from its position under the driver the device H^6 in its downward movement to form a cut for the next fastening will strike such nail and will move the nail and with it the stock, so that when the next nail is driven it will not strike the nail already in the stock. It is especially objectionable in this machine to drive a nail upon one already inserted, as the result must necessarily be the disfigurement of the stock. Also the point of the shank will be diverted, so that it will not be properly clenched, and there is further danger in the manufacture of shoes that the point will shoot off into and through the upper.

The fastening 15 is driven into the cut or indentation while the stock is held clamped between the horn A^{12} (shown in said Letters Patent) and a novel presser-foot H^{10}, having a vertical passage 16 (see Fig. 6^a) to receive the fastening and guide the driver when inserting the fastening, said foot taking the place of the so-called "nose" shown in said Letters Patent.

The presser-foot H^{10} is shown as serrated at its under side, (see Fig. 8,) and it has a groove H^{12}, (see Figs. 3, 4, 6^a, and 11,) in which said device H^6 enters when making a cut or indentation in the stock and which is also entered by the closing device J when it is actuated to close the cut. This groove is of sufficient width to enable the portions of the stock on each side of the cut or indentation to be lifted above the face of the stock by the device H^6, as represented at 14, Figs. 7^a and 7^b.

The stud H^5, (see Fig. 6^b,) on which the le-

ver H^4 is mounted, has an eccentric portion H^{13}, and by rotating the stud H^5 the position of said lever H^4 may be changed vertically to vary the depth of cut made by the device H^6.

After the fastening has been inserted in a cut or indentation the raised portions 14 of the stock are acted upon to close the cut or indentation and cover or conceal the outer end of the fastening by a closing device J, herein shown as a finger pivoted at J′ upon an extension J^2 of the lever H^4. Said finger (see Fig. 6^c) is shown as slotted to receive the upper end of a spring J^3, which normally acts to lift said closer and keep one end of said slot against the upper end of said spring, as shown in Fig. 6^c. The forward end of the closing device is provided, preferably, with a V-shaped notched end 17, and in the first part of the movement of said device toward the right from the position in Fig. 4, where the driver is represented as having inserted a fastening, and from the dotted-line position J^4, Fig. 6^a, into the second dotted-line position J^5 and the full-line position, Fig. 5, this V-shaped end, embracing the raised portions 14 of the stock, forces the two lips 14 toward each other, and in the further movement of the closing device to the right the lips are pressed down and the stock is smoothed out by the under surface of closing device J. This is done after a fastening has been inserted in the cut, the closing of the cut concealing the outer end of the fastening, as represented at the left in Figs. 7 and 7^a and at the right of Fig. 7^b. As the cut is closed over the outer end of the inserted fastening the vertical edges of the cut are forced together and the leather at the sides of the cut is pressed down, so that the surface of the stock is level and smooth and the cut is substantially obliterated.

In the wear of the shoe, in addition to the advantages over the continuous channel already enumerated, it should be noted that there is no wide thin lip which is liable to be separated from the body of the sole to which it is cemented and which may even be entirely detached from the sole, exposing the fastenings to view. I prefer also, as hereinbefore explained, to form the cut in a plane substantially at a right angle to the plane of the surface of the sole, so that there is little, if any, tendency to open the cut in the wear of the shoe.

The closer J and the device H^6 both work in the slot H^{12} and enter the same alternately from opposite directions. The closer is carried, as already stated, by the extension J^2 of the circularly-moving arm H^4, and the tendency of its end 17 would naturally be, therefore, to rise from the stock in the extreme movement of the closer to the right. It is preferable, however, that the notched end 17 when operating to close a cut move in substantially the plane of the upper side of the stock, and to secure this movement I have so shaped the groove H^{12} in the presser-foot, or that portion of it to the left of the driver-passage, viewing Fig. 6^a, and have also so shaped the upper side of the closer back of its end that after the end of the closer enters the said groove the further movement of the closer will be in a substantially straight line in the plane of the surface of the stock or the bottom of the presser-foot.

Fig. 4 shows the driver as having acted to insert a fastening and as having been slightly retracted, and in this position of the parts the cam-roll 10 of the arm H′ occupies the position 10^a (shown by dotted lines, Fig. 1^a) in the cam-groove $H^\times$, and in the further movement of the cam H in the direction of the arrow, Fig. 1^a, the link H^3 is depressed, thus moving the lever H^4 to put the device H^6 in the position Fig. 5, and in this movement the closer enters fully the groove H^{12} in the foot H^{10}. With the parts in the position Fig. 5 the roller-stud referred to will occupy the dotted-line position 10^b, Fig. 1^a, and by the time that said roller-stud arrives in its full-line position, Fig. 1^a, the driver will have been fully lifted and the lever H^4 will have been turned sufficiently to withdraw the closer from the groove H^{12} of the presser-foot into the dotted-line position J^4, Fig. 6^a, leaving the parts as represented in Figs. 1 and 4, the position at which the machine is always left when stopped or the starting position for the machine. When the machine is started in usual manner, the cam H, acting on the roller-stud 10, moves the device H^6 from its position Fig. 4 into the position Fig. 6, the said device arriving in the position Fig. 6 as the roller-stud referred to arrives in the position 10^c, Fig. 1^a, and during this movement the closer is withdrawn from the groove H^{12} of the foot H^{10} into the position Fig. 6 and full-line position, Fig. 6^a.

I have herein chosen to illustrate the closer as operating to close each cut before the next cut is made, and to afford time for this operation in the cycle of the machine's operations it became necessary in the form of machine in which my invention is herein shown as embodied to provide means auxiliary to the driver-lifting block or device $22^\times$, shown in said patent, to lift the driver slightly immediately after it has completed its downstroke in order that the closer may be actuated to enter the groove H^{12} and close the cut in the stock while the stock is yet clamped between the horn and presser-foot and preferably before the formation of the next cut.

The auxiliary means for starting the upward movement of the driver is herein represented as a stud E^{10}, (shown detached in Fig. 3^d,) which is screwed into a boss carried by the arm e^2 of the lever E, instrumental in actuating the wire-feeding means. This auxiliary driver-lifter is shown as provided at one end, as at 20, with a buffer, which may be of leather, said buffer contacting with the

bumper 21, common to my said patent, and detachably mounted upon one end of the driver-lever B^2.

Figs. 1 and 3 show the auxiliary driver-lifter as having acted to slightly lift the driver, and said auxiliary lifter acts to hold the driver in the position Figs. 1, 3, and 4 until in the rotation of the cam C′ the lifter-block $22^{\times}$ meets the bumper and lifts the driver in usual manner into the position Fig. 6. By using this auxiliary driver-lifting device I am able to run the machine at the same speed at which it has been the practice to run these machines not equipped with the cutting device and closing device herein shown, and I am able to do this without making any changes in the machine other than those herein described.

Although I prefer to close the cut immediately after inserting a fastening therein while the stock is clamped between the work-support and the presser-foot in the same position as when the fastening was inserted, it will be understood, however, that my invention would not be departed from if the cut should be closed after another cut or other cuts had been made or after one or more fastenings had been inserted in such other cut or cuts. It will further be obvious that although I prefer to employ in one and the same machine mechanism for making the cut, inserting the fastening, and closing the cut, and although I think that such a combination is preferable as securing to the highest degree the advantages of my present invention some of the advantages of my invention could, nevertheless, be secured by using, in connection with the machine for inserting the fastenings, either the device for forming the cut or the device for closing the cut without using the other, and such a machine would clearly embody important features of my present invention. It will also be understood that while I prefer so to form the opening for the fastening that lips will be raised on opposite sides of the opening it would be possible and might in some cases be preferable to raise a lip on the stock on one side only of the opening, and I should consider a machine for inserting fastenings containing mechanism for so forming the opening or mechanism for closing the opening so formed as within the scope of my invention. It may also be possible to form openings of other shapes or sizes different from the shape and size of the opening herein shown and described; but it will of course be clear that my invention is not limited to the size or shape of the opening or to the number of lips which are raised on the stock to facilitate the subsequent closing of the opening.

In the mechanism herein shown only the bar c^4 of the wire-guideway is grooved, as at 23, (see Fig. 19,) and it has connected with it at its inner side a steel block 25, held detachably to the said bar by suitable dowel-pins 26. The block 25 is provided with two cutting edges 29 and two grooves 27, either of which grooves when in position forms a prolongation of the wire-groove 23. Each groove 27 has an inclined portion 28 to direct the wire out of a straight line, as provided for in said patent, and put it in position to be acted upon by the movable cutter member *h*, which coöperates with one of the edges 29.

In the machine of the Letters Patent referred to a curving device was located adjacent to the wire-guideway to act upon the wire before it entered the guideway; but herein I have provided a novel wire-curving device, located just beyond the delivery end of the wire-guideway. Said curving device, that it may be readily adjusted to determine the amount of curvature in the wire, is shown as an eccentric-stud. The shank of said stud is represented as threaded to enter a threaded hole in the lower end of the shaping device *m*, said shank being preferably split that it may retain itself in any position in which it may be adjusted.

In the machine herein shown as heretofore constructed the driver frequently struck the beveled end of the cutter *h*, which when the driver descends is in the forward position, which it takes in feeding the fastening off the anvil into position under the driver. I have discovered that this happens because the side of the driver next the inclined end of said cutter is at an angle to said inclined end and a portion of the cutter projects slightly beyond the anvil *g′*. I have obviated this difficulty by changing the position of the driver so that its side walls move in planes parallel with the beveled end of the cutter *h*, and I have changed the front face $g'^{\times}$ of the anvil *g′*, so that instead of being at an angle to the beveled end of the cutter *h*, as heretofore, the face $g'^{\times}$ is in the same vertical plane as the end of the cutter. As shown in said patent, the anvil near its delivery end is slightly enlarged, as at g^{10}, said increase in thickness of the anvil insuring that the shank of the fastening will be held closely between the shaping device and the anvil, so that it can be moved only when actuated positively by the means employed to feed it off the anvil. To adapt the guide M^2 to this new position of the fastening, I have beveled its vertical face next the end of the cutter *h*, (see Fig. 17,) so that the fastening is guided accurately while being driven. To further aid in controlling the position of the fastening, I have provided the corner M^3 of the bender with a notch, as shown in Figs. 11^a and 17, which assists in guiding the short depending portion of the head of the fastening.

In the machine as heretofore constructed the corner of the bender, as the latter moves below the top of the anvil *g′* to shape the head of the fastening, fitted and moved closely in the corner between the wall 3 of the wire-guide c^4 and the inner side wall of the anvil, and the lower edge of the bender next the inner wall of the anvil was apt to strike the guide and become worn or dulled, and as a result thereof the short leg depending from the

head of the fastening would be enabled to turn somewhat and the fastening would fail to enter properly the driver-passage in the presser-foot. If the parts were not properly adjusted, this might happen in a few minutes' use and the bender be rendered useless. To prevent this wear of the bender, I have provided the wire-guide c^4 at the inner side of the anvil g' with a notch M^6, (see Fig. 18,) said notch being extended beyond the edge 3 of said block. This notch is of such depth that the corner M^3 of the bender may descend and not touch either the anvil or the side wall 3, thus entirely preventing the damage referred to, enabling the machine to be run for an indefinite period without wear at the points referred to, and thereby effecting a considerable saving.

In order that the horn-shaft A^9 may be reciprocated in its bearings in the arm A^7 and not rotate therein, I have connected with it fixedly by a screw N an arm N', said arm being forked at its end (see Fig. 3^c) to embrace a guide N^2, forming part of the arm A^7.

I have dispensed with the horn-counterbalancing spring surrounding the horn-shaft shown in said Letters Patent and instead have provided a spiral spring N^3, the upper end of which engages a lug N^4 on the arm A^7, the lower end of the spring or a threaded device connected therewith being extended through a guide N^5, carried by the arm N', said device thereafter receiving upon it an adjusting device, (shown as a nut N^6,) by which the strength of the horn-counterbalancing spring N^3 may be regulated as desired.

In machines having a horn or work-support of the class herein shown and sustained by a spring it is sometimes desirable to remove the horn from the control of the spring, and to do this considerable time is consumed by the operator and the machine has to be dismembered.

In case it is desired for any purpose to free the horn herein shown from the control of the spring N^3 it is only necessary to unhook the upper end of the spring from the lug N^4, which may be done instantly. The use of the spring N^3 therefore results in a great saving of time and in the reduction of cost, for it may be constructed more cheaply and applied more readily than the usual spring employed to sustain a work-support.

Referring to Fig. 2, the pressure-wheel c^2 is shown as mounted on a pin c^{30}, secured eccentrically to the lower end of a supporting-stud c^{31}, rotatably mounted in the head A^2 and having at its upper end an enlargement or head c^{32}, provided with an operating-handle c^{33}. It will be manifest that by rotative movement of the stud c^{31} the pressure-wheel will be moved to act with greater or less pressure upon the wire fed between the wheels c' c^2 by positive rotative movement imparted to the former. Imperfections or changes in the cross-section of the wire are liable to occur, and there may be some irregularity in the wire-engaging surface of either or both of said wheels due to wear or otherwise, and it will be manifest that the presence of any of these irregularities will cause a variation in the pressure upon the wire and consequent variation in the feed unless some means is provided for compensating for such irregularities. I have herein provided such means in a very simple and effective manner by making a slot c^{34} in the stud c^{31}, (see Fig. 2,) so that the stud may yield somewhat, and consequently the pressure-wheel c^2, mounted on such stud is supported in a yielding manner. Should the wire vary in diameter, the pressure exerted thereupon by the wheel c^2 will be substantially constant, inasmuch as said wheel will accommodate itself to such diametral variations of the wire, and the same is true should there be any irregularity in the wire-engaging surface of either or both of said wheels c' c^2.

In the machine as heretofore constructed the shield e^{12} of the wire-feeding mechanism was locked prior to the feeding of the wire by a pawl which engaged one of the teeth formed on the periphery of the shield-carrier. In my present machine I secure a more accurate positioning of the shield-carrier by means of a locking device, (shown in Figs. 2 and 2^a,) which consists of a brake-shoe P for engaging the periphery of shield e^{12}, which in my present construction is smooth. This brake-shoe, which is carried by lever P', is actuated to engage the shield-carrier e^{12} by substantially the same mechanism which is shown in said Letters Patent for actuating the locking-pawl.

The boot or shoe having its sole attached by the machine herein shown and the method of making such a boot or shoe have been made the subjects of separate applications for United States Letters Patent.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a machine for securing together layers of material, means for forming a cut in the stock, a driver, means for actuating it to insert a fastening in said cut and means for closing said cut over the fastening.

2. In a machine for securing together layers of material, means for forming a cut in the stock, means for inserting a fastening in said cut, means for closing said cut and means for clamping the stock during said cutting, inserting and closing operations.

3. In a machine for securing together layers of material, a work-support, a presser-foot, means for changing the relative positions of said work-support and presser-foot to clamp and release the stock, means for forming a cut in the stock, means for inserting a fastening in said cut and means for closing said cut, said cutting, inserting and closing operations all taking place while the stock is clamped between the work-support and the presser-foot.

4. In a machine for securing together layers

of material, stock-feeding mechanism, means for forming a cut in the stock, means for inserting a fastening in the cut and means for closing the cut, said cutting, inserting and closing operations all taking place between two consecutive operations of the stock-feeding mechanism.

5. In a machine for securing together layers of material, a work-support, a presser-foot, means for changing the relative positions of said work-support and presser-foot to clamp and release the stock, stock-feeding mechanism, means for forming a cut in the stock, means for inserting a fastening in said cut and means for closing said cut, said cutting, inserting and closing operations all taking place while the stock is clamped between the work-support and the presser-foot and between two consecutive operations of the stock-feeding mechanism.

6. In a machine for securing together layers of material, stock-feeding mechanism, means for forming a cut in the stock, means for inserting a fastening in the cut and independent means for closing the cut, said inserting and closing operations taking place between two consecutive operations of the stock-feeding mechanism.

7. In a machine for securing together layers of material, means for inserting fastening material, means for forming in the stock an opening to receive the fastening material, a movable device for engaging the stock and forcing it over the fastening material and means for actuating said device.

8. In a machine for securing together layers of material, means for inserting fastening material, a work-support and presser-foot, means for changing the relative positions of said work-support and presser-foot to clamp and release the stock, means for forming in the stock an opening to receive the fastening material, a movable device for closing said opening and means for actuating said closing device; said opening, inserting and closing operations all taking place while the stock is clamped between the work-support and the presser-foot.

9. In a machine for securing together layers of material, stock-feeding mechanism, means for inserting fastening material, means for forming in the stock an opening to receive the fastening material, a movable device for closing said opening and means for actuating said closing device; said opening, inserting and closing operations all taking place between two consecutive operations of the stock-feeding mechanism.

10. In a machine for inserting fastenings, means to form openings in the stock, mechanism for inserting fastenings in said openings, and a movable device for closing the openings to conceal the fastenings.

11. A machine for inserting metallic fastenings comprising a device to form an opening in the stock, a driver to insert a fastening in said opening and means to force the stock together to conceal the fastening.

12. In a machine for securing together layers of material, a device to form openings in the stock, mechanism for inserting independent fastenings in said openings entirely below the surface of the stock, and a movable device for forcing the stock over the fastenings.

13. In a machine for securing together layers of material, a device to form an opening in the stock to receive fastening material, means for actuating said device intermittently to enter and withdraw from the stock, a driver for inserting fastening material in said opening and means for forcing the stock over the fastening material.

14. In a machine for securing together layers of material, a device to form an opening in the stock and raise a lip above the surface of the stock, means for actuating said device intermittently to enter and withdraw from the stock thereby forming a plurality of openings, a driver, and means for actuating the driver to insert fastenings in said separate openings.

15. In a machine for securing together layers of material, a device to form an opening in the stock to receive fastening material, means for actuating said device intermittently to enter and withdraw from the stock thereby forming a plurality of openings, means for inserting fastening material in said openings and independent means to force the stock over the fastening.

16. In a machine for securing together layers of material, a device to form an opening in the stock to receive fastening material, means for actuating said device intermittently to enter and withdraw from the stock, means for inserting fastening material in said opening, a movable device for engaging the stock and forcing it over the fastening material and means for actuating said device.

17. In a machine for securing together layers of material, a device to form an opening in the stock to receive fastening material, means for actuating said device intermittently to enter and withdraw from the stock thereby forming a plurality of openings, means for inserting fastening material in said separate openings below the surface of the stock, a movable device for closing said openings over the fastening material and means for actuating said closing device.

18. In a machine for inserting fastenings, a device to form an opening in the stock to receive fastenings, said device raising a lip on the stock adjacent to the opening, means for actuating said device intermittently to enter and withdraw from the stock, and independent means for inserting a fastening in said opening.

19. A machine for securing together layers of material comprising a cutting device, means for actuating said device to form in the stock a plurality of cuts and raise a lip on the stock

adjacent to each cut, means for inserting fastenings in said cuts, and means for engaging said lips and forcing them over the fastenings.

20. In a machine for inserting fastenings, means for forming a cut in the stock and raising a lip above the surface of the stock, a driver, and means for actuating it to insert a fastening in said cut below said lip.

21. In a machine for inserting fastenings, means for forming a cut in the stock and raising a lip above the surface of the stock, and means for driving a fastening in said cut below said lip and entirely below the surface of the stock.

22. In a machine for securing together layers of material, a cutting device, means for actuating said cutting device to form in the stock a plurality of cuts, means for inserting fastening material in said cuts, and means independent of the fastening material to force the stock over the fastening material.

23. In a machine for securing together layers of material, a cutting device, means for actuating said device to form in the stock a plurality of cuts, means for inserting fastening material in said cuts, an independent device to close the cuts and means for actuating said device to force the stock over the fastening material immediately after the insertion of the fastening material therein and before the insertion of fastening material in the next cut.

24. In a machine for securing together layers of material, a cutting device, means for actuating said cutting device to form in the stock separate cuts, leaving the stock between the cuts untouched, means for inserting independent fastenings in said separate cuts, one fastening in each cut, a device to close the cuts over the fastenings and means for actuating said device to close each cut immediately after the insertion of the fastening therein and before the insertion of the next fastening.

25. In a machine for securing together layers of material, means for forming in the stock a plurality of openings to receive the fastening material, means for inserting fastening material in said openings, a movable device for engaging the stock to force it over the fastening material, and means for actuating said device.

26. In a machine for securing together layers of material, means for forming in the stock a plurality of independent openings to receive fastening material, means for inserting independent fastenings in said openings, one fastening in each opening, a movable device for forcing the stock over the fastening, and means for actuating said device.

27. In a machine for securing together layers of material, a driver, means for actuating the driver to insert fastening material in an opening in the stock and means for closing the stock over said opening.

28. In a machine for securing together layers of material, means for inserting fastening material in an opening in the stock, a movable device for engaging the stock and forcing it over the fastening material, and means for actuating said device.

29. In a machine for securing together layers of material, means for inserting fastening material in a series of separate disconnected openings and independent means to force the stock over said openings after the fastening material has been inserted.

30. In a machine for securing together layers of material, a driver, means for actuating the driver to insert fastening material in a series of openings, a movable device to engage the stock and force it over the fastening material, and means for actuating said device.

31. In a machine for securing together layers of material, means for inserting independent fastenings in a series of openings, a separate fastening in each opening, a device to close the opening and means for actuating said device to close the stock over each opening immediately after the insertion of the fastening therein and before the insertion of a fastening in the next opening.

32. In a machine for securing together layers of material, means for inserting fastening material, a cutting device for forming in the stock a cut to receive the fastening material, said cutting device being arranged to raise the stock on each side of the cut, a closing device and means for actuating said closing device to force together and press down said raised portions of stock.

33. In a machine for securing together layers of material, means for inserting fastening material, a cutting device for forming in the stock an opening to receive the fastening material, said cutting device being arranged to raise the stock on each side of the opening, and a closing device having its end V-shaped to engage said raised portions of the stock and force them together.

34. In a machine for securing together layers of material, a driver, means for actuating the driver to insert fastenings in an opening in the stock, a device for closing the opening, a presser-foot for bearing on the face of the stock, said presser-foot being shaped at its lower end to receive and guide said closing device, and means for actuating said closing device after a fastening has been inserted.

35. In a machine for securing together layers of material, a driver, a device to form an opening in the stock under the driver, a device to close such opening in the stock while still under the driver and a presser-foot having a passage for the driver, said presser-foot being shaped to permit the operation of said cutting device and said closing device under the driver, and means for actuating said cutting device and said closing device whereby they are made operative at different times.

36. In a machine for securing together layers of material, a device for closing an opening in the stock and a presser-foot for bearing on the face of the stock, said presser-foot

being shaped at its lower end to receive and guide said closing device, said presser-foot and said closing device being so shaped relatively that the closing device is made to travel in a substantially straight line in the plane of the bottom of the presser-foot.

37. In a machine for making and inserting metallic fastenings, a wire-guideway and an independent curver to bend the wire after it is delivered from said guideway combined with means to form from said wire a fastening with a curved shank or body.

38. In a machine for making and inserting metallic fastenings, a wire-guideway and an eccentric stud arranged to curve the wire delivered from said guideway.

39. In a machine of the class described, a shaper to bend wire in the production of a fastening and a device, carried by said shaper, for curving the wire.

40. In a machine of the class described, a shaper and a bender arranged for bending wire to form a fastening with a hook-shaped head, the bender being grooved to guide the head of the fastening.

41. In a machine of the class described, a driver, and means for actuating the driver to insert fastenings, mechanism for lifting the driver, and a device for raising the driver after the fastening has been inserted and prior to the operation of the driver-lifting mechanism.

42. In a machine of the class described, a device to form an opening in the stock, a driver, means for actuating the driver to insert fastenings in said opening, a device to close the opening, and means to raise the driver out of the way of said closing device.

43. In a machine of the class described, a device to form an opening in the stock, a driver, driver-lifting mechanism, means for actuating the driver to insert fastenings in said opening, a device to close the opening, and an auxiliary driver-lifting mechanism to raise the driver out of the way of the closing device.

44. In a machine for securing together layers of material, mechanism for forming a cut in the stock, means for inserting a fastening in said cut, means for closing said cut, and means for adjusting said cutting mechanism to vary the depth of cut.

45. In a machine for securing together layers of material, a device to form an opening in the stock for receiving and concealing fastening material, means for actuating said device intermittently to enter and withdraw from the stock, means for inserting fastening material in said opening, and means for adjusting said device to vary the depth of the cut.

46. In a machine for inserting fastenings, a device for forming a cut in the stock, a driver for inserting a fastening in said opening, and means for closing said opening, the cutting device being withdrawn from the stock when the opening is under the driver, the fastening being then inserted and the opening being closed while it is still under the driver.

47. In a machine of the class described, a wire-guide composed of a bar having a groove to receive wire, and a detachable and reversible steel block having a plurality of grooves, and a plurality of cutting edges, either of said grooves being adapted to be alined with the groove of the bar.

48. In a machine of the class described, a bender, combined with a coöperating anvil having a bender-protecting groove in line with one corner of the bender, to obviate dulling of said bender by contact with said anvil.

49. In a machine of the class described, cutting mechanism including a movable cutter having its acting edge at an acute angle to the direction of feed of the work, means to move said cutter to feed a fastening into position to be driven, and a driver having its side nearest said movable cutter in a plane substantially parallel to the edge of said cutter.

50. In a machine of the class described, a wire-feed wheel, a coöperating pressure-wheel, to bear upon the wire in opposition to the feed-wheel, said pressure-wheel having a split hub to afford a yielding support therefor.

51. In a machine of the class described, a feed-wheel, a coöperating pressure-wheel, and a rotatable, yielding support for and on which the pressure-wheel is eccentrically mounted.

52. In a machine for inserting fastenings, means for forming in the stock a plurality of cuts and raising a lip adjacent to each cut above the surface of the stock, and means for inserting fastenings in said cuts below said lips.

53. In a machine for inserting fastenings, means for forming in the stock a plurality of separate disconnected cuts and raising a lip adjacent to each cut above the surface of the stock, and means for inserting a fastening in each of said cuts below said lip and entirely below the surface of the stock.

54. In a machine for inserting fastenings, means to form an opening in the stock and raise a lip on the stock adjacent to the opening, means to insert a fastening in said opening below said lip, and stock-feeding mechanism, said opening being formed and the fastening being inserted in the opening between two consecutive operations of the stock-feeding mechanism.

55. In a machine for inserting fastenings, a device to form an opening in the stock and raise a lip on the stock adjacent to the opening, means for actuating said device intermittently to enter and withdraw from the stock, means for inserting fastening material in said opening below said lip, and stock-feeding mechanism, said opening being formed and the fastening being inserted in the opening between two consecutive operations of the stock-feeding mechanism.

56. In a machine for inserting fastenings, a work-support, a presser-foot, means for chang-

ing the relative positions of said work-support and presser-foot to clamp and release the stock, means for forming an opening in the stock and raising a lip on the stock adjacent to the opening, and means for inserting a fastening in said opening below said lip, the opening being formed and the fastening being inserted while the stock is clamped between the work-support and the presser-foot.

57. In a machine for inserting fastenings, a work-support, a presser-foot, means for changing the relative positions of said work-support and presser-foot to clamp and release the stock, a device for forming an opening in the stock and raising a lip on the stock adjacent to the opening, means for actuating said device intermittently to enter and withdraw from the stock, and means for inserting a fastening in said opening below said lip, the opening being formed and the fastening being inserted in the opening while the stock is clamped between the work-support and the presser-foot.

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

LOUIS A. CASGRAIN.

Witnesses:
JOHN C. EDWARDS,
MARGARET A. DUNN.