No. 684,364. Patented Oct. 8, 1901.

J. N. GIFFORD.

MACHINE FOR MAKING TACKS OR NAILS.

(Application filed May 11, 1901.)

(No Model.) 4 Sheets—Sheet 1.

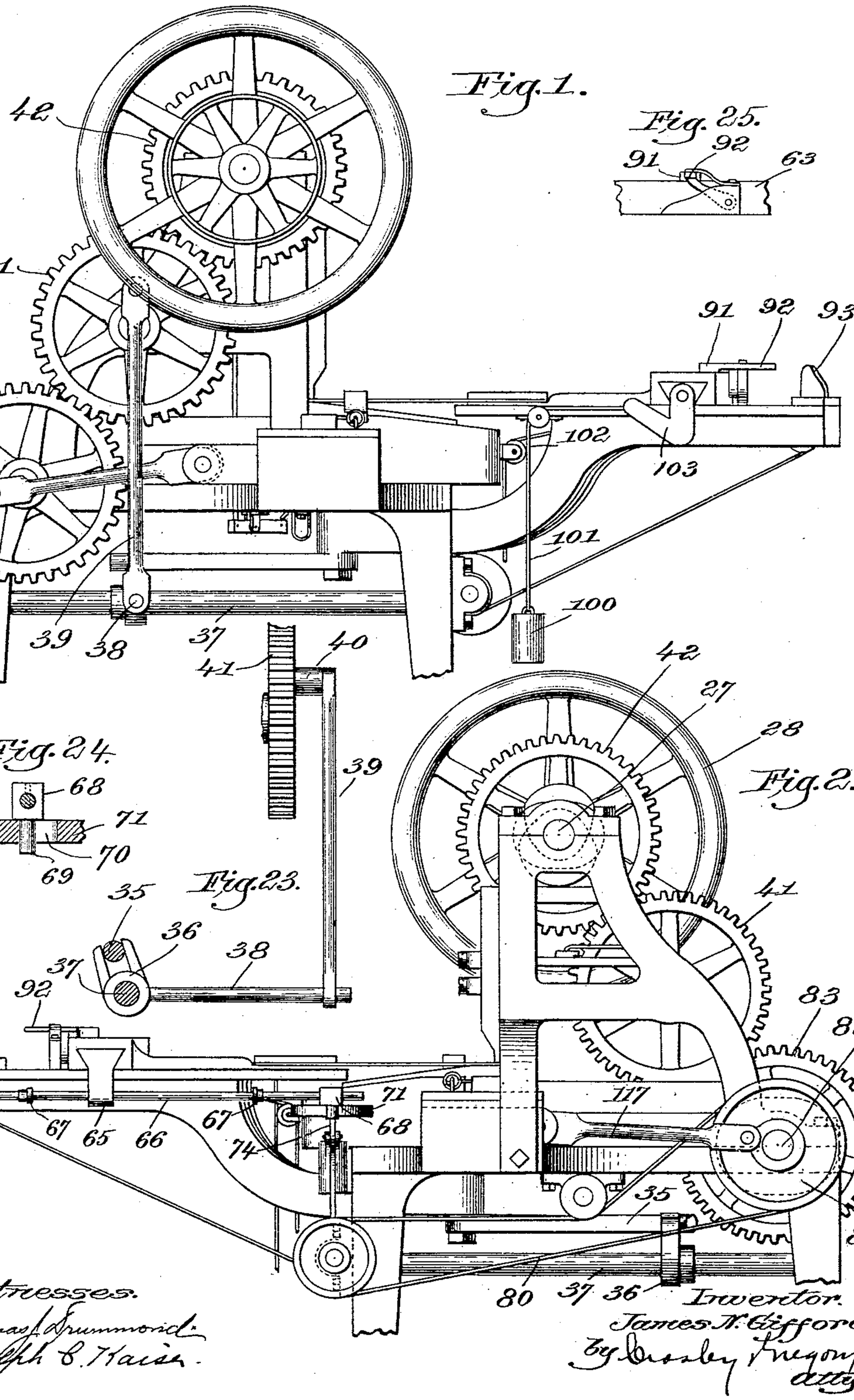

Fig. 1.

Fig. 25.

Fig. 24.

Fig. 23.

Fig. 2.

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(No Model.) 4 Sheets—Sheet 2.

Fig. 3.

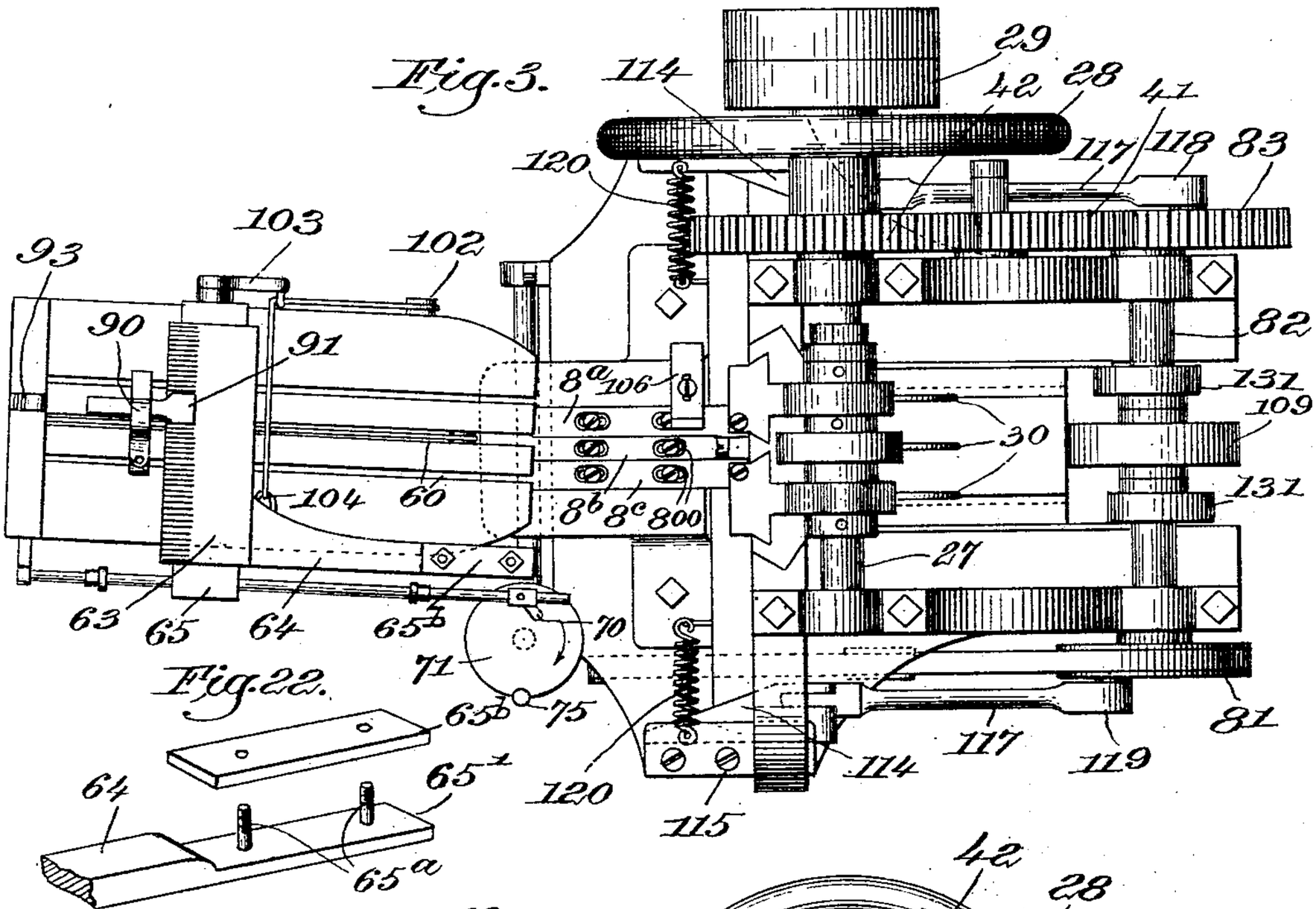


Fig. 22.

Fig. 21.

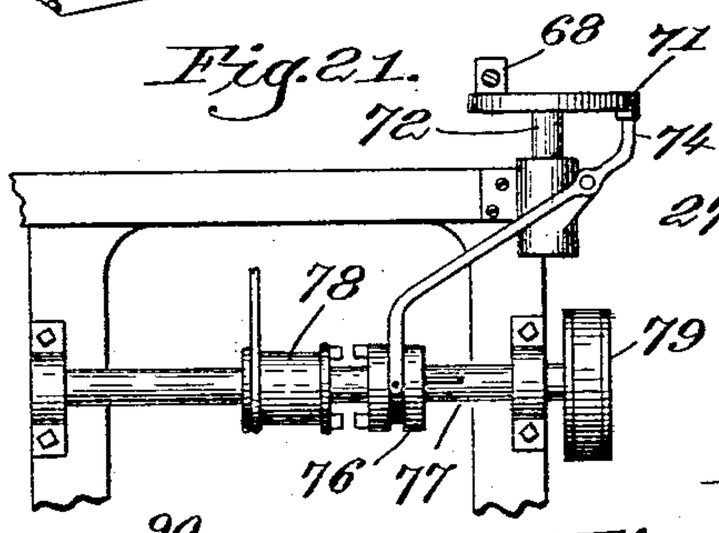
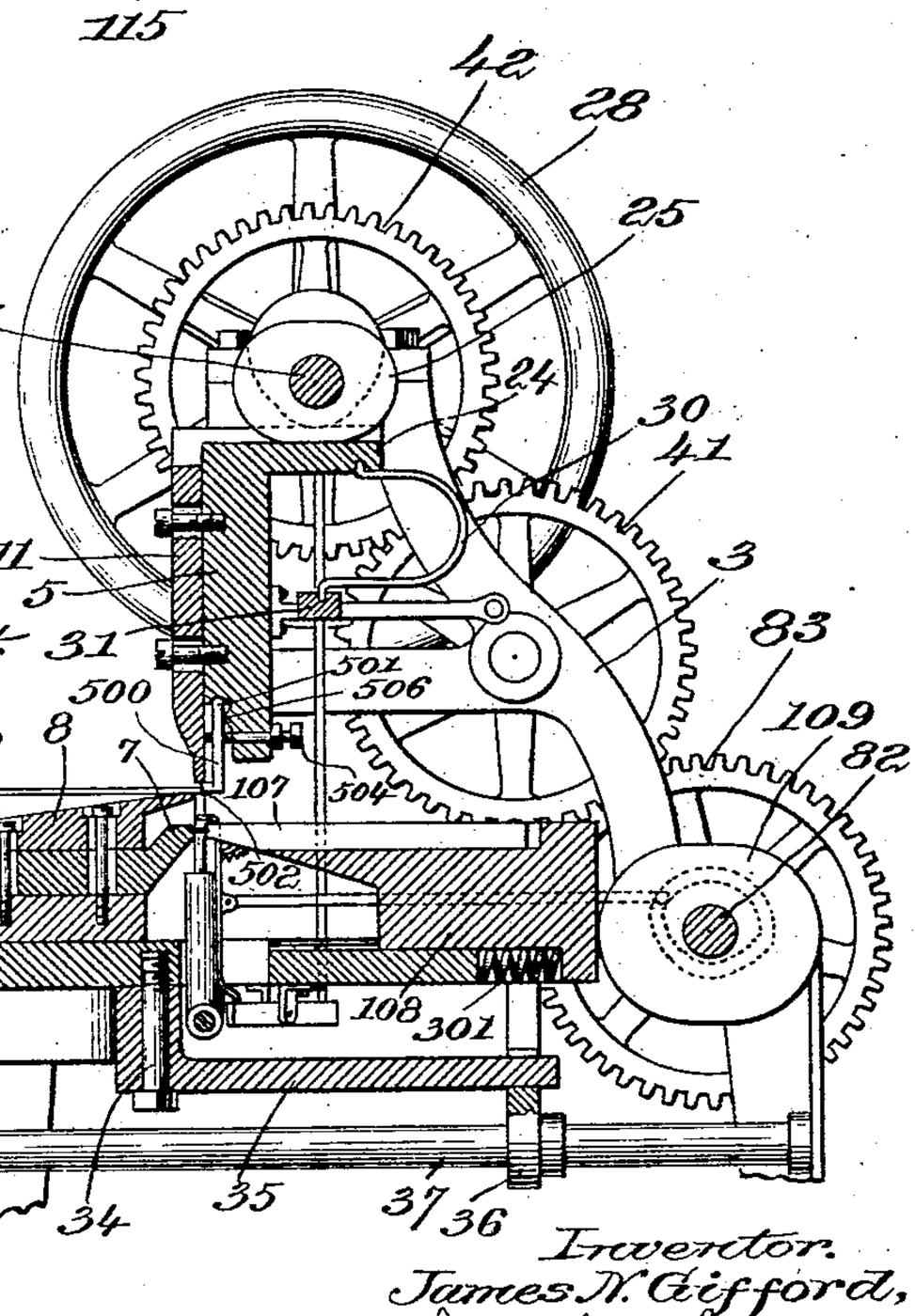


Fig. 4.



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MACHINE FOR MAKING TACKS OR NAILS.

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(No Model.) 4 Sheets—Sheet 3.

Fig. 5.

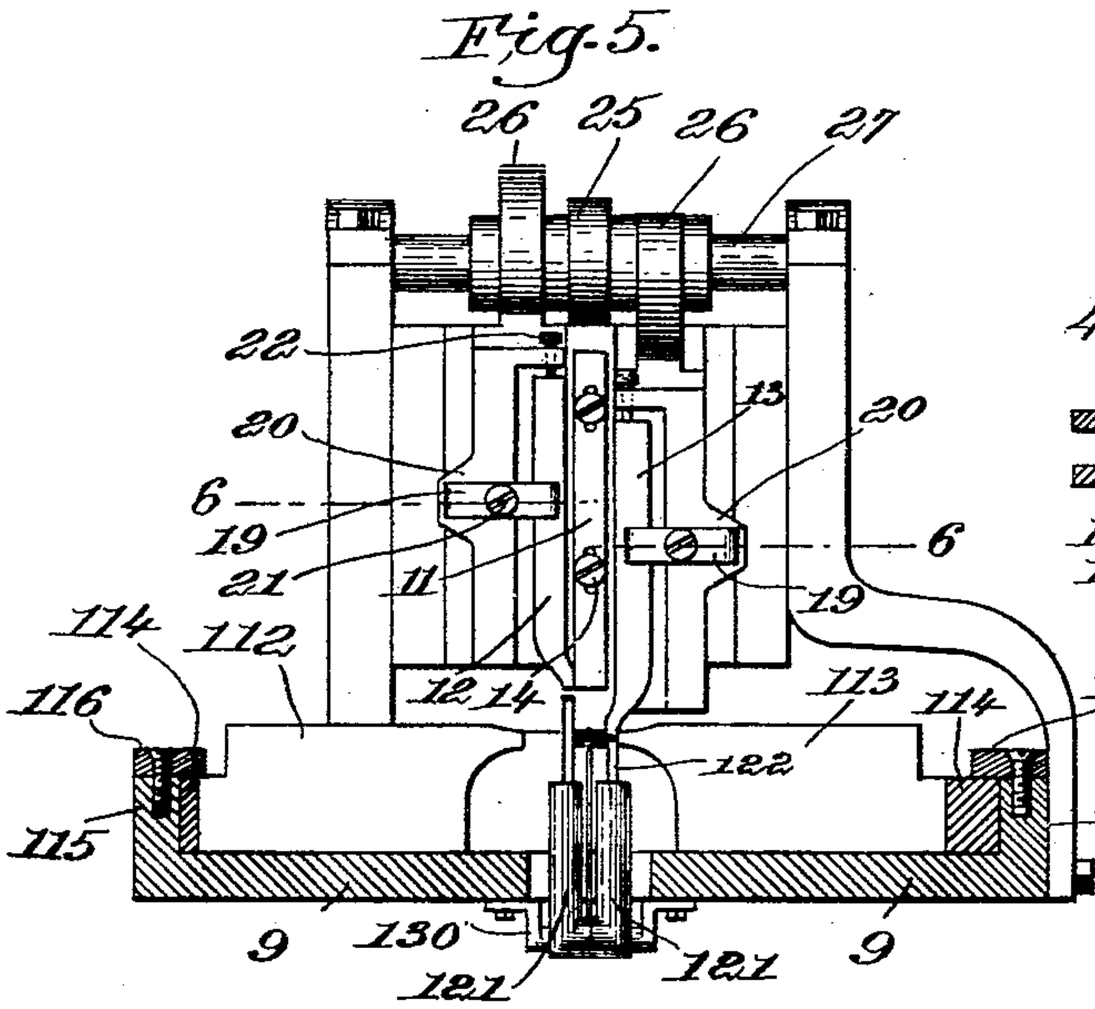

Fig. 6.

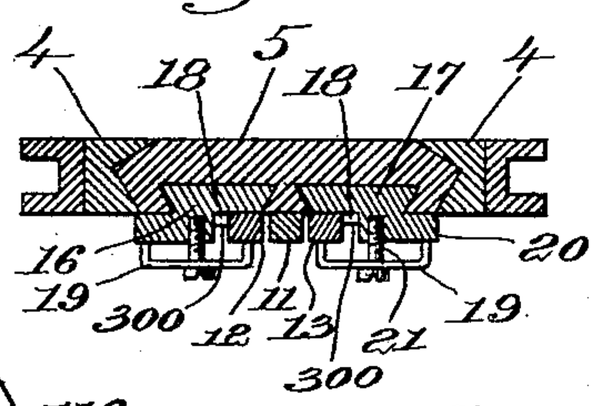

Fig. 6a

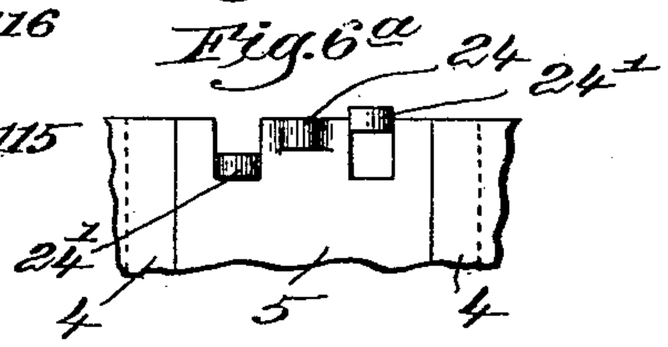

Fig. 7.

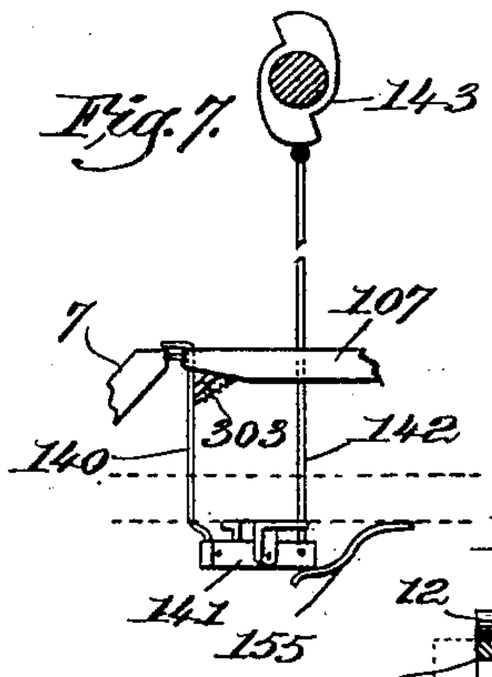

Fig 8

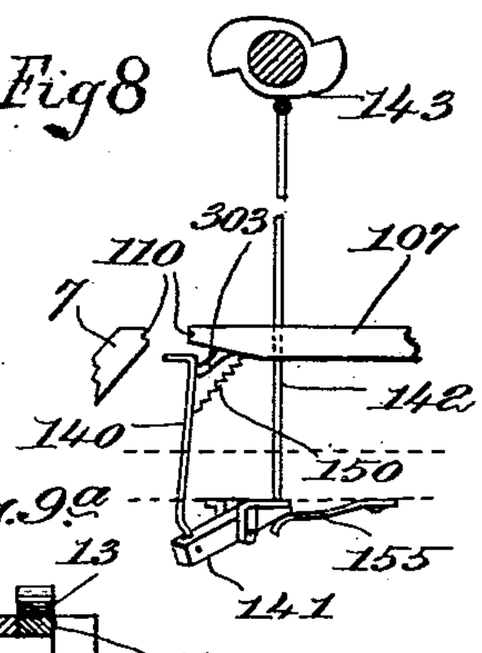

Fig. 9.

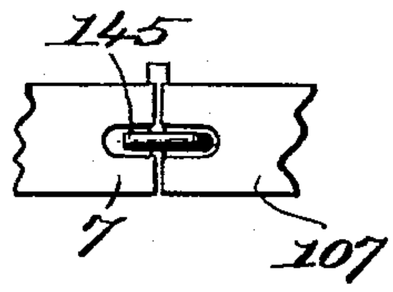

Fig. 9a

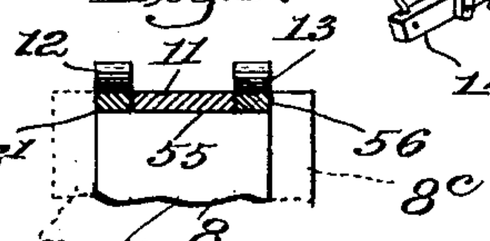

Fig. 10.

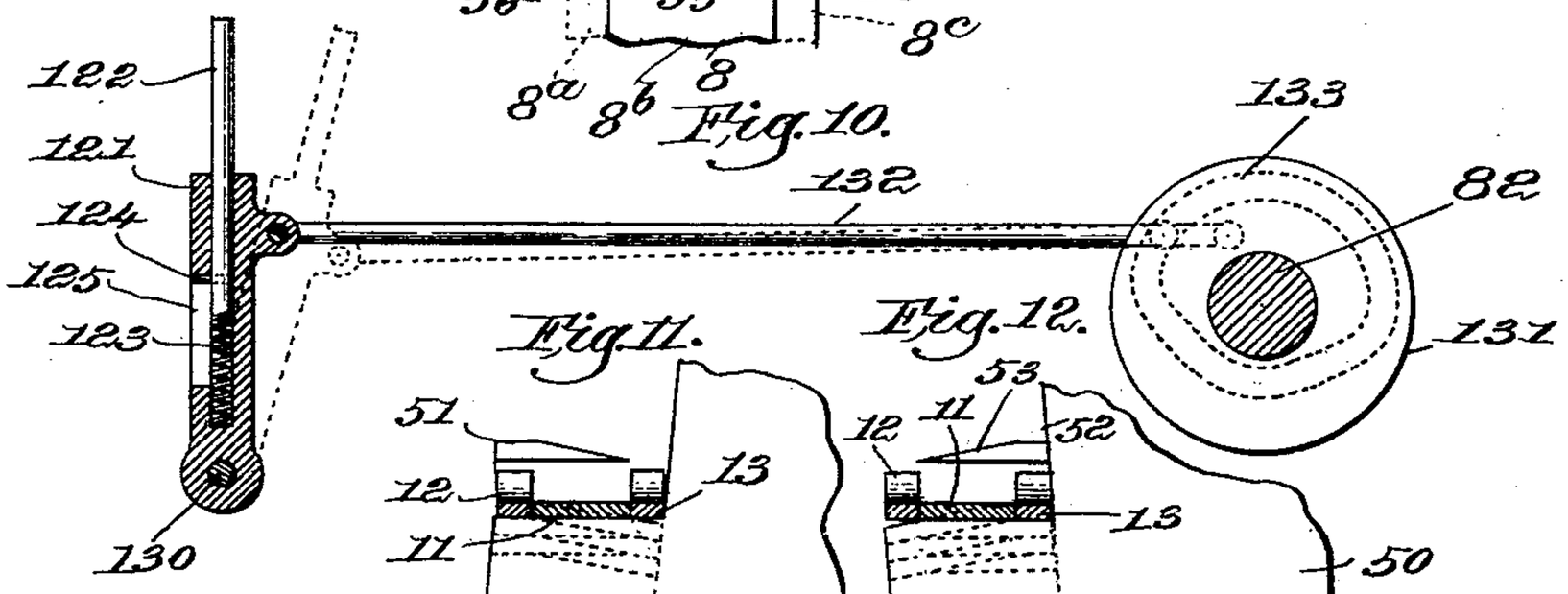

Fig. 11.

Fig. 12.

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MACHINE FOR MAKING TACKS OR NAILS.

(Application filed May 11, 1901.)

(No Model.) 4 Sheets—Sheet 4.

Fig. 13.

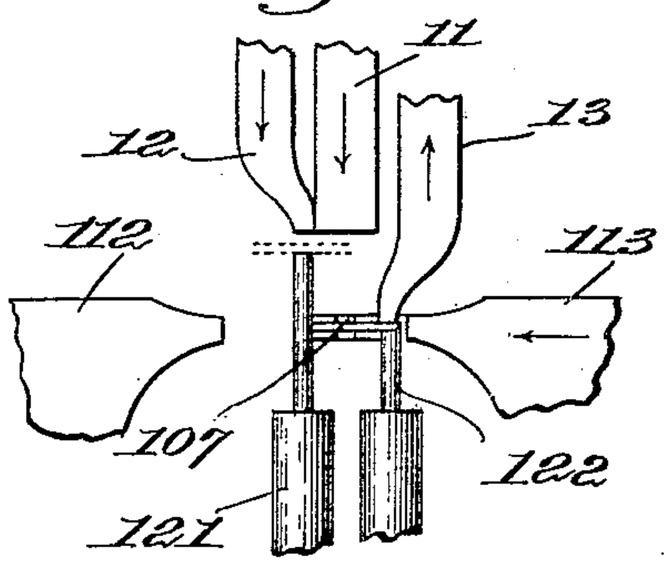


Fig. 14.

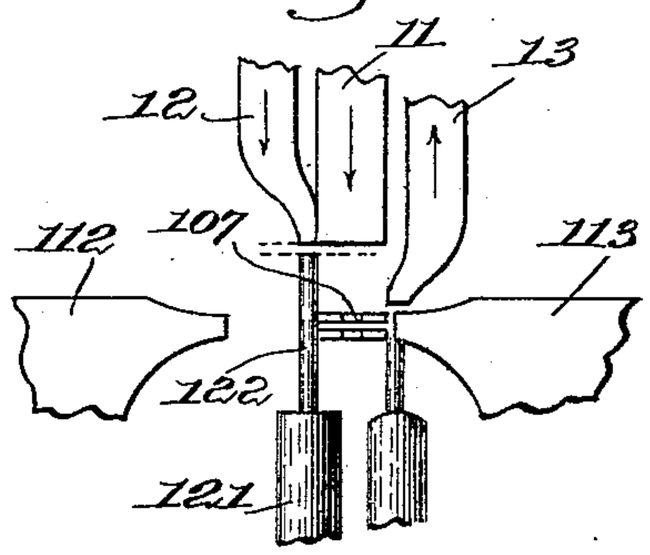


Fig. 15.

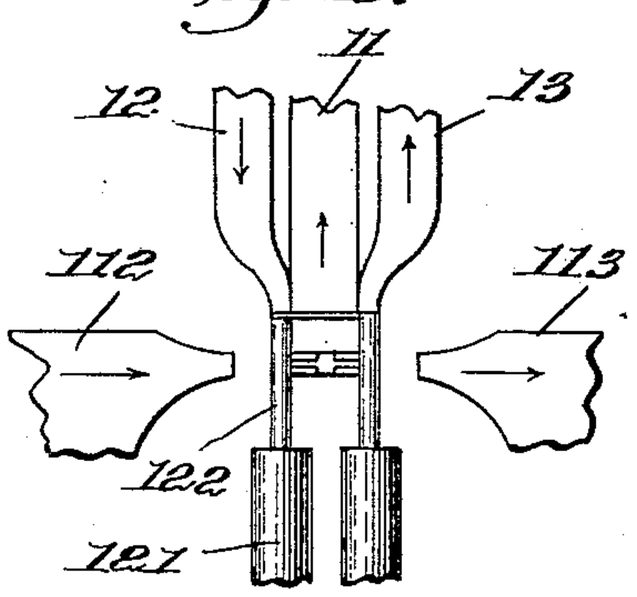


Fig. 16.

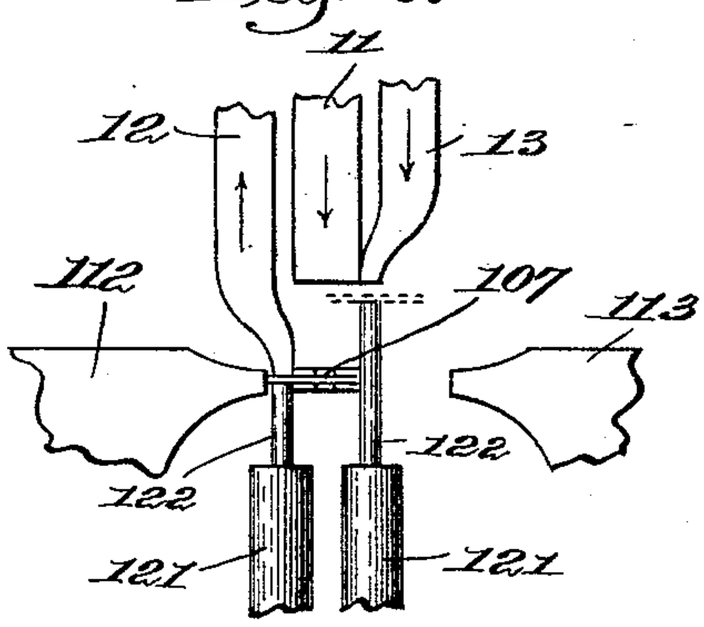


Fig. 17.

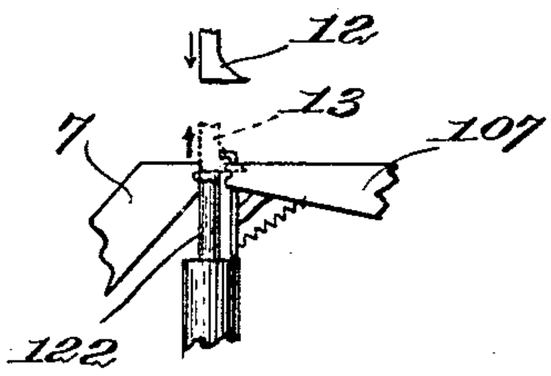


Fig. 18.

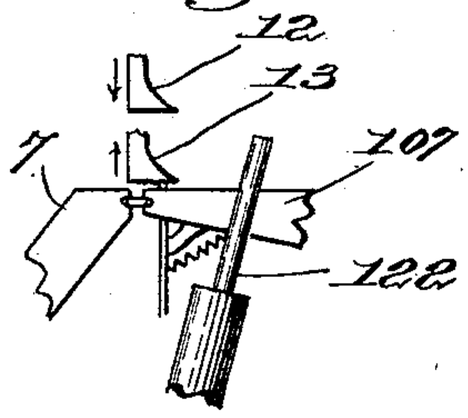


Fig. 19.

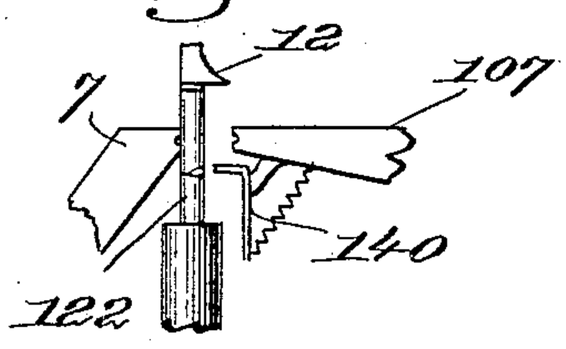
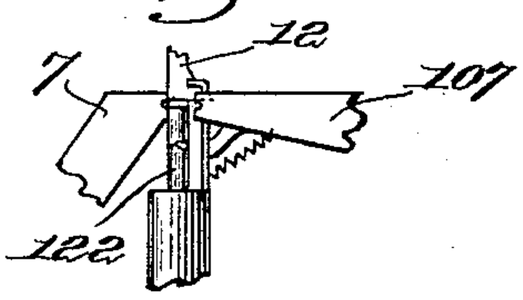


Fig. 20.



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UNITED STATES PATENT OFFICE.

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MACHINE FOR MAKING TACKS OR NAILS.

SPECIFICATION forming part of Letters Patent No. 684,364, dated October 8, 1901.

Application filed May 11, 1901. Serial No. 59,787. (No model.)

To all whom it may concern:

Be it known that I, JAMES N. GIFFORD, a citizen of the United States, residing at Fairhaven, in the county of Bristol and State of Massachusetts, have invented an Improvement in Machines for Making Tacks or Nails, of which the following description, in connection with the accompanying drawings, is a specification, like numerals on the drawings representing like parts.

In most automatic machinery for cutting tack-blanks from a sheet of metal and forming the same into tacks or nails the sheet of metal from which the tacks are to be made is first cut into strips which are of a width approximately equal to the length of the blanks from which the tacks are made, and said strip is then fed to a cutting mechanism which operates to cut the same transversely into the blanks of the requisite shape. From the cutting mechanism the blank is delivered to a heading mechanism, which operates to swage a head on the blank, thus completing the tack or nail. With this class of machines it is necessary to cut the material from which the blanks are formed into strips of the appropriate size before feeding the same to the cutting mechanism; and it is the object of my invention to improve this class of devices by providing a mechanism which operates to cut a sheet of metal into strips, the strips being cut successively, and to cut each strip into tack-blanks simultaneously with the operation of cutting said strip from the sheet. My device includes a cutting mechanism and means to feed the sheet of metal toward the cutting mechanism, and said cutting mechanism operates during the forward movement of the sheet to make a series of cuts parallel to the line of feed, thereby cutting from the sheet of metal a strip parallel to the line of feed and longitudinally of the sheet. The cutting mechanism is so constructed that as the longitudinal strip is cut from the sheet it is simultaneously cut transversely into tack-blanks. Suitable heading mechanism is employed in connection with the cutting mechanism for forming heads upon the blanks. The apparatus is so constructed that after one strip has been cut from the sheet of metal and cut up into tack-blanks the said sheet is automatically retracted from the cutting mechanism and when in its retracted position is moved transversely to the line of feed, and thus shifted into the proper position to have another strip of metal cut therefrom. The forward-feed mechanism is then automatically thrown into operation to feed the sheet of metal toward the cutting mechanism, said cutting mechanism operating to cut a strip from the sheet and simultaneously cut said sheet into tack-blanks, as described. This operation is repeated until the sheet is entirely cut into blanks. With my device, therefore, it is unnecessary to first cut the sheet into strips before feeding it to the machine, as the machine cuts the strips from the sheet, as well as cutting said strips into tack-blanks.

The invention comprises a cutting mechanism including three knives—a center knife and at either side thereof one which which I have termed a "leader-knife." The center knife is adapted to cut the sheet of metal perpendicular to the line of feed, and one of the leader-knives is constructed to cut the sheet both perpendicular to the line of feed and parallel thereto. Suitable knife-operating mechanism is employed to reciprocate the knives independently, the center knife being reciprocated alternately in unison with the leader-knives. Combined with the cutting mechanism is a vibrating table upon which is mounted the feeding mechanism for feeding the sheet of metal to the cutting mechanism, and the vibrating table is constructed to vibrate synchronously with the reciprocations of the center knife. The knife-operating mechanism and the table-vibrating mechanism are so timed that the center knife and one leader-knife are reciprocated to cut a blank from the sheet of metal when the table is in one extreme position, and the center knife and the other leader-knife are reciprocated to cut an oppositely-disposed blank when the table is in the other extreme position.

My invention also includes a suitable heading mechanism for forming heads on the tack-blanks, and the leader-knives operate to deliver the blanks to the heading mechanism.

In the drawings, Figure 1 is a side elevation of a machine embodying my invention.

Fig. 2 is a side elevation looking in the opposite direction from Fig. 1. Fig. 3 is a top plan view. Fig. 4 is a central vertical section of the machine. Fig. 5 is a front elevation of the knives, the bed of the machine being shown in section. Fig. 6 is a section on the line 6 6, Fig. 5. Fig. 6ª is a detail of the upper end of the slides carrying the movable knives. Figs. 7 and 8 are details of the die members and the clearer. Fig. 9 is a plan view of the die members. Fig. 9ª is a plan view of the cutting end of the bed-knives, showing the movable knives in section. Fig. 10 is an enlarged detail of one of the followers. Figs. 11 and 12 are details showing the manner in which the sheet of metal is cut into strips and simultaneously cut into blanks, Fig. 11 being the cut which is made by the center knife and one leader-knife when the table is in one extreme position, and Fig. 12 being the cut which is made by the center knife and the other leader-knife when the table is in the opposite position. Figs. 13, 14, 15, and 16 are views showing different operative positions of the knives and headers. Figs. 17, 18, 19, and 20 are views showing the corresponding positions of the die members. Figs. 21 and 24 are details showing the knock-off for the reciprocating feeding mechanism. Fig. 22 is a detail of the means for holding the sheet of metal to be cut. Fig. 23 is a detail showing the mechanism for vibrating the table. Fig. 25 is a detail of the clamp for the two slides of the holder.

3 designates a frame of any suitable construction adapted to support the operative parts of the machine, the said frame having means to support the fixed die member 7, hereinafter referred to, and the fixed or bed knife 8 of the cutting mechanism, the said bed-knife in this embodiment of my invention being supported on top of the fixed die member 7 and both the fixed knife and the fixed die member being connected to the bed 9 of the machine by any suitable means, as by the bolts 10. Coöperating with the fixed knife 8 are the reciprocating knives 11, 12, and 13, the knife 11 being situated between the knives 12 and 13 and being designated as the "active" or "central" knife, while the knives 12 and 13 either side of the central knife are hereinafter referred to as "leader-knives." The active or central knife 11 is adjustably mounted in any suitable way upon a head-block 5, as by screws 14, passing through slots in the central knife and into said head-block, and the said head-block 5 reciprocates in and is guided by suitable ways 4, carried by the frame 3. At either side of the central knife 11 the head-block or slide 5 is provided with a dovetailed recess in which are slidably mounted the auxiliary slides 16 and 17, the said slides carrying the leader-knives 12 and 13, respectively. For this purpose each slide is preferably channeled out, as at 18, sufficiently to receive a leader-knife, and the said knife is adjustably held in position by means of a clamp, shown as a yoke 19, bearing at one end against the face of the knife and at the other end against the face of the slide 17 or of a projection 20 thereon, the said yoke or U-shaped strap 19 being held in place by the screw 21, passing into the slide. The upper end of each leader-knife bears against an adjusting-screw 22, supported in the upper end of the corresponding slide, the purpose of which adjusting-screw is to provide means for properly adjusting the cutting edge of each leader-knife with relation to the cutting edge of the center knife. By making the center knife detachable and by supporting the leader-knives in the channeled-out portions 18 of the slides it will be seen that knives of different sizes or widths may be employed, whereby tack-blanks of different lengths may be cut according to the size of tack desired to be made. I preferably fill the space between the outer sides of the leader-knives and the shoulder of the channeled-out portion 18 of the slides with shims 300 of a suitable thickness, as seen in Fig. 6, said shims operating in connection with the yokes 19 to hold the leader-knives firmly in place.

The head-block 5 is provided at its upper end with the rearwardly-extending arm 24, and each slide 16 and 17 is provided with a similar arm or bearing 24′, these arms being engaged by cams 25 and 26, mounted upon a main shaft 27, which is carried at the upper end of the frame, said shaft preferably having attached thereto the fly-wheel 28 and being driven in any suitable way, as by a belt passing over the usual fast and loose pulleys 29. The cam 25 is a double cam, (see Fig. 4,) while the cams 26 are single cams and are oppositely disposed, so that as the shaft 27 revolves the center knife 11 will make two reciprocations, while the leader-knives 12 and 13 each make a single reciprocation and operate alternately. The purpose of this arrangement of the operating mechanism will be presently explained. To return the knives to their upper position after having been forced down by the cams, I may provide a series of springs 30, which are supported at one end upon a suitable fixed support, as a cross-piece 31, secured to the frame, and bear at their upper ends against the under side of the arms 24 and 24′ on the head-block and auxiliary slides, respectively. Any other suitable means for raising the knives may be employed, if desired.

The means for holding the sheet of metal which is to be cut into tack-blanks and for feeding the same to the cutting mechanism is mounted upon a reciprocating table 33, the said table being provided with the supporting-arm 33ª, which is pivoted to the under side of the bed 9 upon the pivot-bolt 34, the pivot-point of the table being situated nearly vertically beneath the center knife 11. The operating mechanism for vibrating the table 33 comprises an arm 35, which is rigid with

and extends rearwardly from the supporting-arm 33^a at the pivotal point of the table and is confined between the two arms of a fork 36, carried by the shaft 37. The fork 36 has the arm 38 extending transversely therefrom, to the end of which is connected the link 39, the said link being connected to the eccentric-pin 40, carried by the gear-wheel 41. The said gear-wheel 41 is journaled in any suitable bearings on the frame 3 and is driven by means of the gear 42, fast on the drive-shaft 27. The gear-wheels 41 and 42 are of the same size, and it will thus be seen that for each rotation of the drive-shaft or cam-shaft 27 the gear-wheel 41 will be rotated once and the table 33 will be given a complete vibration—*i. e.*, it will move from one extreme position to the opposite extreme position and back again. The vibrating mechanism for the table 33 and the cams on the cam-shaft are so timed relative to each other that one leader-knife and the center knife are moved downwardly to coöperate with the bed-knife to cut a blank from the sheet of metal when the table is in one extreme position, and the other leader-knife and the center knife are operated to cut the next succeeding blank when the table is in the opposite extreme position.

Referring now to Figs. 11 and 12, the manner in which the sheet of metal, which is designated by 50, is cut into strips and the strips simultaneously cut into tack-blanks will be made more clear. Assuming that the table is in one extreme position—for instance, that illustrated in Fig. 3—the cams 25 and 26 are then operating to depress the center knife 11 and the leader-knife 12, with the result that a tack-blank of the shape illustrated at 51 in Fig. 11 will be severed from the sheet of metal. The leader knife 12 is further depressed to carry the blank 51 into position to be operated by the heading mechanism, as will be presently described, and the table 33 is meanwhile swung into the opposite position from that illustrated in Fig. 3, carrying the sheet of metal 50, supported thereby, to the position shown in Fig. 12. The knife-operating cams now depress the center knife 11 and the leader-knife 13, and since the leader-knife 13 is constructed to cut the metal both on the same line as the center knife 11 and on the line 52, which is approximately parallel to the line of feed, it will be seen that a tack-blank 53 will be cut from the sheet, with its point disposed in an opposite direction from that of the tack-blank 51. The table is then swung back to the position shown in Fig. 3, when the knives 11 and 12 coöperate to cut another blank similar to 51, and this operation is repeated. Since, therefore, the leader-knife 13 operates to cut both transversely and longitudinally of the sheet, it will be seen that a strip of metal, as 54, is cut from the sheet of metal 50, the said strip being simultaneously cut into oppositely-disposed tack-blanks.

Referring to Fig. 9^a, the shape of the bed-knife will be more plainly seen, and it will be seen that the said knife has the straight transverse cutting edge 55, coöperating with the center knife 11 and the front portion of the leader-knife 13, and the longitudinal cutting edge 56, coöperating with the side of the leader-knife 13, whereby the sheet is cut both longitudinally and transversely. I may, if desired, provide the said bed-knife with the longitudinal cutting edge 56′ to coöperate with the leader-knife 12, although this is not necessary. I may construct the bed-knife 8 of a single piece of metal having its operative edge shaped to form the ⌊-shaped cutting edge, or I may make said bed-knife in one or more sections. In Fig. 3 the said knife is illustrated as made in three sections 8^a, 8^b, and 8^c, the section 8^a, which may or may not be used, coöperating with the leader-knife 12 and having the longitudinal cutting edge 56′, the section 8^b coöperating with the active or central knife 11 and the front of both leader-knives and having the straight cutting edge 55, and the section 8^c coöperating with the leader-knife 13 and having the longitudinal cutting edge 56. Each of these sections are preferably made adjustable longitudinally by providing them with the slots 800, through which the bolts 10 pass. By this means different-sized bed-knives may be used when it is desired to cut different-sized tack-blanks.

The mechanism for holding and feeding the sheet of metal to the cutting mechanism will now be described.

The upper side of the table is provided with suitable grooves or guideways 60, in which is guided a slide 61, the said slide having suitable lugs fitted to the grooves or guideways 60. The upper face of the slide 61 is provided with a dovetailed rib 62, on which is mounted to slide transversely of the table an upper slide or holder 63, the said holder having an arm 64 extended therefrom, to the end of which is any suitable clamping device for holding a sheet of metal, said clamping device consisting conveniently of two plates 65^b and 65′, between which one corner of the sheet of metal 50 is firmly clamped, the plate 65′ being rigid with the arm 64 and provided with the bolts 65^a, over which a plate 65^b is placed, said plates being clamped together by any suitable nuts. The slide 61 is automatically fed forward or toward the cutting mechanism as the blanks are cut by any suitable means, as by the weight 70, carried by a cord 71, which passes over a suitable pulley 72 and is attached in any usual way to the said slide. I have provided a suitable gage 500, Fig. 4, against which the front edge of the strip of metal being cut abuts as it is fed toward the knives, said gage holding the sheet in proper position to have the blanks cut therefrom. The gage is preferably supported in a suitable slot 501 in the head-block 5, and is situated immediately behind the active or central knife 11, it having the nose portion 502, which pro-

jects underneath the lower edge of the knife 11 and against which the edge of the sheet of metal abuts. The gage, it will be seen, moves up and down with the active knife, and to prevent said gage from being disengaged from the sheet of metal I make the nose 502 of such a length that even when the active knife is in its extreme upper position the nose of the gage will extend below the top of the bed-knife. Any suitable means may be employed to adjust the gage for different sizes of blanks, and, as shown, I support said gage on an adjusting-screw 504, which is held against longitudinal movement in the lower end of the head-block 5 and is screw-threaded into the stem of the gage. The upper end of the gage-stem will preferably rest against a swell 506, about which the gage is rocked by the adjusting-screw. When the sheet has been advanced to the cutting mechanism sufficiently to cut an entire strip therefrom and to simultaneously cut said strips into tack-blanks, automatic mechanism is thrown into operation to retract the said slide 61, and consequently the sheet 50, and when the slide and sheet are in their retracted position the upper slide or holder 63 is automatically shifted at right angles to the line of feed a distance sufficient to bring the sheet into position to have a second strip cut therefrom. The slide 61 carries at one end a downwardly-extended arm 65, through which is threaded a rod 66, slidably mounted in suitable guides upon the side of the table, the said rod 66 having thereon the adjustable stop-collars 67. The front end of the rod is secured in any suitable way to a block 68, having a stem 69, which passes through a slot 70 in the cam-plate 71, Fig. 24, which is mounted upon the vertical pivot or spindle 72, said pivot or spindle being supported in any suitable way on the frame of the machine. A knock-off lever 74 is pivoted to any suitable support, as to the bracket which supports the spindle 72, said knock-off lever having at its upper end a head 75, which engages a depression or recess in the edge of the cam-plate 71, as plainly seen in Fig. 3. The lower end of the knock-off lever may be forked, if desired, and engages a suitable groove in a sliding clutch member 76, splined to the shaft 77, the said clutch member coöperating with the clutch member 78, loose on said shaft. The shaft 77 may be driven by any suitable means, and I have illustrated said shaft as having a pulley 79 mounted on the end thereof, over which runs a belt 80, said belt passing around a drive-pulley 81 on the shaft 82, which shaft operates header mechanism, as hereinafter described, and is driven by means of the gear-wheel 83, which meshes with the gear 41, above referred to. Secured to the slide 61 is the belt or cord 85, passing over pulley 86 on the end of the table and secured at its end to the clutch member 78. The front stop-collar 67 will be so adjusted upon the rod 66 that the arm 65 will contact therewith just when the sheet of metal has been fed forward sufficiently so that a strip has just been cut therefrom, and any further movement toward the cutting mechanism of the slide 61, caused by the weight 70, will cause the arm 65 to engage the stop-collar 67 and move the rod 66 toward the cutting mechanism and through the block 68 turn the cam-plate 71 in the direction of the arrow, Fig. 3, thereby throwing the head of the knock-off lever out of the notch in the edge of the plate and moving the clutch member 76 into engagement with the clutch member 78. The rotation of the shaft 77 is thereby imparted to the clutch member 78, and the cord 85 is then wound upon the drum portion, thus retracting the slide 61.

Pivoted to the rear end of the slide 61 is a lever 90, carrying at its end a friction clamp device 91, which normally binds upon the top of the holder 63 and by its weight or a suitable spring mechanism locks the said holder to the slide 61. The clamp device 91 has the stem 92 extending rearwardly therefrom, and the table has at its rear end the cam 93 so positioned as to be engaged by the stem 92 when the slide reaches its retracted position, the said cam 93 operating to raise the clamp device 91 and allow the holder or upper slide 63 to be moved transversely of the line of feed by means of the weight 100, the said weight being suspended from a cord 101, which passes over a suitable pulley 102 through an eye on the arm 103, secured to the end of the slide 61, and is attached to the holder 63, as at 104. The holder 63 is limited in its transverse movement by the edge of the sheet of metal which is being cut striking a suitable stop or guide device 106, fastened in any suitable way to the bed of the machine, the said guide being so positioned that the sheet will be stopped in the correct position to be presented to the knives to have another strip cut therefrom. Preferably the upper face of the slide 63 where it is engaged by the clamping device 91 will be slightly roughened, as shown in Fig. 3, so that the said clamp device will more firmly grip the upper slide or holder 63 to lock it in its proper position. It will be understood, of course, that as soon as the forward movement of the slide 61 begins the stem of the clamp device will drop off from the cam 93 to allow the said clamp device to lock the holder 63 to the slide 61.

Combined with the cutting mechanism which has been above described is a heading mechanism, which is adapted to receive tack-blanks from the cutting mechanism and form the heads thereon to make the complete tack. The form of heading mechanism illustrated herein comprises a suitable die, including fixed and movable die members adapted to receive the tack-blanks between the same, and reciprocating headers operating to swage heads on said blanks while they are gripped between the die members. Means are also employed in connection with the cutting mechanism whereby the cutting mechanism

is made to feed or deliver the severed blanks directly to the die members.

Referring to Fig. 4, the fixed die member is designated by 7, this being secured to the bed 9 of the machine by the bolts 10, as hereinbefore described. The movable die member is designated by 107, the same being supported upon and secured in any suitable way to a slide 108, guided in suitable ways in the bed of the machine and operated in one direction by the double cam 109, mounted upon the shaft 82, hereinbefore referred to, and in the other direction by a spring 301. The active faces of the dies are provided with the grooves or scores 110, (see Figs. 7 and 8,) in which the tack-blank is received, as hereinafter described, the said scores or grooves 110 operating to give the proper shape to the stem or shank of the blank. The headers which swage the heads upon the tack-blanks while they are gripped between the die members are designated by 112 and 113, respectively, they being mounted to reciprocate transversely of the bed and in suitable ways and being moved in a direction toward the die members by wedges 114, which engage the ends thereof and play against suitable backings or flanges 115, made integral with the bed 9 of the machine, the said wedges being held in place by the cap-plates 116, as seen in Fig. 5. One of the wedges is connected by means of a link 117 to a crank-pin 118 on the gear-wheel 83, while the other wedge is connected by a similar link 117 to a crank-pin 119 upon the belt-pulley 81, before referred to, and the crank-pins 118 and 119 are oppositely disposed, as will be seen from Fig. 3, so that while one wedge is moved to the left to cause the corresponding header to swage a head upon the tack the opposite wedge is withdrawn. Suitable springs 120, connected to the headers and to the plates 116, respectively, serve to retract the headers when the wedges are withdrawn. The gear-wheel 83 is of the same size as the gear-wheels 41 and 42, so that the shaft 82 rotates synchronously with the drive-shaft 27, and the movable die therefore moves synchronously with the active knife. The object in having the two oppositely-disposed headers alternately operating is because the character of the cutting mechanism is such that oppositely-disposed tack-blanks are cut from the sheet of metal, and as the said blanks are received by the dies the successive blanks are arranged with their heads in opposite directions.

Coöperating with each leader-knife is what I have termed a "follower," the same comprising a rocking member 121, which receives the yielding bearer-pin 122, the said pin being received in a recess in the rocking member 121 and being supported upon a suitable spring 123. To limit the movement of the bearer-pin 122, the same is provided with a lug 124, which plays in a suitable groove or slot 125 in the rocking member. A follower composed of the rocking member 121 and the bearer-pin 122 is normally disposed directly beneath each leader-knife, and as either leader-knife and the center knife is depressed by the cam mechanism to cut a blank from the sheet of metal the blank when severed is carried by the leader-knife down into engagement with the upper end of the bearer-pin 122, the said bearer-pin and the leader-knife operating to clamp the head of the tack-blank therebetween. The cams 26 for operating the leader-knife are so designed and shaped that after they have depressed the leader-knife sufficiently to cut the blank from the sheet of metal they continue the downward movement of said leader-knife, the continued downward movement of said knife operating to force the bearer-pin into the rocking member 91 against the action of the spring 123, the tack-blank, it being remembered, being clamped between the bearer-pin and the leader-knife. When the tack-blank is carried down in line with the score 110 in the two die members, the cam 109 operates to move the movable die member toward the fixed die member and grip the tack-blank between the two die members. At this point the cam 26, which has depressed the leader-knife, allows the same to rise under the action of the spring 30, and the wedge 114 operates to force the header 112 toward the die member to swage the head on the tack-blank. Before the header is brought into operative position the follower is rocked on its support 130 in order to remove the bearer-pin 122 out of the way of the active face of the header, such rocking movement of the follower being accomplished in some suitable way, as by a suitable cam 131, mounted on the shaft 82. In this embodiment of my invention the cam is shown as a grooved cam and the rocking member 121 is shown as having connected thereto a suitable link 132, from the end of which extends a projection which is engaged by the cam-groove 133 in the cam 131. It will be understood, of course, that there is one follower coöperating with each leader-knife, and the cam-groove 133 in the cam-disks 131 is so constructed that each follower will be rocked slightly just before the corresponding header comes into position to swage the head upon the tack-blank, the rocking of the follower of course not occurring until after the tack-blank has been gripped between the two die members. The extent of rocking movement of the follower need not be sufficient so that the end of the bearer-pin 122 becomes disengaged from the end of the coöperating leader-knife, and therefore as the leader-knife rises under the action of the spring 30 the bearer-pin follows the same upwardly until the stop-pin 124 engages the end of the groove 125, although in the embodiment of my invention I have shown the rocking member as having a rocking movement sufficient so that the end of the bearer-pin passes off from the end of corresponding leader-knife. When this oc-

curs, (see Fig. 18,) the spring 123 lifts the bearer-pin to its normal or elevated position, and as the leader-knife is raised the rocking member is brought into the vertical position, with the bearer-pin again directly under the leader-knife by the cam 131. I would here remark that the movable die member 107 is in practice approximately the width of the active knife, so that after either leader-knife has descended, carrying down the tack-blank and the bearer-pin of the corresponding follower, and the movable die member moves up to grip the tack-blank, said die member passes just inside the leader-knife. As the follower is rocked to remove the bearer-pin from the path of the header said bearer-pin moves along the side of the movable die member, as shown in Fig. 18.

Referring to Figs. 13 to 20, inclusive, the various steps of cutting the tack-blanks and forming the heads upon the same will be traced out. In Fig. 13 the header 112 is withdrawn and the leader-knife 12 and the center knife 11 are in their extreme upper position and have just started downwardly, as indicated by the arrows, the leader-knife 13 being in its lowest position. As the knives 12 and 11 descend a tack-blank is cut from the sheet of metal, as hereinbefore described, the head of the tack-blank being underneath the leader-knife 12, as will be evident from an inspection of Fig. 11. Figs. 14 and 18 illustrate the position of the parts just as the cutting action begins, and Fig. 15 illustrates the position of the knives after the blank has been fully severed from the sheet and the active or center knife 11 is just about to move upward again for another stroke, while the leader-knife 12 continues its downward movement and clamps the tack-blank between the same and the pin 122 of the follower. The arrows in Fig. 15 show the direction of the knives and headers at this point. Disregarding for the moment the movement of the leader-knife 13 and the header 113, it will be understood from the above description that the leader-knife 12 continues its downward movement, holding the tack-blank between the same and the bearer-pin 122 and forcing the said bearer-pin against the spring 123 until the tack-blank is brought into alinement with the scores 110 in the die members, Figs. 16 and 20. At this point the movable die member is operated by means of its cam to clamp and grip the tack-blank between the same and the fixed die member, and the header 112 is forced toward the die members by its wedge 114 to swage the head upon the tack. Just previous to the swaging action the cam 133 operates to retract or vibrate the follower to move the end of the bearer-pin 122 out of the way of the header 112, above described, the said bearer-pin passing out from underneath the head of the tack and being forced by the spring up against the edge of the lower end of the leader-knife 12. This position of the parts is illustrated in Figs. 16 and 18, and as the leader-knife 12 begins to ascend the cams 26 and 25 are depressing the active knife 11 and the other leader-knife 13 to cut from the sheet of metal a tack-blank corresponding to that illustrated at 53 in Fig. 12, the head of the tack-blank being directly under the leader-knife 12 and disposed in an opposite direction from the head of the previous tack. The cam 26, operating the leader-knife 13, is constructed precisely like the cam for operating the leader-knife 12, and consequently after the knives 11 and 13 have been operated in unison to cut a blank from the sheet of metal the cam 26 for the knife 13 operates to continue the downward movement of said knife, and the said knife coöperating with its follower operates to bring the severed tack-blank into position to be gripped between the die members, and as this takes place the header 113 is operated by its wedge to form a head on said tack, the follower coöperating with the leader-knife 13 being moved out of the way of the header 113 by the cam-groove above described. It will also be seen that the leader-knives operate alternately and that the center or active knife operates in unison with each leader-knife and also that the movable die member operates synchronously with the active knife. Furthermore, the header 112 operates synchronously with the leader-knife 12, while the oppositely-disposed header 113 operates synchronously with the other leader-knife 13. By thus using two leader-knives, each operating alternately but in unison with the active knife, and in using two headers I am enabled to materially increase the output of the machine without increasing the speed of the heading mechanism, for each header operates to head only every other tack, and consequently the movement thereof may be comparatively slow relative to the movement of the active knife.

I have also employed in connection with the mechanism herein described a clearer operating to positively force the finished tacks from between the die members when they are separated. One suitable form of clearer is illustrated in Figs. 7 and 8, and it comprises a hooked rod 140, pivoted at its lower end to a lever 141, which lever in turn is suitably pivoted to the bed of the machine and has connected to its other end a rod 142, passing up through the bed of the machine and in position to be operated upon by a cam 143, mounted on the shaft 27. The active faces of the die members 7 and 107 are provided with a central groove or notch 145, in which the upper bent end of the clearer 140 normally plays. The clearer is yieldingly connected to the movable die member 107 by any suitable means, such as a spring 150, and I will preferably provide the movable die member with a suitable guide-arm 303, against which the clearer is held by the spring 156. The cam 143 is so constructed as to depress the rod 142 and raise the clearer 141 while the movable die member 107 is in its retracted

position, the spring 150 serving to hold the clearer in the recess 145 of the said movable die member. After the tack-blank has been brought into position to be gripped by the die member the said die member is moved forward by its operating-cam, as above described, and the hooked nose of the clearer is brought over the tack-blank, this being the position of the parts illustrated in Fig. 7. When the head has been formed upon the tack, the cam 143 has been so turned that the end of the rod 142 passes off from the rise thereon and a suitable spring, as 155, operates to raise the rod 142 and quickly depress the clearer 140 to thus force the tack from between the die members, the tack falling into a suitable chute (not shown) and gravitating to any suitable receptacle. As the movable die member is retracted the cam 143 operates to raise the clearer, as above described, into position to operate on the next tack.

From the above description it will be seen that I have devised a machine for cutting strips from a sheet of metal and for simultaneously cutting said strips into oppositely-disposed tack-blanks, and such cutting mechanism is combined with heading mechanism comprising die members adapted to receive the successive oppositely-disposed blanks and oppositely-disposed header mechanism operating to form heads on the blanks while they are gripped by the die members. Believing that I am the first to devise a machine for thus cutting a sheet of metal into strips and simultaneously cutting the same into tack-blanks, I desire to claim the same broadly, and I consider as coming within my invention any structure which accomplishes this result.

It will be obvious to those skilled in the art that various changes may be made in the details of my invention without departing from the spirit and scope thereof, which is expressed in the appended claims.

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

1. In a machine for making tacks, cutting mechanism, means to feed a sheet of metal to said cutting mechanism, said mechanism operating to make a series of cuts parallel to the line of feed, whereby a single strip is cut from said sheet and to simultaneously make cuts transverse to the line of feed, whereby said strip is cut transversely into tack-blanks, and means, rendered operative after each strip has been cut into tack-blanks, to automatically shift the sheet into position to have another strip cut therefrom.

2. In a machine for making tacks, a plurality of knives, means to advance a sheet of metal toward said knives, said knives operating to cut a single strip from said sheet parallel to the line of feed and to simultaneously cut said strip transversely into tack-blanks, and means, rendered operative after one strip has been cut, to automatically withdraw said sheet from the knives and move the same parallel to the knives and into position to have another strip cut therefrom.

3. In a tack-making machine, a table having means to support a sheet of metal, and a plurality of coöperating knives adapted to cut tack-blanks from said sheet, said knives cutting the sheet longitudinally thereof to cut a single strip therefrom, and cutting each strip transversely into oppositely-disposed tack-blanks simultaneously with the cutting of the strip from the sheet.

4. In a tack-making machine, a vibrating table, adapted to support a sheet of metal, a plurality of independent knives, comprising a center knife and leader-knives either side thereof, the center knife and one leader-knife coöperating to cut a blank when the vibrating table is in one extreme position, and the center knife and the other leader-knife coöperating to cut the next blank when the table is in the other extreme position.

5. In a tack-making machine, a vibrating table, adapted to support a sheet of metal, cutting mechanism, means to feed the sheet to said cutting mechanism, comprising a movable center knife and independent leader-knives either side thereof, said center knife being adapted to make a cut transversely to the line of feed of the sheet, and one of said leader-knives being adapted to cut both transversely to the line of feed and parallel thereto, whereby the sheet is cut into strips, and said strips are simultaneously cut into tack-blanks.

6. In a tack-making machine, a vibrating table, adapted to support a sheet of metal, cutting mechanism, means to feed the sheet toward said cutting mechanism, said cutting mechanism comprising a movable center knife and independent leader-knives either side thereof, said center knife being adapted to make a cut transversely to the line of feed, and one of the leader-knives being adapted to cut both transversely and parallel to the line of feed, whereby the sheet is cut into strips, and said strips are simultaneously cut into tack-blanks, and means, rendered operative after each strip has been cut into tack-blanks, to automatically shift the sheet into position to have a fresh strip cut therefrom.

7. In a machine for making tacks, means for successively cutting single strips longitudinally from a sheet of metal, and means for cutting each strip transversely into tack-blanks simultaneously with the operation of cutting said strip from the sheet, combined with means independent from the cutting means for automatically forming heads upon the cut blanks.

8. In a machine for making tacks, coöperating knives, means to advance a sheet of metal toward said knives, said knives being adapted to cut a single strip from said sheet parallel to the line of feed, and to simultaneously cut said strip transversely into tack-blanks, means for forming heads upon the cut blanks, and means, rendered operative

after each strip has been cut into blanks, to automatically shift the sheet relative to the knives, and into position to have another strip cut therefrom.

9. In a machine for making tacks, a plurality of knives, means to advance a sheet of metal toward said knives, said knives operating to cut a single strip from said sheet parallel to the line of feed, and to simultaneously cut said strip transversely into tack-blanks, means for automatically forming heads upon the cut blanks, and means, rendered operative after one strip has been cut, to automatically withdraw said sheet from the knives and move the same parallel to the knives, and into position to have another strip cut therefrom.

10. In a tack-making machine, a vibrating table, having means to support a sheet of metal, cutting mechanism, including a central knife and independent leader-knives either side thereof, means to operate said central knife alternately in unison with each leader-knife, and means to feed the sheet of metal toward said knives, the center knife and one leader-knife operating to cut a blank from the sheet when the table is in one extreme position, and the center knife and the other leader-knife operating to cut the next succeeding blank from the sheet when the table is in the other extreme position, whereby the succeeding blanks are cut with their points extending in opposite directions, combined with heading mechanism adapted to receive the blanks from the cutting mechanism and form heads thereon.

11. In a tack-making machine, cutting mechanism, a vibrating table, having means to support a sheet of metal, means to feed the sheet toward the cutting mechanism, means to vibrate said table synchronously with the operation of the cutting mechanism, whereby tack-blanks are cut with the points of succeeding blanks extending in opposite directions, a die to receive the tack-blanks from the cutting mechanism, and means to form heads upon the blanks while they are in the die.

12. In a tack-making machine, cutting mechanism to cut tack-blanks from a sheet of metal, a vibrating table to support said sheet, means to vibrate said table synchronously with the operation of the cutting mechanism, means to feed said sheet to the cutting mechanism, whereby tack-blanks are cut with the head end of succeeding blanks extending in opposite directions, a die to receive the tacks from the cutting mechanism, the blanks being received by the die with the heads alternately in opposite directions, and alternately-operating headers to form heads on the tacks while they are held in the die.

13. In a tack-making machine, cutting mechanism, a vibrating table, having means to support a sheet of metal, means to feed the sheet toward the cutting mechanism, means to vibrate said table synchronously with the operation of the cutting mechanism, whereby tack-blanks are cut with the points of succeeding blanks extending in opposite directions, a die to receive the tack-blanks from the cutting mechanism, means to form heads upon the blanks while they are in the die, and means to positively force the completed tacks from the die.

14. In a tack-making machine, cutting mechanism, comprising a fixed bed-knife, a central movable knife, and movable leader-knives either side thereof, means to operate the central knife alternately in unison with the leader-knives to cut tack-blanks from a sheet of metal, a yielding follower in line with each leader-knife, each follower adapted to receive and hold the blanks between the same and the coöperating leader-knife, a fixed and movable die member below the bed-knife, each leader-knife and its coöperating follower operating to carry the blank therebetween into position to be gripped between the die members while the other leader-knife and the central knife are cutting a blank from the sheet, and means to form heads on the blanks while they are gripped between the die members.

15. In a tack-making machine, cutting mechanism, comprising a fixed bed-knife, a central movable knife, and movable leader-knives either side thereof, means to operate the central knife alternately in unison with the leader-knives to cut tack-blanks from a sheet of metal, a yielding follower in line with each leader-knife, each follower adapted to receive and hold the blanks between the same and the coöperating leader-knife, a fixed and movable die member below the bed-knife, each leader-knife and its coöperating follower operating to carry the blank therebetween into position to be gripped between the die members while the other leader-knife and the central knife are cutting a blank from the sheet, and oppositely-disposed headers operating alternately to form heads on the successive blanks.

16. In a tack-making machine, a vibrating table, having means to support a sheet of metal, cutting mechanism, comprising a central knife and leader-knives either side thereof, means to operate said central knife alternately in unision with the leader-knives, means to vibrate the table synchronously with the operation of the central knife, whereby alternately-disposed tack-blanks are cut from the sheet, a die to receive the blanks from the cutting mechanism, and means for forming heads on the said blanks while they are held in the die.

17. In a tack-making machine, a vibrating table, having means to support a sheet of metal, cutting mechanism, comprising a central knife and leader-knives either side thereof, means to operate said central knife alternately in unison with the leader-knives, means to vibrate the table synchronously with the operation of the central knife, whereby

alternately-disposed tack-blanks are cut from the sheet, a die to receive the blanks from the cutting mechanism, and alternately-operating headers to form heads on the tack-blanks while they are held in the die.

18. In a tack-making machine, a vibrating table, having means to support a sheet of metal, cutting mechanism comprising a bed-knife, a central movable knife, and independently-movable leader-knives either side of the central knife, means to operate said central knife alternately in unison with the leader-knives, means to vibrate the table synchronously with the operation of the central knife, whereby alternately-disposed tack-blanks are cut from the sheet, a die to receive the blanks from the cutting mechanism, said die comprising a fixed die member and a movable die member operating synchronously with the central knife, and oppositely-disposed headers to form heads on the tack-blanks while they are held between the die members.

19. In a tack-making machine, a vibrating table having means to support a sheet of metal, cutting mechanism, comprising a fixed bed-knife, a central movable knife, and independently-movable leader-knives either side of the central knife, a yielding follower in line with each leader-knife, knife-operating mechanism constructed to move the central knife in unison with each leader-knife alternately to cut oppositely-disposed tack-blanks from the sheet, and to give each leader-knife, after the blank is cut, a further movement, whereby the severed blank is held between said knife and its coöperating yielding follower, and carried into position to be gripped in a die, the said die, and means for forming heads on the tack-blanks while they are gripped therein.

20. In a tack-making machine, a vibrating table having means to support a sheet of metal, cutting mechanism, comprising a fixed bed-knife, a central movable knife, and independently-movable leader-knives either side of the central knife, a yielding follower in line with each leader-knife, knife-operating mechanism constructed to move the central knife in unison with each leader-knife alternately to cut oppositely-disposed tack-blanks from the sheet, and to give each leader-knife, after the blank is cut, a further movement, whereby the severed blank is held between said knife and its coöperating yielding follower, and carried into position to be gripped in a die, the said die, comprising a fixed and movable die member, means to move the movable die member synchronously with the central knife, and oppositely-disposed headers to form heads on the tack-blanks while they are gripped between the die members.

21. In a tack-making machine, a vibrating table, adapted to support a sheet of metal, cutting mechanism, means to feed a sheet to said cutting mechanism, said cutting mechanism comprising a movable center knife and independent leader-knives either side thereof, said center knife being adapted to make a cut transversely to the line of feed, and one of said leader-knives being adapted to cut both transversely and parallel to the line of feed, whereby the sheet is cut into strips, and said strips are simultaneously cut into tack-blanks, combined with a die to receive tacks from the cutting mechanism, the blanks being received by the die with the heads alternately in opposite directions, and alternately-operating headers to form heads on the tacks while they are held in the die.

22. In a tack-making machine, coöperating die members, cutting mechanism to cut strips from a sheet of metal and to simultaneously cut said strips into tack-blanks, and to deliver each tack-blank to said die members, and heading mechanism operating to form heads on each tack-blank while it is held between said die members.

23. In a tack-making machine, means to cut strips from a sheet of metal, and to simultaneously cut said strips into tack-blanks, said means including fixed and movable knives, a yielding follower in line with the movable knife, and adapted to receive and hold the tack-blanks between the same and the movable knife, a fixed and movable die, said movable knife and follower supporting the blank until it is received and clamped between the dies, and means to swage a head on the tack when the blank is gripped between the dies.

24. In a tack-making machine, a vibrating table, adapted to support a sheet of metal, cutting mechanism, means to feed the sheet toward said cutting mechanism, comprising a movable center knife and independent leader-knives either side thereof, one of said leader-knives being adapted to cut both transversely to the line of feed and parallel thereto, whereby the sheet is cut into strips, and said strips are simultaneously cut into tack-blanks, a yielding follower in line with each leader-knife and adapted to receive and hold the tack-blanks between the same and the coöperating leader-knife, a fixed and movable die, said leader-knife and follower supporting the blank until it is received by and clamped between the die members, and means to form heads on the tack-blanks when they are gripped in the die.

25. In a tack-making machine, a vibrating table, adapted to support a sheet of metal, cutting mechanism, means to feed said sheet toward the cutting mechanism, said cutting mechanism comprising a movable center knife and independent leader-knives either side thereof, said center knife being adapted to make a cut transverse to the line of feed, and one of the leader-knives being adapted to cut both transversely and parallel to the line of feed, whereby the sheet is cut into strips, and said strips are simultaneously cut into oppositely-disposed tack-blanks, a yielding follower in line with each leader-knife

and adapted to receive and hold the tack-blanks between the same and the coöperating leader-knife, a fixed and movable die, each leader-knife and its follower supporting a severed blank until it is received by and clamped between the die members, and alternately-operating headers to form heads on the tack-blanks when they are gripped in the die.

26. In a tack-making machine, a vibrating table, adapted to support a sheet of metal, cutting mechanism, means to feed said sheet toward the cutting mechanism, said cutting mechanism comprising a movable center knife and independent leader-knives either side thereof, said center knife being adapted to make a cut transverse to the line of feed, and one of the leader-knives being adapted to cut both transversely and parallel to the line of feed, whereby the sheet is cut into strips, and said strips are simultaneously cut into oppositely-disposed tack-blanks, combined with means, rendered operative after one strip has been cut, to automatically withdraw said sheet from the knives and move the same parallel to the knives and into position to have a second strip cut therefrom.

27. In a tack-making machine, a vibrating table adapted to support a sheet of metal, cutting mechanism, means to feed said sheet toward the cutting mechanism, said cutting mechanism comprising a movable center knife and independent leader-knives either side thereof, said center knife operating to cut the metal transverse to the line of feed, and one of said leader-knives operating to cut the metal both transverse and parallel to the line of feed, whereby the sheet is cut into strips and said strips are simultaneously cut into tack-blanks, a die to receive the tacks from the cutting mechanism, the blanks being received by the die with the heads alternately in opposite directions, and alternately-operating headers to form heads on the tacks while they are held in the die, combined with means, rendered operative after each strip has been cut into tack-blanks, to automatically shift the sheet into position to have a fresh strip cut therefrom.

28. In a tack-making machine, coöperating die members, cutting mechanism, means to automatically feed a sheet of metal thereto, said cutting mechanism operating to cut a strip from a sheet of metal and to simultaneously cut said strip into tack-blanks and to deliver each tack-blank to said die members, heading mechanism operating to form heads on each tack-blank while it is held between the die members, and means, rendered operative after one strip has been cut from the sheet of metal, to automatically shift the sheet into position to have a fresh strip cut therefrom.

29. In a tack-making machine, means to cut strips from a sheet of metal, and to simultaneously cut said strips into tack-blanks, said means including fixed and movable knives, means to feed said sheet of metal to said knives, a yielding follower in line with the movable knives and adapted to receive and hold the tack-blank between the same and the corresponding movable knife and fixed and movable die, each movable knife and its follower supporting the blank between the same until it is received and clamped between the dies, means to form a head on the tack when the blank is gripped between the dies, combined with means, rendered operative after one strip has been cut from the sheet, to automatically withdraw the sheet from the knives and move the same parallel thereto and into position to have another strip cut from the sheet.

30. In a tack-making machine, a vibrating table, adapted to support a sheet of metal, cutting mechanism, means to feed a sheet toward the cutting mechanism, said cutting mechanism comprising a movable center knife and independent leader-knives either side thereof, said center knife operating to cut the sheet transversely to the line of feed, and one of the leader-knives operating to cut the sheet both transversely and parallel to the line of feed, whereby the sheet is cut into strips and said strips are simultaneously cut into oppositely-disposed tack-blanks, a yielding follower in line with each leader-knife and adapted to receive and hold the tack-blanks between the same and the coöperating leader-knife, a fixed and movable die, each leader-knife and its follower supporting a severed blank between the same until it is received and clamped between the die members, means to form heads on the tack-blanks when they are gripped in the die, combined with means, rendered operative after one strip has been cut, to automatically withdraw said sheet from the knives and move the same parallel thereto and into position to have a fresh strip cut from the sheet.

31. In a tack-making machine, cutting mechanism, a horizontally-arranged table, means thereon to hold a sheet of metal, said means comprising two superimposed slides, means to secure said sheet of metal to the upper slide, means to automatically move the lower slide toward and from the cutting mechanism, and means to automatically move the upper slide transversely to the line of movement of the lower slide when said lower slide is in its retracted position, whereby the sheet is moved transversely to the line of feed.

32. In a tack-making machine, cutting mechanism, a table, means thereon to hold a sheet of metal, said means comprising two superimposed slides, one of said slides movable at right angles to the cutting mechanism, and the other slide movable parallel thereto, means to attach a sheet of metal to the last-mentioned slide, means to normally lock said slides together, means to automatically move said slides toward and from the cutting mechanism, and automatic mechanism to release the transversely-moving slide when the said

slides are in their retracted position and to move the same parallel to the cutting mechanism, whereby the sheet is brought into position to have a fresh strip cut therefrom.

33. In a tack-making machine, a cutting mechanism, a vibrating table, having means thereon to support a sheet of metal, means to automatically feed said sheet of metal toward said cutting mechanism, said cutting mechanism including a movable center knife and independent leader-knives either side thereof, said center knife operating to cut the sheet on a line transverse to the line of feed, and one of said leader-knives operating to cut the sheet on lines both transverse and parallel to the line of feed, whereby strips are cut from the sheet, and at the same time said strips are cut into oppositely-disposed tack-blanks, means to retract said sheet after a strip has been cut therefrom, and means to automatically move the same transversely to the line of feed when in its retracted position to bring the sheet into position to have a fresh strip cut therefrom.

34. In a tack-making machine, cutting mechanism, a vibrating table, a slide thereon movable toward and from the cutting mechanism, a holder carried by the slide, and having means to grip a sheet of metal, means to normally lock said holder to the slide, means to automatically feed the slide toward the cutting mechanism, said cutting mechanism including a movable center knife and independent leader-knives either side thereof, said center knife operating to cut the sheet on a line transverse to the line of feed, and one of the leader-knives operating to cut the sheet on lines both transverse and parallel to the line of feed, whereby strips are cut from the sheet and at the same time said strips are cut into oppositely-disposed tack-blanks, means to automatically retract said slide after a strip has been cut therefrom, means to automatically release the locking means and move said holder on the slide transverse to the line of feed of the sheet when the sheet is in its retracted position, whereby the said sheet is brought into position to have another strip cut therefrom.

35. In a tack-making machine, a frame, a reciprocating head-block mounted thereon, a central knife carried by said head-block, two independent slides also carried by said head-block and either side of the center knife, a leader-knife adjustably secured to each slide-cam, mechanism for depressing the leader-knives alternately and the center knife with each leader-knife, combined with a vibrating table, having means to support a sheet of metal, and means to feed said sheet toward the knives, whereby oppositely-disposed tack-blanks are cut from the sheet.

36. In a tack-making machine, a reciprocating head-block, a central knife carried thereby, two independent slides mounted on said head-block at either side of the central knife, a leader-knife adjustably carried by each slide, cam mechanism for depressing the leader-knives alternately and the center knife with each leader-knife, one of said leader-knives operating to cut the sheet both transversely and longitudinally, combined with a vibrating table, having means to support a sheet of metal, and means to feed said sheet toward the knives, whereby said sheet is cut into strips, and the strips are simultaneously cut into oppositely-disposed tack-blanks.

37. In a tack-making machine, a reciprocating head-block, a central knife carried thereby, two independent slides mounted on said head-block at either side of the central knife, a leader-knife adjustably carried by each slide, cam mechanism for depressing the leader-knives alternately and the center knife with each leader-knife, one of said leader-knives operating to cut the sheet both transversely and longitudinally, combined with a vibrating table, having means to support a sheet of metal, and means to feed said sheet toward the knives, means to automatically retract the sheet from the knives after each strip has been cut therefrom, and means to automatically shift the sheet transversely to the line of feed when in its retracted position to bring said sheet into position to have another strip cut therefrom.

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

JAMES N. GIFFORD.

Witnesses:
JOB C. TRIPP,
JOSEPH B. PECK.