

May 3, 1927.

T. SIBLEY

1,626,977

MACHINE FOR FORMING FASTENERS

Filed Aug. 15, 1925

3 Sheets-Sheet 1

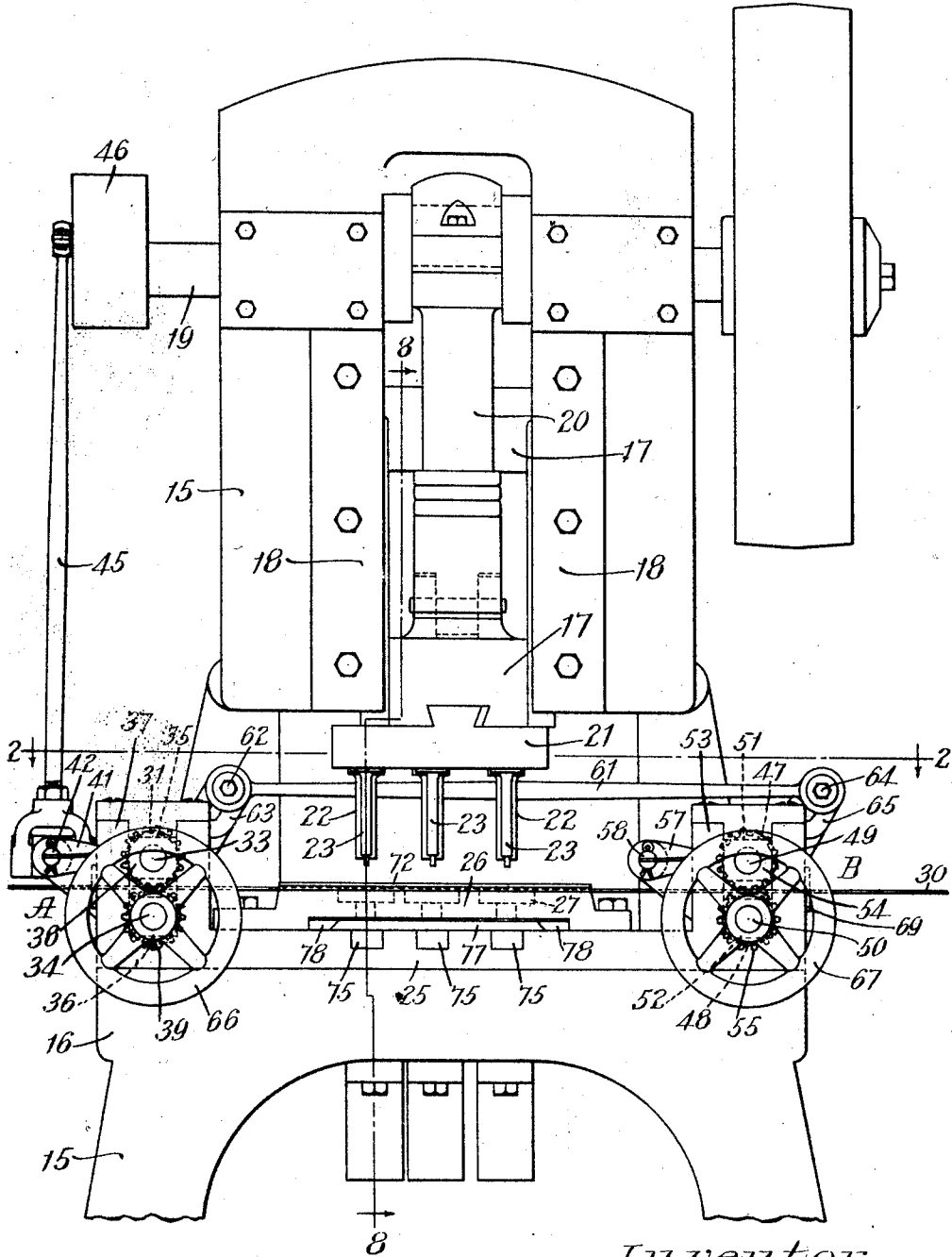


Fig. 1.

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May 3, 1927.

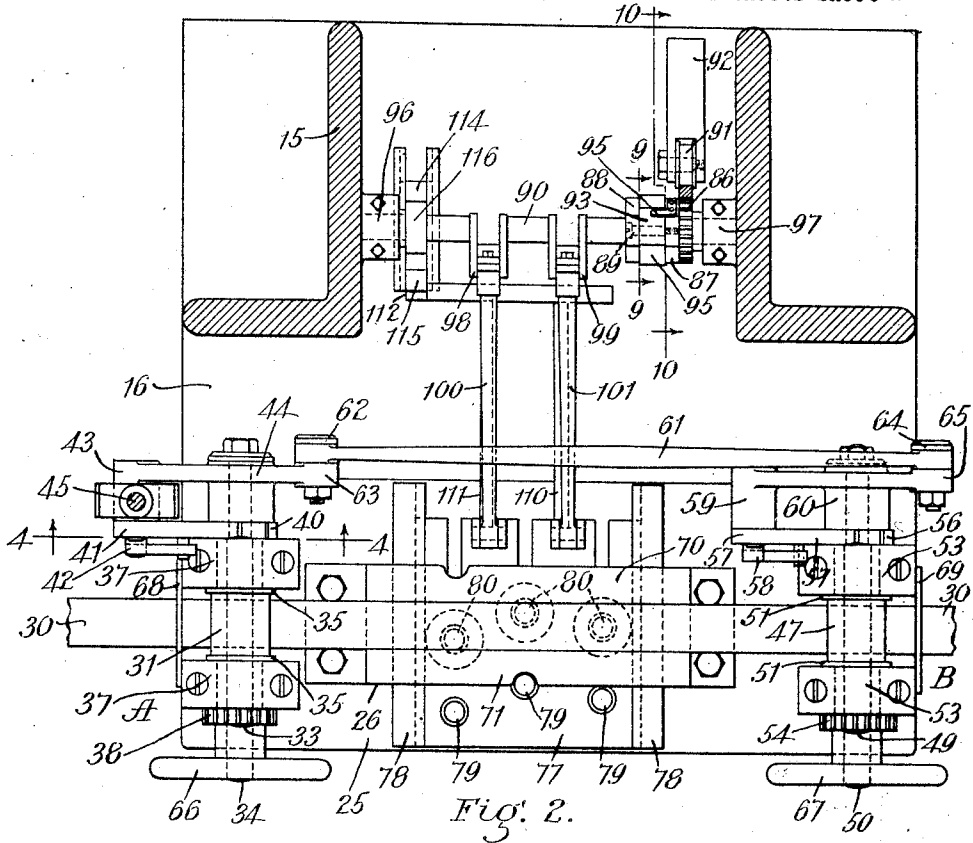
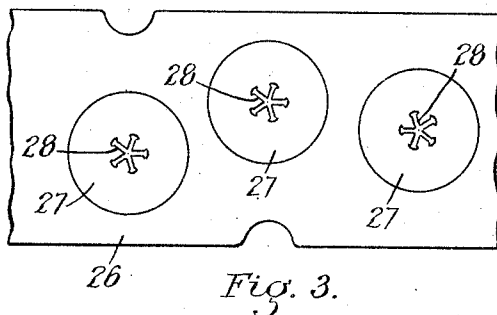
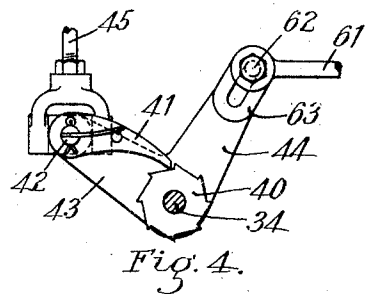
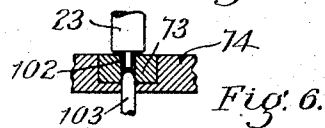
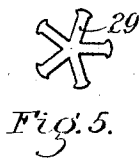
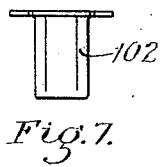
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MACHINE FOR FORMING FASTENERS

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3 Sheets-Sheet 2



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MACHINE FOR FORMING FASTENERS

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3 Sheets-Sheet 3

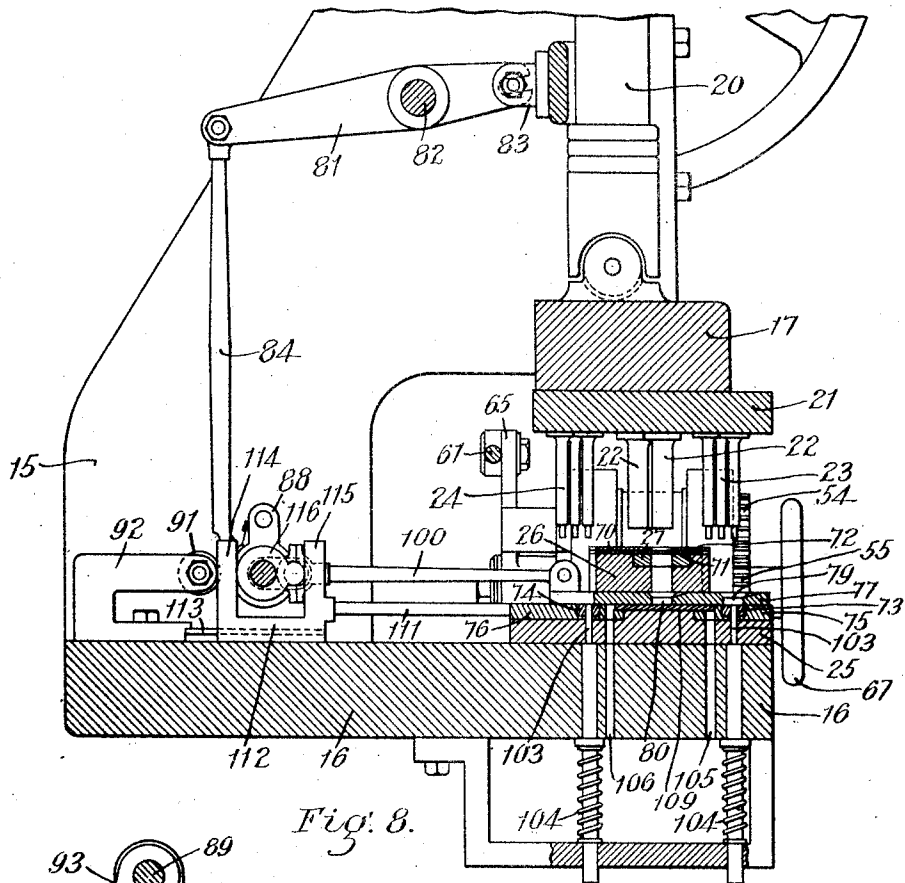


Fig. 8.

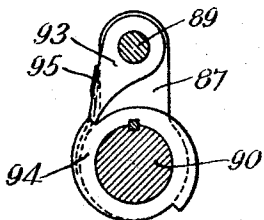


Fig. 9.

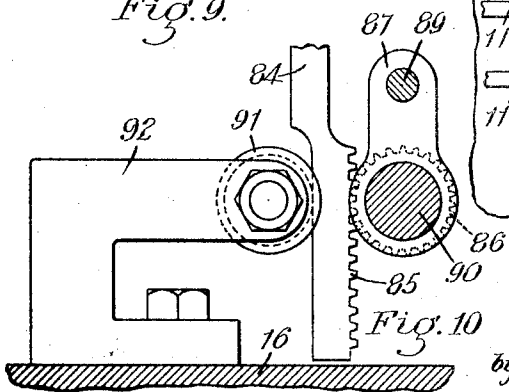


Fig. 10

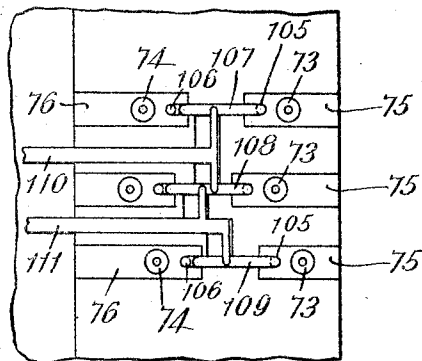


Fig. 11

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Patented May 3, 1927.

1,626,977

UNITED STATES PATENT OFFICE.

TARRANT SIBLEY, OF BENNINGTON, VERMONT.

MACHINE FOR FORMING FASTENERS.

Application filed August 15, 1925. Serial No. 50,510.

This invention relates to a machine for forming fasteners, the latter being of a type commonly employed in securing sheets of paper and the like together.

5 The object of the invention is to provide a machine for forming fasteners, said machine first punching blanks from a strip of sheet material, the latter being fed intermittently to the blank punching instrumentalities, after which said blanks are fed transversely of the line of feed of the sheet material into alignment with suitable instrumentalities where said blanks are formed into fasteners.

15 It is still further an object of the invention to provide two sets of fastener forming instrumentalities, one set being located upon each side of the blank cutting instrumentalities, and said sets operate alternately upon successive sets or blanks to form the latter into fasteners, there being a set of blanks and a set of fasteners formed with each reciprocatory movement of the press ram.

25 The invention consists in a machine for forming fasteners from sheet material as set forth in the following specification and particularly as pointed out in the claims thereof.

Referring to the drawings:—

30 Figure 1 represents a front elevation of a machine for forming fasteners embodying my invention, the bottom portion of said machine being broken away to save space in the drawings.

35 Fig. 2 is a horizontal section as taken on the line 2—2 of Fig. 1.

40 Fig. 3 is a plan view of a portion of the holder for the blank cutting dies, illustrating the position of said dies mounted therein.

45 Fig. 4 is a detail sectional elevation taken on the line 4—4 of Fig. 2 illustrating a portion of the mechanism for feeding a strip of sheet material to the blank cutting dies and punches.

Fig. 5 is a plan view of a blank from which fasteners are formed.

50 Fig. 6 is a detail vertical section illustrating a fastener forming die and punch pressing a blank into a fastener.

Fig. 7 is a front elevation of a fastener, the same being greatly enlarged.

Fig. 8 is a vertical section taken on the line 8—8 of Fig. 1.

55 Fig. 9 is a vertical section taken on the line 9—9 of Fig. 2.

Fig. 10 is a vertical section taken on the line 10—10 of Fig. 2.

60 Fig. 11 is a plan view illustrating a portion of the mechanism for opening and closing the passages through which the fasteners are discharged from the machine.

Like numerals refer to like parts throughout the several views of the drawings.

65 In the drawings, 15 represents the frame of a press of well known construction, and 16 represents a bed portion of said frame. A ram 17 is slidably mounted in ways 18 provided upon the frame 15 and a reciprocatory motion is imparted to said ram by a crank shaft 19 and connecting rod 20. A holder 21 is detachably secured to the ram 17 and mounted in said holder 21 are a plurality of blank cutting punches 22 and sets of fasteners forming punches 23 and 24, a set of said fasteners forming punches being located upon each side of the blank cutting punches 22.

75 Fastened to the bed 16 of the press is an auxiliary bed 25, and superimposed upon the latter is a holder 26 for a plurality of individual blank cutting dies 27, each of said dies having a similar die opening 28 formed therein as illustrated in Fig. 3.

80 The blank cutting dies 27 are spaced a predetermined distance apart and in staggered relation to each other, the opening 28 being located centrally in each die, and the relationship of said die openings to each other is such that a plane normal to the surface of the die holder 26 and extending longitudinally of the line of feed of sheet material will intersect more than one of said die openings, while on the other hand, no two of said die openings will be intersected by a plane normal to the surface of said die holder and extending transversely of said line of feed. The blank cutting punches 22 are located in vertical alignment with the die openings 28 and co-operate therewith in a manner well known to those skilled in the art to punch blanks 29 illustrated in detail in Fig. 5 from sheet material.

85 A strip of sheet material 30 from which the blanks 29 are formed is fed between the punches 22 and dies 27 by feeding mechanisms A and B, said mechanisms being similar in design and imparting an intermittent feeding movement to said sheet material. The feeding mechanism A embodies therein feed rolls 31 and 32 rigidly secured to shafts

33 and 34 respectively. The shafts 33 and 34 are mounted in suitable bearing blocks 35 and 36 respectively, the bearing blocks being slidably mounted in guides 37 which are formed integral with the auxiliary bed 25. Spur gears 38 and 39 are rigidly secured to the shafts 33 and 34 respectively, and mesh with each other in a manner to permit the feed rolls 31 and 32 to rotate in unison and at the same speed.

The shaft 33 has a ratchet 40 rigidly fastened thereto, and said ratchet is engaged by a pawl 41 pivoted at 42 to an arm 43 of a bell crank lever 44. The bell crank lever 44 is loosely mounted upon the shaft 33 adjacent to the ratchet 40 and has a rocking movement imparted thereto by a connecting rod 45, which connects the arm 43 of said lever to a crank 46 fast to the crank shaft 19.

The feed mechanism B embodies therein feed rolls 47 and 48 fast to shafts 49 and 50 respectively. The shafts 49 and 50 are mounted in suitable bearing blocks 51 and 52 respectively, said blocks being slidably mounted in guides 53 which are formed integral with the auxiliary bed 25. Spur gears 54 and 55 are rigidly secured to the shafts 49 and 50 respectively, and mesh with each other in a manner to permit the feed rolls 47 and 48 to rotate in unison and at the same speed. The shaft 49 has a ratchet 56 rigidly fastened thereto and said ratchet is engaged by a pawl 57 pivoted at 58 to an arm 59 of a bell crank lever 60, the latter being loosely mounted upon the shaft 49 adjacent to the ratchet 56. The bell crank lever 60 is rocked in unison with the bell crank lever 44 by a connecting rod 61, one end of which is connected at 62 to an arm 63 of the bell crank lever 44, while the other end of said connecting rod 61 is connected at 64 to an arm 65 of the bell crank lever 60. It will, therefore, be seen that the feed rolls 31 and 32 or the mechanism A will be rotated intermittently to feed the strip of sheet material 30 between the punches 22 and dies 27, while the feed rolls 47 and 48 of the mechanism B will also rotate intermittently and in unison with the feed rolls 31 and 32 and will carry off the perforated portion of said strip of sheet material at the same speed at which said material is fed to the punching instrumentalities.

The feeding mechanisms A and B may also be operated manually if it is so desired to feed the strip of sheet material 30 by utilizing hand wheels 66 and 67 respectively, said hand wheels being rigidly secured to the shafts 34 and 50 respectively of said feeding mechanisms.

It is necessary that the strip of sheet material 30 shall be very accurately guided to the punching instrumentalities, and for this purpose guides 68 and 69 are provided fast to

the guide portions 37 and 53 respectively of the auxiliary bed 25, said strip of sheet material passing through slots provided therefor in said guides 68 and 69. Other guides 70 and 71 are also provided fastened to the upper surface of the die holder 26, said guides extending longitudinally of said holder on opposite sides of the strip of sheet material, the latter being guided by the opposite adjacent edges of said guides.

A stripper plate 72 is superimposed upon the guides 68 and 69 and said plate extends above a strip of sheet material in such a manner that as the punches 22 ascend after the punching operation, said stripper plate will hold a strip of sheet material 30 from rising and will push said sheet material from off said punches.

The blanks 29 after being formed, are fed to the fastener forming instrumentalities, the latter consisting of two sets of forming punches 23 and 24 previously mentioned and two sets of forming dies 73 and 74, said dies being mounted in holders 75 and 76 respectively and co-operating with the forming punches 23 and 24. The dies 73 and 74 are sunk in the upper surface of their respective holders, and the latter are sunk in the upper surface of the auxiliary bed 25, and the upper surfaces of said dies, holders, and auxiliary bed are all flush with each other.

The mechanism for feeding the blanks 29 to the fastener forming instrumentalities is as follows:—Mounted upon the upper surface of the auxiliary bed 25 directly beneath the die holder 26 is a slide 77, the latter being guided between ways 78 fast to the auxiliary bed 25. The slide 77 has two sets of openings 79 and 80 extending therethrough, said openings being spaced to align with the various sets of punches 22, 23 and 24. A reciprocatory movement is imparted to the slide 77 by a lever 81 pivoted at 82 to the frame 15, one end of said lever being operatively connected at 83 to an upper portion of the ram 17, while the other end of said lever has a rod 84 connected thereto, said rod being provided adjacent to its lower end with a set of rack teeth 85, the latter meshing with a gear 86 rigidly fastened in any suitable manner to a rocker member 87 loosely mounted upon the shaft 90. Another rocker member 88 is also loosely mounted upon the shaft 90, and said members are secured together so that they will rock in unison, and are also spaced a suitable distance apart by a screw stud 89. The toothed portion of the rod 84 is always held in engagement with the gear 86 by a grooved roller 91 which is mounted to rotate upon a bracket 92 fast to the bed 16 of the frame 15.

Mounted between the rocker members 87 and 88 upon the screw stud 89 is a pawl 130

93, the latter being adapted to engage a ratchet 94 also positioned between the rocker members 87 and 88, and rigidly fastened to the shaft 90. A spring 95 fastened to one of the rocker members engages the pawl 93 in a manner to always hold the latter in engagement with the ratchet 94. The ratchet 94 has two teeth formed thereon, said teeth being oppositely disposed upon the periphery of said ratchet. The shaft 90 is mounted to rotate in bearings 96 and 97 provided upon the frame 16, and said shaft has crank portions 98 and 99 provided thereon, said crank portions being connected by rods 100 and 101 respectively with the slide 77.

With each downward movement of the ram 17 a set of blanks 29 are punched from the strip of sheet material 30 said blanks dropping into one or another of the sets of openings 79 and 80 in the slide 77 at which time they rest upon the upper surface of the auxiliary bed 25 and during the upward movement of said ram 17, said blanks are moved alternately into alignment with the sets of fastener forming punches 23 and 24 and their co-operating dies 73 and 74 in which position said blanks are formed into fasteners 102, as illustrated in Fig. 7.

The fasteners 102, after being formed, are pushed out of the dies 73 and 74 and into the openings 79 and 80 of the slides 77 by pins 103, the latter having springs 104 extending therearound and acting to always force said pins upwardly. During the downward movement of the fastener forming punches 23 and 24 the pins 103 are forced downwardly as the fasteners 102 are formed, but immediately as the punches ascend, the springs 104 will push the pins 103 upwardly and disengage said fasteners from the dies 73 and 74.

The fasteners 102 having been ejected from the dies in which they are formed are discharged from the openings 79 and 80 in the slide 77 through passages 105 and 106, said passages extending downwardly from the upper surface of the various holders 75 and 76 through the auxiliary bed 25 and bed 16. The passages 105 and 106 are closed alternately during the interval that the fasteners are being formed and said passages are opened and closed by a plurality of slides 107, 108 and 109, see Fig. 11, said slides all being operated in unison by a pair of connecting rods 110 and 111, said rods interlocking with said slides and having a reciprocatory movement imparted thereto by mechanism operated by the crank shaft 90 as follows:—Mounted upon the bed 16 of the frame 15 is a slide 112, the latter being adapted to reciprocate between ways 113 provided upon said bed 16. The slide 112 has upwardly projecting arms 114 and 115 formed integral therewith, said arms being

located upon opposite sides of the shaft 90. A cam 116 is rigidly fastened to the shaft 90 and the periphery of said cam engages the arms 114 and 115 in a manner to impart an intermittent reciprocating movement to the slide 112, and this movement is transmitted through the rods 110 and 111 to the slides 107, 108 and 109, thereby opening and closing the passages 105. The slides 107, 108, and 109 and rods 110 and 111 are all so positioned relatively to each other and to the holders 75 and 76 that their upper surfaces will all be flush with each other, and with the upper surface of the auxiliary bed 25.

The general operation of the mechanism hereinbefore specifically described is as follows:—An intermittent feeding movement is imparted to the strip of sheet material 30 by the feeding mechanisms A and B, said mechanisms operating in unison and at the same speed, the mechanism A carrying the strip of sheet material to the punching instrumentalities and the mechanism B carrying the perforated portion of said material away from said punching instrumentalities.

Between the feeding movements of the mechanism A and B a reciprocatory movement is imparted to the press ram 17, and the blank cutting punches 22 are forced into co-operative relation with the blank cutting dies 27 to punch blanks 29 from the strip of sheet material 30, and as the machine is illustrated as having three punches, there will be three blanks punched from said sheet material. The blanks 29 when punched will drop into the set of openings that align therewith in the slide 77. The ram 17 then rises, lifting the punches 22 from the dies 27 and the strip of sheet material 30 is then fed into position for the next blank punching operation.

During the downward movement of the ram 17 the lever 81 is rocked upon its pivot in a manner to cause the teeth 85 formed upon the rod 84 to impart an oscillatory movement to the rocker members 87 and 88 during which time the pawl 93 will move loosely over the periphery of the ratchet 94 and the shaft 90 will remain stationary. During the upward movement, however, of the ram 17, the movement of the rocker members 87 and 88 will be reversed and the pawl 93 will engage one of the teeth of the ratchet 94 and will cause the shaft 90 to be rotated one-half of a revolution, and as said shaft is operatively connected with the slide 77, the blanks 29 that have previously been punched will be moved transversely of the line of feed of the sheet material 30 into alignment with one of the sets of fastener forming instrumentalities where they will be formed into fasteners with the next downward movement of the ram, at which time

another set of blanks is punched from the sheet material by the punching instrumentalities, and this latter set of blanks will also fall into the openings in the slide 77 that align therewith.

During the next reciprocating movement of the ram 17 the last set of blanks formed will be moved by the slide 77 in the opposite direction from the set of blanks previously formed, said last formed set of blanks being moved into alignment with the other set of fastener forming instrumentalities. At the same time the fasteners previously formed having been forced from the dies by the pins 104 will be fed by the slide 77 above the open upper end of an adjacent discharge passage, the latter having just previously been opened to permit the fastener to drop therethrough by the mechanism operated by the crank shaft 90. With each succeeding reciprocating movement of the ram 17 there will be a set of blanks 29 punched, and a set of fasteners 102 formed, the fastener forming instrumentalities upon opposite sides of the blank forming instrumentalities operating alternately to form said fasteners.

It is evident that the blank punching instrumentalities may include any number of co-operating blank forming punches and dies that may be desired, in which event there will be a similar number of co-operating fastener forming punches and dies in each of the sets of the latter.

I claim:—

1. A machine for forming fasteners embodying therein blank cutting instrumentalities, means to feed a strip of sheet material to said cutting instrumentalities, fastener forming instrumentalities upon opposite sides of said cutting instrumentalities, and means to feed blanks in opposite directions into alignment with each of said forming instrumentalities alternately, whereby said blanks may be pressed into fasteners.

2. A machine for forming fasteners comprising, in combination, a frame, a blank cutting die upon said frame, a reciprocatory ram, a blank cutting punch fast to said ram and adapted to co-operate with said die to form a blank, means to feed a strip of sheet material between said die and punch, a fastener forming die upon opposite sides of said blank cutting instrumentalities, a fastener forming punch fast to said ram upon opposite sides of said blank cutting instrumentalities and adapted to co-operate with said forming dies to form fasteners, and means to feed blanks in opposite directions into alignment with each of said co-operating forming instrumentalities alternately, whereby said blanks may be pressed into fasteners.

3. A machine for forming fasteners comprising, in combination, a frame, a plurality

of blank cutting dies upon said frame, a reciprocatory ram, a plurality of blank cutting punches fast to said ram and adapted to co-operate with said dies to form blanks, means to intermittently feed a strip of sheet material to said blank forming instrumentalities, fastener forming dies upon opposite sides of said blank cutting instrumentalities, fastener forming punches fast to said ram upon opposite sides of said blank cutting instrumentalities and aligning with said forming dies, and means to feed blanks in opposite directions into alignment with sets of said forming instrumentalities alternately whereby said blanks may be pressed into fasteners.

4. A machine for forming fasteners comprising, in combination, a frame, a plurality of blank cutting dies upon said frame, a reciprocatory ram, a plurality of blank cutting punches fast to said ram and adapted to co-operate with said dies to form blanks, means to intermittently feed a strip of sheet material to said blank forming instrumentalities, means to guide said strip of sheet material to said blank forming instrumentalities, a set of fastener forming dies upon opposite sides of said blank cutting instrumentalities, a set of fastener forming punches fast to said ram and adapted to co-operate with said forming dies to form fasteners, and means to feed blanks in opposite directions into alignment with each of said sets of co-operating fastener forming instrumentalities alternately whereby said blanks may be pressed into fasteners.

5. A machine for forming fasteners comprising, in combination, a frame, a plurality of blank cutting dies upon said frame, a reciprocatory ram, a plurality of blank cutting punches fast to said ram and adapted to co-operate with said dies to form blanks, means to intermittently feed a strip of sheet material to said blank forming instrumentalities, means operating in unison with said feeding means to carry the perforated portion of said sheet material away from said blank forming instrumentalities, a set of fastener forming dies upon opposite sides of said blank cutting instrumentalities, a set of fastener forming punches fast to said ram and adapted to co-operate with said forming dies to form fasteners, and means to feed blanks into alignment with each of said sets of co-operating fastener forming instrumentalities alternately whereby said blanks may be pressed into fasteners.

6. A machine for forming fasteners comprising, in combination, a frame, a plurality of blank cutting dies upon said frame, a reciprocatory ram, a plurality of blank cutting punches fast to said ram and adapted to co-operate with said dies to form blanks, means to intermittently feed a strip of sheet material to said blank forming instrumen-

talities, a set of fastener forming dies upon opposite sides of said blank cutting instrumentalities, a set of fastener forming punches fast to said ram and adapted to co-operate with said forming dies to form fasteners, means to feed blanks, in opposite directions into alignment with each of said sets of co-operating fastener forming instrumentalities alternately whereby said blanks may be pressed into fasteners, means to force said fasteners from said forming dies, and means to open and close discharge passages for said fasteners.

7. A machine for forming fasteners comprising, in combination, a frame, a plurality of blank cutting dies upon said frame, a reciprocatory ram, a plurality of blank cutting punches fast to said ram and adapted to co-operate with said dies to form blanks, means to intermittently feed a strip of sheet material to said blank forming instrumentalities, a set of fastener forming dies upon opposite sides of said blank cutting instrumentalities, a set of fastener forming punches fast to said ram and adapted to co-operate with said forming dies to form fasteners, a slide adapted to receive blanks from said blank forming instrumentalities, and means actuated by said ram to move said slide to feed blanks in opposite directions into alignment with each of said sets of co-operating fastener forming instrumentalities alternately whereby said blanks may be pressed into fasteners.

8. A machine for forming fasteners comprising, in combination, a frame, a plurality of blank cutting dies upon said frame, a reciprocatory ram, a plurality of blank cutting punches fast to said ram and adapted to co-operate with said dies to form blanks, means to intermittently feed a strip of sheet material to said blank forming instrumentalities, means operating in unison with said feeding means to carry the perforated portion of said sheet material away from said blank forming instrumentalities, a set of fastener forming dies upon opposite sides of said blank cutting instrumentalities, a set of fastener forming punches fast to said ram and adapted to co-operate with said forming dies to form fasteners, a slide adapted to receive blanks from said blank forming instrumentalities, and means actuated by said ram to move said slide to feed blanks into alignment with each of said sets

of cooperating fastener forming instrumentalities alternately whereby said blanks may be pressed into fasteners.

9. A machine for forming fasteners comprising, in combination, a frame, a plurality of blank cutting dies upon said frame, a reciprocatory ram, a plurality of blank cutting punches fast to said ram and adapted to co-operate with said dies to form blanks, means to intermittently feed a strip of sheet material to said blank forming instrumentalities, a set of fastener forming dies upon opposite sides of said blank cutting instrumentalities, a set of fastener forming punches fast to said ram and adapted to co-operate with said forming dies to form fasteners, a slide adapted to receive blanks from said blank forming instrumentalities, a crank shaft operatively connected to said slide, and means actuated by said ram to impart an intermittent rotary motion to said crank shaft thereby moving said slide to feed blanks into alignment with each of said sets of co-operating fastener forming instrumentalities alternately whereby said blanks may be fed into fasteners.

10. A machine for forming fasteners comprising, in combination, a frame, a plurality of blank cutting dies upon said frame, a reciprocatory ram, a plurality of blank cutting punches fast to said ram and adapted to co-operate with said dies to form blanks, means to intermittently feed a strip of sheet material to said blank forming instrumentalities, a set of fastener forming dies upon opposite sides of said blank cutting instrumentalities, a set of fastener forming punches fast to said ram and adapted to co-operate with said forming dies to form fasteners, a slide adapted to receive blanks from said blank forming instrumentalities, a crank shaft operatively connected to said slide, means actuated by said ram to impart an intermittent rotary motion to said crank shaft thereby moving said slide to feed blanks into alignment with each of said sets of co-operating fastener forming instrumentalities alternately whereby said blanks may be fed into fasteners, means to force said fasteners from said forming dies and means to open and close discharge passages for said fasteners.

In testimony whereof I have hereunto set my hand.

TARRANT SIBLEY.