June 21, 1932. G. B. BAKER ET AL 1,864,267

TACK MACHINE

Filed June 5, 1928 3 Sheets-Sheet 1

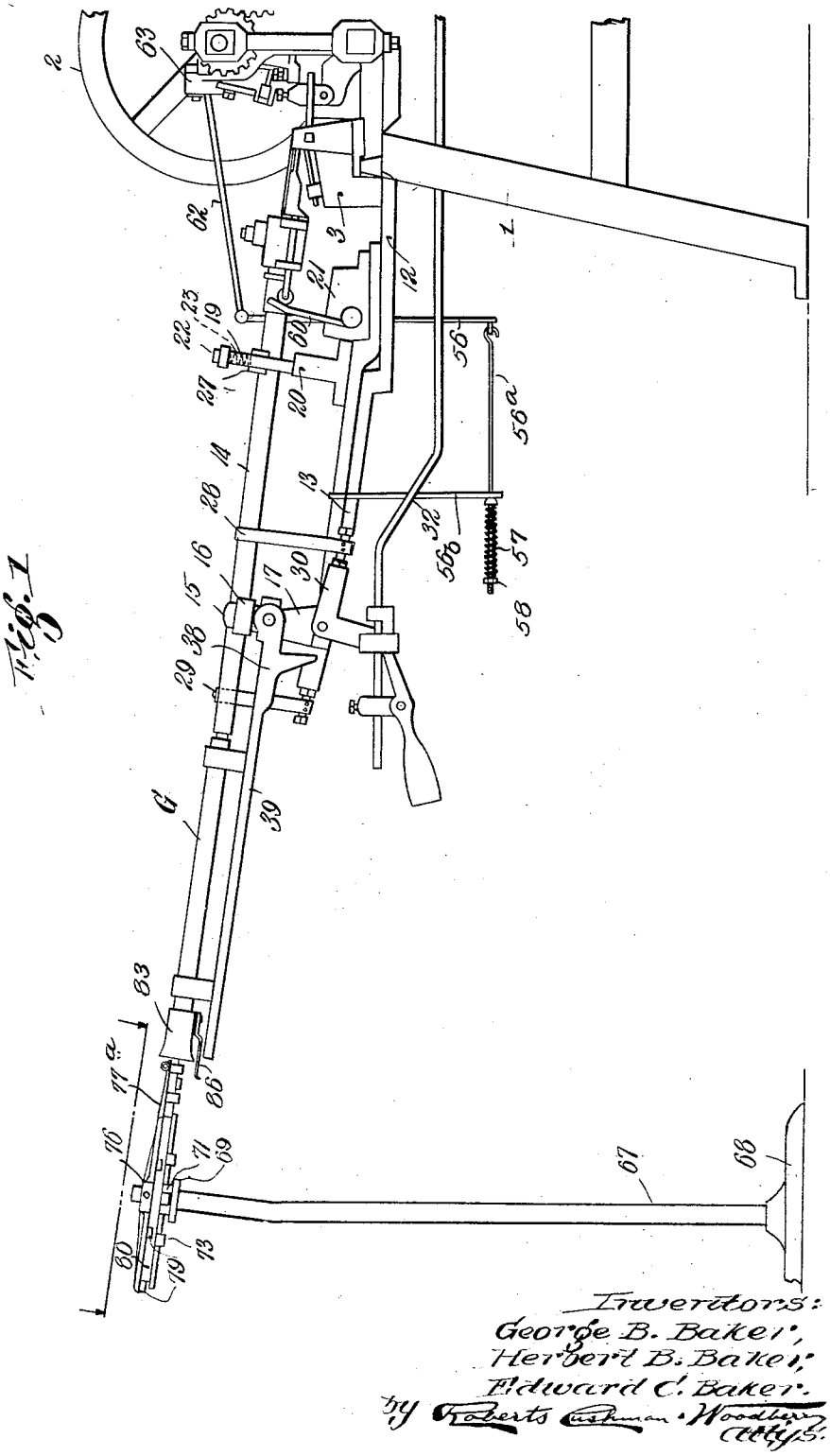


Fig. 1

Inventors:
George B. Baker,
Herbert B. Baker,
Edward C. Baker.
by Roberts Cushman & Woodbury
Attys.

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Fig. 2

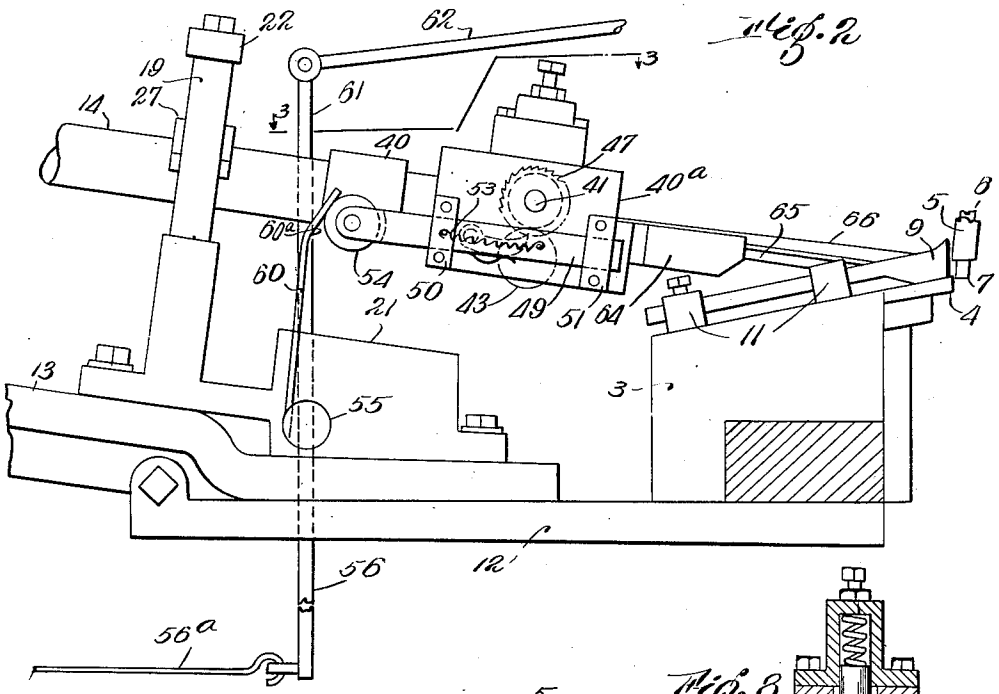


Fig. 3

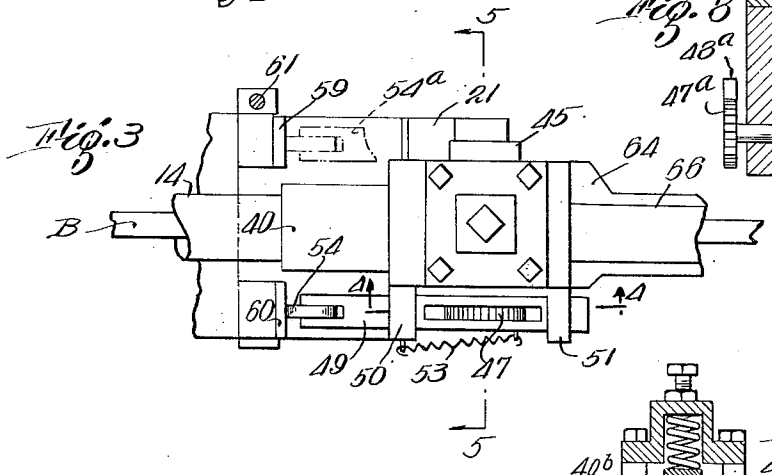


Fig. 8

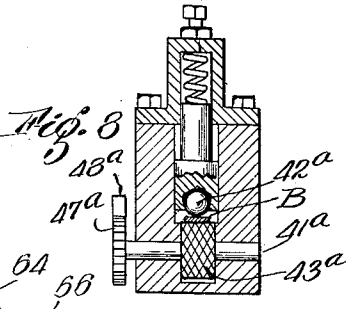


Fig. 4

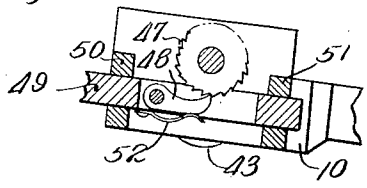
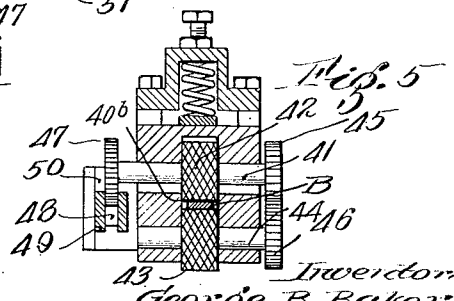


Fig. 5



Inventors.
George B. Baker.
Herbert B. Baker.
Edward C. Baker.
by Roberts Cushman & Woodberry
Attys.

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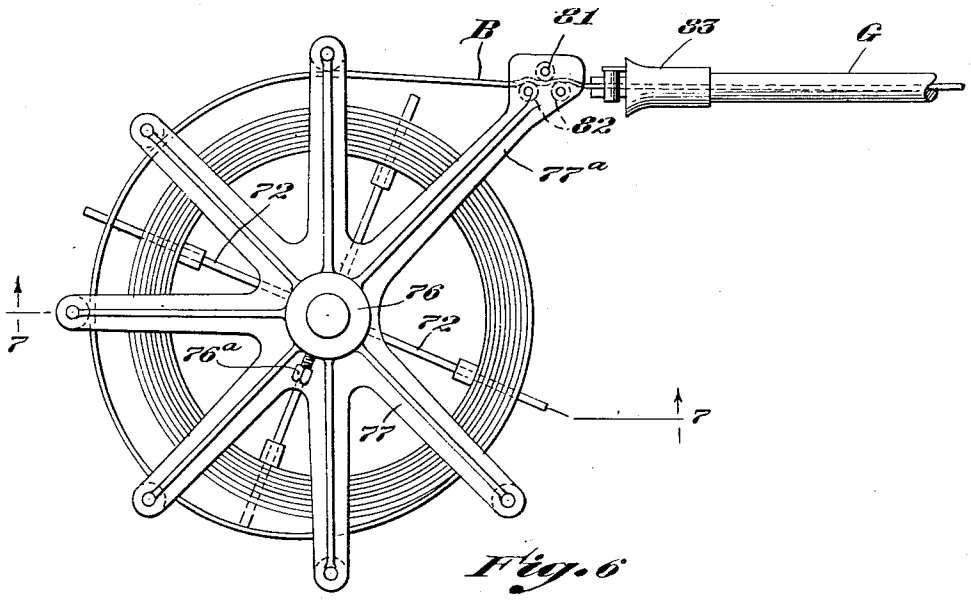


Fig. 6

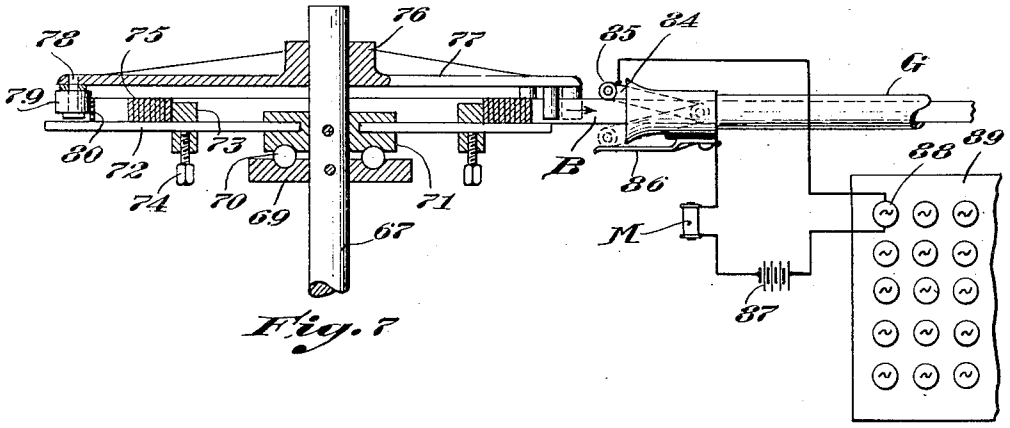


Fig. 7

Inventors
George B. Baker
Herbert B. Baker
Edward C. Baker
by Roberts Cushman & Woodberry
Attys.

Patented June 21, 1932 1,864,267

UNITED STATES PATENT OFFICE

GEORGE B. BAKER, HERBERT B. BAKER, AND EDWARD C. BAKER, OF BROCKTON, MASSACHUSETTS, ASSIGNORS, BY MESNE ASSIGNMENTS, TO GEORGE B. BAKER AND EDWARD C. BAKER, OF BROCKTON, MASSACHUSETTS, AS SURVIVING JOINT TENANTS

TACK MACHINE

Application filed June 5, 1928. Serial No. 282,899.

This invention pertains to tack and nail making machines and relates more particularly to means for presenting the blank stock to the cutting instrumentalities. In our application for patent Serial No. 228,138, filed October 24, 1927, we have disclosed and claimed certain very efficient means for advancing independent tack strips to the cutting instrumentalities, whereby at each stroke of the cutters a full and plump tack is produced, thus eliminating uncertainty of operation and the production of imperfect work, such as commonly results from the operation of usual feed mechanisms. In our aforesaid application we disclosed our improved feed mechanism in association with automatic replenishing means of the general type disclosed in our Patent No. 1,555,933, dated October 6, 1925, and while such blank presenting means represents a distinct advance in the art from the standpoint of economy, labor cost, saving in material, and simplicity of construction, we have, as the result of further experiment, devised blank presenting means of improved character which, in combination with feed mechanism of the type disclosed in our aforesaid application, reduces the cost of machine attendance to a minimum, reduces the waste of material to a negligible amount, permits the speed of production to be increased, and as an incident, enables the tack manufacturer to eliminate certain usual preliminary operations, including stripping, pickling, and liming.

In accordance with the present invention we have substituted for the automatic replenishing device of our Patent No. 1,555,933, a support, preferably a reel arranged to turn very freely, and upon this reel we mount a flat coil of ribbon-like tack plate of the proper width to form the desired size of tack. Such ribbon-like tack plate may readily be prepared in any desired width and in coils of any reasonable length, the plate being pickled to remove scale and treated with lime before delivery to the machine.

We are aware that various impractical suggestions have previously been made to the effect that coiled plate might be fed to a tack machine, but so far as is known to us no practical method or mechanism has heretofore been devised for carrying such suggestions into effect. In order to obtain the desired results, it is desirable to provide a reel which turns very freely and which has devices for confining the resilient coil so that if the reel overruns, the turns of the coil will not spring off and snarl up. It is also important to provide feed means for drawing off the strip from the reel while at the same time providing for a long straight and unconfined run of the strip which is free to twist as the barrel oscillates. The feed rolls described in our aforesaid application constitute very effective means for drawing off the strip from the coil, since they are reliable in action and are located so close to the cutting instrumentalities that there is little chance for the strip to buckle between the rolls and the cutters, at the same time leaving all of that part of the strip which extends from the reel to the feed rolls free to twist with the oscillation of the rolls and barrel.

In the arrangement described in our aforesaid patent it was necessary to employ a nose piece having a channel of accurately adjusted width to prevent successive strips from riding upon one another, but with the present arrangement such accuracy of adjustment is not necessary since the slight retained curvature resulting from coiling the strip causes the advancing end of a new strip to hug closely against one wall of the channel so that it exhibits no tendency to ride over the end of the proceeding strip.

Preferably we provide automatic signaling means for indicating the need of replenishment, and if desired for automatically stopping the machine, but since replenishment is so infrequent, for example once in six to eight hours of operation, we prefer to arrange the signals, for example lamps, for all of the machines in the factory, or in a unit group, at a central point, for example upon a single panel, so that the operator, by noting the lighting of a signal lamp may know at once the exact machine which needs attention.

Since a single coil will furnish material for

several hours operation, the waste from butt ends is almost negligible, and the labor cost for attendance is extremely low. The strip material is very uniform in width and thickness and the feed is not interrupted except at infrequent intervals so that the machine gives almost 100% of the theoretical output, and by reason of the greater smoothness and continuity of operation the machine may be run at greater than the usual speed.

In the accompanying drawings we have illustrated by way of example one desirable embodiment of the present invention, it being understood that in its broader aspects the invention is not limited to this precise construction but that various changes in size, proportion of parts and relative arrangement of parts as well as the substitution of equivalents may be made without departing from the spirit of the invention.

In the drawings,

Fig. 1 is a fragmentary side elevation of a tack machine of the type above referred to and having the present improvements applied thereto;

Fig. 2 is a fragmentary side elevation, to larger scale, partly in section, showing the forward portion of the blank supporting barrel and associated parts;

Fig. 3 is a fragmentary plan view, partly in section on the line 3—3 of Fig. 2;

Fig. 4 is a fragmentary vertical section on the line 4—4 of Fig. 3;

Fig. 5 is a vertical section on the line 5—5 of Fig. 4;

Fig. 6 is a fragmentary plan view, to larger scale, showing certain details of the coil supporting reel;

Fig. 7 is a fragmentary vertical section on the line 7—7 of Fig. 6, with certain additional parts shown diagrammatically; and

Fig. 8 is a view similar to Fig. 5, but illustrating a modified arrangement.

Referring to the drawings, the numeral 1 indicates the supporting frame of a tack machine of the type referred to. This frame is provided with bearings for the main shaft having the hand wheel 2 and carrying the usual cams, cranks, and other devices for actuating the operating parts of the machine, including the usual head and body forming dies as referred to in our Patent No. 1,618,628, February 22, 1927, movable cutters 5 and 6 (Fig. 2) and the movable limiting stop 7. The frame 1 also supports an anvil block 3 carrying the fixed or ledger blade 4, the latter being provided with a diagonal cutting edge in the usual manner. Resilient guards or guides 9 are supported upon the anvil block 3 by means of brackets 11, these guards cooperating in usual manner to position the blank laterally as it is advanced toward the cutters. A table 12 projects from the upper part of the frame and carries a relatively narrow elongate rearward extension 13.

The usual cylindrical tubular blank supporting barrel 14 is employed for guiding the blank strips toward the cutters. This barrel inclines downwardly toward the anvil and is furnished at a suitable point with a spherical collar 15 (Fig. 1) which turns freely in a cup bearing 16 carried by a bracket 17 mounted upon the extension member 13. At a suitable point, intermediate the bracket 17 and the anvil block 3, posts 19 are secured in an arm 20 carried by a block 21 supported by the table 12. A cross bar 22 is secured to the upper ends of the posts 19 and constitutes an abutment for a spring 23 whose lower end engages a yoke member 27 bearing upon the upper surface of the barrel 14. This spring tends to hold the barrel downwardly with its free lower extremity engaging the upper surface of the anvil block but permits the barrel to rise slightly as it is oscillated during the operation of the machine.

Straps 28 and 29 constitute the means for oscillating the barrel as is usual in machines of this type. These straps are wound in opposite directions about the barrel, and their lower ends are secured to oppositely directed arms of a lever 30 fulcrumed upon the extension 13. This lever is rocked at suitable intervals by means of a link 32 actuated by a cam or crank carried by the main shaft of the machine.

A yoke 38 is secured to the bracket 17 and supports an elongate member 39 which carries a stationary guide G, preferably of tubular form, arranged in alignment with the barrel 14.

Near its lower end the barrel is furnished with a sleeve 40 (Fig. 2) which carries a box-like casing 40^a which has a passage 40^b (Fig. 5) aligning with the passage through the barrel. The casing 40^a is provided with journal openings for a transverse shaft 41 upon which is mounted a knurled feed roll 42 which cooperates with a feed roll 43 mounted upon a second transverse shaft 44. Preferably the upper shaft 41 is journaled in movable bearings and is pressed toward the other shaft by means of a spring or springs as more fully disclosed in our aforesaid patent.

The shafts 41 and 44 are provided with intermeshing gear wheels 45 and 46 which constrain the shafts to move at substantially the same speed in opposite directions. One of these shafts, as here shown the shaft 41, is provided at one end with a ratchet wheel 47 fixedly secured to the shaft and constituting means for driving the feed wheels. A driving pawl 48 (Fig. 4) engages the teeth of this ratchet wheel, being pressed into engagement with such teeth by means of a spring 52. This pawl 48 is pivotally supported upon a pawl carrier 49 which slides longitudinally in suitable guides 50 and 51 projecting from the side of the casing 40^a. A spring 53, connected with the pawl carrier, tends to move the

latter to the left as viewed in Figs. 2, 3 and 4, that is to say, in a direction such as to retract the pawl and cause it to engage a fresh tooth of the ratchet wheel. Preferably the pawl carrier 49 is of angular section or other suitable shape to prevent it from turning in its bearings, and is provided at its rear end with an anti-friction roller 54.

The block 21 is furnished with a journal opening for a transverse shaft 55 constituting the fulcrum of an actuator lever which includes the downwardly extending arm 56 affixed to shaft 55. A rod 56[a] is connected to the lower end of arm 56 and extends through an opening in a fixed guide 56[b]. A spring 57 interposed between the guide 56[b] and an adjustable nut 58 on the rod 56[a] tends to swing the lever arm 56 in a clockwise direction as viewed in Fig. 2.

The actuator lever also comprises a pair of upwardly extending pusher arms 59 and 60 affixed to shaft 55 disposed respectively at opposite sides of the barrel 14 and so positioned that during the cutting operation one or the other of these arms engages the anti-friction roll 54 of the pawl carrier. The arms 59 and 60 are substantially upright and if desired their upper ends may be bent slightly as indicated at 60[a] although this is not essential. The actuator lever also has an upwardly extending arm 61 also affixed to shaft 55 and pivotally connected at its upper end to a link 62 extending to a member 63 which is rocked by a cam or other suitable element carried by the main shaft.

The forward end of the casing 40[a] supports a bracket 64 carrying the nose piece comprising the spaced upper and lower members 65 and 66 constituting the means for guiding the blank B near the cutting point.

In accordance with the present invention we provide coil supporting means for supporting a coiled up ribbon-like strip of tack plate in position to be delivered into the barrel 14. In order to provide an extended straight run of the tack strip between the feeding rolls and the supply reel and to provide a suitable support for such straight run of the material, we prefer to provide the elongate tubular guide G above described, of a length approximating that of the barrel, between the receiving end of the barrel proper and the reel.

The reel or support upon which the coil is mounted preferably consists of a substantially vertical fixed shaft 67 mounted upon a suitable base 68 and carrying a fixed collar 69 near its upper end. If desired, the upper portion of the shaft may be inclined slightly from the vertical in order that the plane of the reel may be inclined to the same degree as the barrel 14. The collar 69 forms the lower member of an anti-friction bearing also comprising the balls 70 and the upper member 71, the latter forming the hub of the rotary support or reel proper. The hub 71 carries a plurality of substantially radial arms 72 each preferably provided with a coil positioning member 73. As shown, these positioning members are blocks adjustable lengthwise of the arms 72 and having set screws 74 for fixing them in adjusted position. These blocks are so adjusted as to engage the inner turn of the coil 75 of tack strip and to hold the coil centered with respect to the axis of the shaft 67.

In order properly to confine the coil we prefer to provide a cover member preferably consisting of a hub 76 normally fixed upon the shaft 67 by means of a set screw 76[a] or equivalent means, such cover being removable to permit a fresh coil to be placed upon the arms 72. The cover also comprises arms 77 radiating from the hub 76, each arm being provided with a downwardly extending member 78, for example, a pin forming a bearing for an anti-friction roller 79 adapted to engage the outermost turn 80 of the coil. These rollers 79 thus prevent undue expansion of the coil when, for example, the reel overruns, but since the rollers exert but little friction upon the coil, they do not interfere materially with the free rotation of the coil.

Preferably one of the arms projecting from the hub 76, for example the arm 77[a], is provided at its end with a plurality of rollers or pins 81 and 82 between which the blank strip B, unwound from the coil, passes on its way to the barrel. These pins in large measure remove the curvature from the strip so that as it enters the barrel it is substantially straight.

Preferably the receiving end of the guide member G is provided with a funnel or bell mouth 83 to facilitate introduction of the end of the blank strip. At the receiving end of the guide G or at a point between the guide G and the receiving end of the barrel 14, we preferably provide a feeler roll 85 carried by a lever 84, such roll normally resting on the upper edge of the blank B and thus being held out of engagement with a contact member 86 disposed immediately below the roll 85. The roll 85 and the contact 86 constitute terminals of an electrical circuit receiving electrical energy from a suitable source 87, such circuit including a lamp 88 or other suitable signal device. Conveniently such lamp may be mounted upon a panel 89, together with other signal lamps corresponding to other tack machines, and thus an operator, stationed at the panel, receives immediate warning whenever one of the machines of the unit group served by the panel requires replenishment. If desired, the same circuit may include a magnet M or other device for actuating stop mechanism to stop the machine until the reel has been replenished.

The operation of the machine is in general similar to that of tack machines of this type.

As indicated in Fig. 2 the parts are in position for the downward movement of the cutters 5 and 6. At this time the forward end of the blank B may be assumed to be in engagement with the limiting stop 7, and the arm 60 of the actuator lever is pressed into engagement with the roll 54 of the pawl carrier by the action of the spring 57. This spring is strong and tends to exert a constant pressure upon the pawl carrier, urging the latter in a forward direction or to the right, as viewed in Fig. 2, thus tending to turn the ratchet wheel 47 through an arc of large extent. If free to do so the ratchet wheel would turn and with it the feed rolls to an extent much greater than necessary to advance the blank B the proper distance for cutting, but such excess forward movement of the blank is prevented by engagement of the end of the blank with the limiting stop 7. However, this does not interfere with the above-noted tendency of the spring 57 to advance the blank and thus the blank is urged very forcibly, although with a yielding and substantially constant pressure, against the stop. By reason of this normally exerted force the blank is held firmly in proper position during cutting.

As the barrel 14 must be oscillated through 180° between successive cutting operations, and as the pawl carrier turns bodily with the barrel, the roll 54 moves out of engagement with the arm 60 as the barrel starts to oscillate, the latter action beginning at about the time that the movable cutters start to retract. As soon as the roll 54 disengages the arm 60, the spring 53 is free to retract the pawl carrier so that the pawl may engage a fresh tooth of the ratchet wheel. This rearward movement of the pawl carrier, as well as such forward movement of the actuator lever as may be permitted after the pawl carrier has disengaged the arm 60, so positions the parts that as the pawl carrier approaches the dotted line position indicated at 54^a in Fig. 3, it would normally contact with the end of the arm 59 of the actuator lever. To avoid such contact we have provided the lever with the arm 61 and the actuating link 62, and as the barrel nears the completion of its oscillation and the cutters near the upper limit of their movement, the arm 61 is rocked so as to swing the actuator lever and move the arms 60 and 59 to the left in Fig. 2. In this position the roll 54 is free to swing down into its lowermost position, whereupon the arm 61 is permitted to rock backwardly, causing the arm 59 to engage the roll, thus reapplying pressure to the pawl carrier and feeding the blank forwardly with substantially a constantly maintained force beneath the retracted cutter and against the limiting stop.

The above operations are repeated at each successive oscillation of the barrel, and it is evident that, except during the time when the barrel is turning, the action of the spring 57 through the intervening parts is to press the blank forwardly with substantially constant force prior to and during the entire cutting operation. All back-lash between the blank and the cutting instrumentalities is thus avoided, and since the operative movement of the actuator lever is not dependent upon any reciprocating element having a definite length of throw, the mechanism is capable, without adjustment, of advancing the blank to the proper extent and without reference to the size of the piece to be removed from the end of the blank.

It is understood that before the machine is started a coil 75 of the ribbon-like tack strip B has been placed upon the reel, that the end of the strip has been fed into the guide G and through the barrel into the bight of the feed rolls, and that before introducing the end of the strip into the guide G the roller 85 was raised to permit the strip to pass beneath it.

At each step by step actuation of the feed rolls the blank is drawn off between the rolls or pins 81 and 82 from the reel and passing through the guide and barrel is advanced toward the cutting instrumentalities. Since the feed rolls are disposed quite close to the cutting instrumentalities, there is little chance for the tack strip to buckle or yield on its way from the positive bite of the rolls to the cutters, so that at each actuation of the cutters a predetermined amount of tack strip is cut off. On the other hand, since the feed rolls are so far removed from the reel, the tack strip is free to twist as the barrel oscillates, and since this twist is distributed over a long run of the material, it does not tend to weaken the material by overstraining it at any one point, nor does this action appreciably increase the amount of power necessary to drive the machine.

In Fig. 8 we have illustrated a modified form of feed mechanism wherein the upper feed roll of Fig. 5 is replaced by a spherical feed roll 42^a free to turn in any direction and which is forced down toward the lower roll 43^a by means of a spring pressed plunger or other yielding means. The lower roll is fixed to a shaft 41^a provided with a ratchet wheel driven by a pawl 48^a mounted upon a pawl carrier similar to the carrier 49 of Fig. 6.

By the provision of the mechanism above described we have been able to eliminate substantially all waste due to improper feeding and to obtain in many cases perfect, that is to say, 100% production. Moreover, since it is possible to provide a coil of blank material of sufficient length to supply the machine for a long period, for example a day's run, the time required for attendance is very substantially cut down so that one operator may care for several times as many machines as has previously been possible, except by the

use of the most complicated and expensive types of mechanism; and with the present arrangement, where the material is supplied in the form of a coil, no complication can result from improper operation of machine parts such as commonly occurs when usual magazines for feeding independent strips are employed. The operation of the machine is so smooth and uniform that high speeds are readily attainable and substantially no damaged tacks or other waste material is produced. While we have shown a preferred embodiment of our invention, we contemplate that similar results may be obtained by mechanism of somewhat different character but operating upon the same general principle, and we wish it to be understood that it is within the scope of our invention to make such changes in proportion and relative arrangement of parts and to substitute such equivalents as fall within the scope of the appended claims.

We claim:

1. In combination with a tack machine of the type having an intermittently oscillating blank supporting barrel, cutting means at the forward end of the barrel, and stop means adjacent to the cutting means, a blank feeding mechanism comprising a reel for holding a coil of tack strip, and means for simultaneously drawing off the strip from the reel and yieldingly forcing the forward end of the strip against said stop means, said yielding means accommodating itself to the variable uncoiling action of the reel.

2. In combination with a tack machine of the type having an intermittently oscillating blank supporting barrel, cutting means at the forward end of the barrel, and stop means adjacent to the cutting means, a blank feeding mechanism comprising a reel for supporting and peripherally confining a coiled tack strip, and mechanism for simultaneously drawing off tack strip from the reel and yieldingly forcing the forward end of the strip against said stop means, said mechanism including a feed roll disposed yieldingly to engage said tack strip, and actuating means for yieldingly urging said feed roll to rotate in a feeding direction, said yielding actuating means accommodating itself to the variable uncoiling of the reel.

3. In combination with a tack machine of the type having an intermittently oscillating blank supporting barrel, cutting means at the forward end of the barrel, and stop means adjacent to the cutting means, a blank feeding mechanism comprising means for supporting and peripherally confining a coil of tack strip in position for delivery to the barrel, and mechanism moving with the barrel and actuated thereby for simultaneously pulling off tack strip from the coil and delivering it under resilient pressure against the stop means, said resilient delivering mechanism accommodating itself to the variable uncoiling action of said coil of tack strip.

4. In combination with a tack machine of the type having an intermittently oscillating barrel, stop means for limiting the advance of the tack strip, cutting means, and forming dies, a blank feeding mechanism comprising means for supporting and peripherally confining a coiled tack strip at a substantial distance from the end of the barrel, a fixed guide for guiding the strip on its way from said supporting means to the barrel, and blank advancing means adjacent to the delivery end of the barrel, said advancing means normally exerting resilient pressure, when the barrel is stationary, to advance said blank along the barrel into engagement with the stop means and being operable to advance a blank of unlimited length, said resilient advancing means accommodating itself to the variable uncoiling action of said coil of tack strip.

5. In combination with a tack machine of the type having an intermittently oscillating blank supporting barrel, cutting means, and stop means for limiting the advance of the tack strip, a blank feeding mechanism comprising means for supporting and peripherally confining a coil of tack strip, the supporting means being arranged to deliver the strip into the receiving end of the barrel, a feed roll adjacent to the delivery end of the barrel, and means for yieldingly urging the feed roll to rotation for forcing the tack strip against the stop means under resilient pressure, said yielding means accommodating itself to the variable uncoiling action of said coil of tack strip, the tack strip being free to twist throughout substantially the entire distance between the reel and the feed rolls.

6. In combination with a tack machine of the type having an intermittently oscillating blank supporting barrel, cutting means, and stop means for limiting the advance of the tack strip, a blank feeding mechanism comprising a reel for holding a coiled tack strip, a tubular guide interposed between the reel and the receiving end of the barrel, feed rolls adjacent to the delivery end of the barrel, means for driving said feed rolls, the feed rolls being constructed and arranged to draw off the tack strip from the reel and to advance it toward the cutters under resilient pressure, said feed rolls accommodating themselves to the variable uncoiling action of said reel, the strip being free to twist throughout substantially the entire distance between the reel and the feed means.

7. In combination with a tack machine of the type having an intermittently oscillating blank supporting barrel, cutting means, stop means for limiting the advance of the strip, and head forming means, a blank feeding mechanism comprising feed rolls for advanc-

ing a tack strip along the barrel, means for supporting and peripherally confining a coiled tack strip, and means operative during the intervals between the successive oscillations of the barrel and yieldingly urging the feed rolls to rotate in a forward feeding direction thereby to draw off tack strip from the supporting means and delivering it under resilient pressure against the stop means, said yieldingly urging means accommodating itself to the variable uncoiling action of said coil of tack strip.

8. In combination with a tack machine of the type having an intermittently oscillating blank supporting barrel, stop means for limiting the advance of the strip, and cutting means, a blank feeding mechanism comprising a reel for holding a coiled tack strip, said reel being spaced a substantial distance from the end of the barrel, stationary guide means for guiding the strip on its way from the reel to the barrel thereby permitting a long run of the tack strip between the reel and feeding means, feed rolls engaging the tack strip for advancing the same, and yielding means for rotatably driving the feed rolls to advance the strip against the stop means under resilient pressure, said yielding means accommodating itself to the variable uncoiling action of said reel.

9. In combination with a tack machine of the type having a blank supporting barrel, stop means for limiting the advance of the strip, and cutting means, a blank feeding mechanism comprising means for supporting and peripherally confining a coiled tack strip at a substantial distance from the end of the barrel, a fixed tubular guide for guiding the strip on its way from the reel to the barrel, feed rolls adjacent to the cutting means and in yielding engagement with said strip for advancing the same along the barrel, and means for rotatably driving the feed rolls to advance the strip into engagement with the stop means under resilient pressure, said means for driving the feed rolls and advancing the strip under resilient pressure accommodating itself to the variable uncoiling action of said coiled tack strip.

Signed by us at Brockton, Massachusetts, this 1st day of June, 1928.

GEORGE B. BAKER.
HERBERT B. BAKER.
EDWARD C. BAKER.