July 18, 1944. E. L. BUTLER 2,353,645

FASTENING FORMING MACHINE

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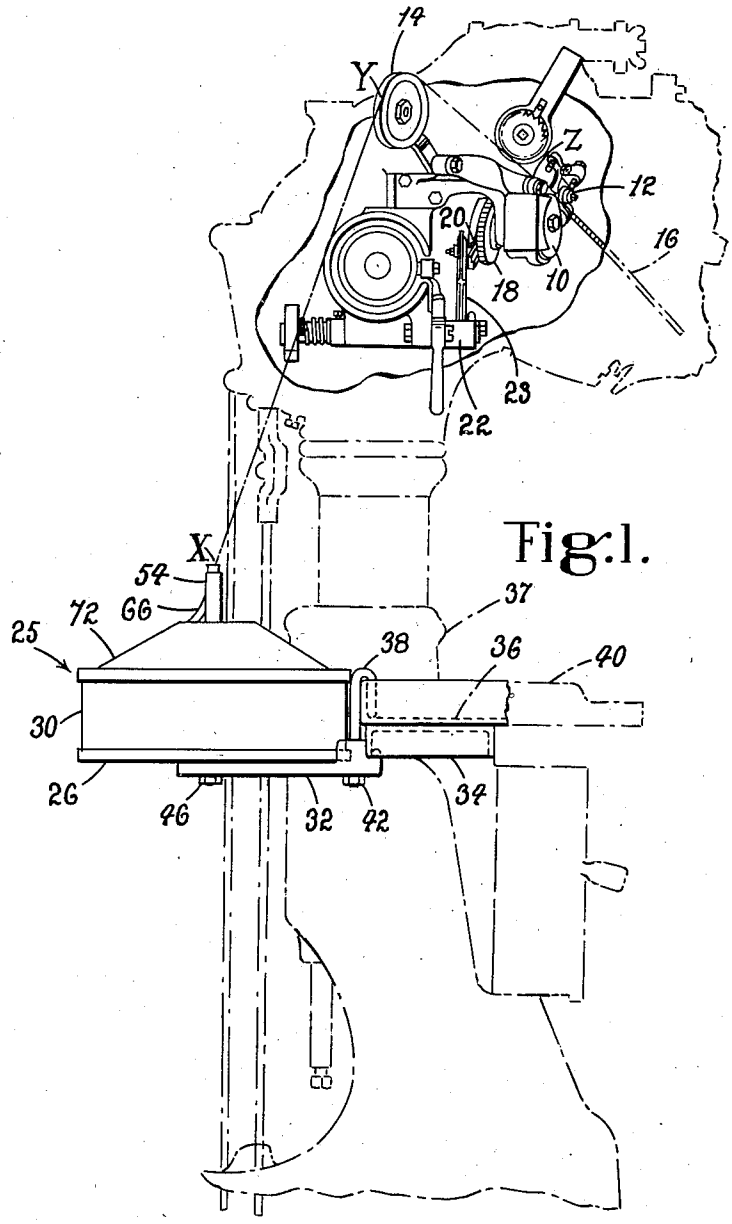


Fig. 1.

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Fig. 2.

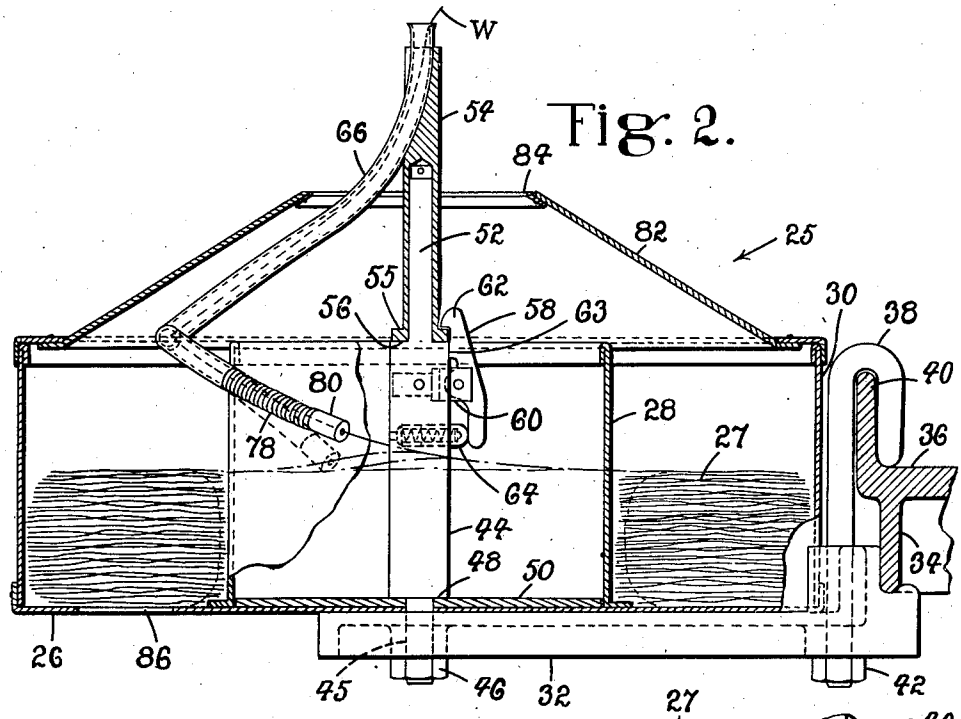
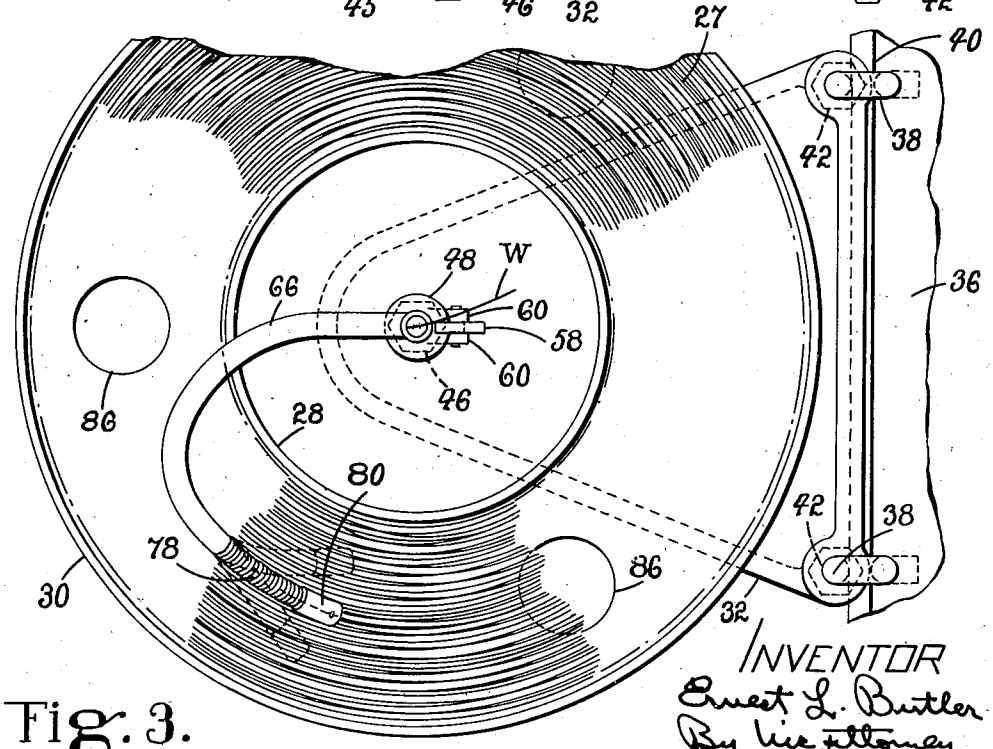


Fig. 3.



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UNITED STATES PATENT OFFICE

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FASTENING FORMING MACHINE

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3 Claims. (Cl. 1—20)

This invention relates to machines for forming wire fastenings and is herein illustrated as embodied in a machine such as that disclosed in Letters Patent of the United States 1,796,451, granted March 17, 1931, on an application of George Goddu, although it is to be understood that the invention is not limited to machines of that particular type.

Heretofore it has been customary in supplying wire to wire-fastening-forming machines to carefully wind the wire tightly and uniformly on a reel so that the wire may be readily drawn off by the wire-feeding means without danger of kinking. Moreover, since reels are rotatably mounted, it has been customary to supply the wire on comparatively light reels in order to avoid any excessive pull on the wire in the feeding operation such as might occur if heavy reels were used. For preventing rotation of the reel faster than the wire is withdrawn therefrom by the feeding means it has been customary to apply a brake to the reel. The use of such a brake to prevent overrunning of the reel increases the tension on the wire as it is withdrawn from the reel and places a load on the feeding means which further limits the size of reel that may be employed with the machine. The size of reel that may be employed with such machines is still further restricted by the necessity of employing narrow reels. This results from the fact that the wire is spirally wound on the reel and the location from which the wire is withdrawn constantly changes widthwise of the reel. This change in location of the point of withdrawal causes the wire to approach the feed rolls, or the guide roll over which the wire passes to the feed rolls, at constantly changing angles. This interferes with the smooth operation of the feed rolls, the interference increasing with the width of the reel, and it has accordingly been the practice to employ narrow reels to insure the smooth operation of the machines. The small reels which are commonly used for supplying wire to such machines are wound from large loosely formed coils and because of this extra winding operation the cost of the wire is considerably increased.

In accordance with the present invention substantial savings are effected in the operation of a machine for forming wire fastenings by supplying the wire directly thereto from large coils as originally formed at the wire mill. Furthermore, less frequent replacement of the supply of wire is required when using a large coil in space of a small reel, thus necessitating less frequent stopping of the machine and thereby increasing production and effecting further savings in the cost of operation.

It is an object of the present invention to provide a machine for forming fastenings of wire having means for supporting a large loosely wound coil of wire and a roll or the like for guiding wire from the coil to the feeding means of the machine in a predetermined manner. To this end and as a feature of the invention the machine is provided with a dispensing container adapted to receive a comparatively large supply of the less expensive loosely coiled wire and to dispense portions of such wire to a guide roll from a fixed location in substantial alinement with the periphery of the roll. The guide roll and the feed rolls of the machine are also preferably located in a common plane so that any tendency for the wire to whip as it passes over the guide roll is greatly minimized and smoother operation of the feeding means is insured without imposing any appreciable load thereon.

A take-off arm associated with the container assists in loosening each convolution of wire as it is uncoiled, the wire then passing over the guide roll to the feeding means. To minimize the load on the feeding means and to insure smooth withdrawal of wire from the coil, the container for the wire is so located in the machine that the path of wire from the take-off arm to the guide roll is not excessively long and so that the wire approaches the guide roll in a plane which is substantially perpendicular to its axis. The path of wire to the guide roll and the path of wire from the guide roll to the feed rolls are preferably in a common plane thus minimizing the tendency for the wire to whip as it passes to the guide roll, thereby to insure smooth operation of the feeding means without imposing an excessive load thereon.

These and other features of the invention will now be more particularly described by reference to the accompanying drawings and pointed out in the claims.

In the drawings,

Fig. 1 illustrates a fastener-forming machine of the type described in the above-mentioned Goddu patent, the machine having embodied therein means for supporting a large loosely wound coil from which wire is guided to the feeding means of the machine in a predetermined manner;

Fig. 2 is a vertical section through the wire-supplying means shown in Fig. 1; and

Fig. 3 is a plan view of the wire-supplying means of Fig. 2 with the cover member removed.

Machines of the type shown in the above-mentioned Goddu Patent No. 1,796,451, each include in their organization wire-feeding means comprising a pair of feed rolls 10, 12 to which wire is guided by an idler roll 14. The wire is fed by the rolls 10 and 12 through a tube 16 to the fastening-forming and inserting mechanism of the machine which is not herein shown or described since it is fully described in the above-mentioned Goddu patent. It will be understood that the upper feed roll 12 is spring pressed toward the lower feed roll 10 to clamp the wire and that the lower feed roll is rotated through a predetermined angle in each cycle of the machine to cause a predetermined length of fastening material to be fed to the forming and driving instrumentalities. For thus operating the wire-feeding means intermittently there is provided a ratchet and pawl mechanism 18, 20 operated by a cam-controlled lever 22 connected to the ratchet and pawl mechanism by means of an adjustable link 23.

The illustrated machine is provided with a container 25 for supporting wire in loosely wound coil form and for supplying it to the wire-feeding means of the machine. The container as shown comprises a support 26 having concentric vertically extending walls 28 and 30 which form an annular chamber for a loosely wound coil 27. The container is carried by a bracket 32 which may be formed as an integral part of the machine base but is herein shown clamped against a depending wall 34 of a support 36 mounted on the base 37 of the machine. The container is clamped to the support 36 by means of a pair of bolts 38 having their upper ends curved to hook over an upstanding wall 40 and to bear against the upper surface of the support, the lower ends of the bolts passing through the brackets 32 and having threaded on their end portions nuts 42.

The container 25 for the coil of wire is clamped to its supporting bracket 32 by a centrally disposed upstanding post 44 having a reduced lower threaded portion 45 passing through the support and the supporting bracket. A nut 46 threaded onto the lower end of the post 44 clamps the support 26 between a shoulder 48 of the post and the bracket 32. A plate 50 of heavier gage metal than the support 26 may be placed between the shoulder 48 and the support 26 to form a more rigid connection between the support and the bracket.

The upper end of the post is reduced at 52 to form a journal for a vertical spindle 54. The lower end of the spindle is flanged at 55 and rests on a shoulder 56 of the post. To hold the spindle 54 against vertical movement relative to the post while permitting rotative movement of the spindle thereon, a latch 58 pivoted to the post between ears 60 has an end 62 which overlies the flange 55. A spring-pressed plunger 64 mounted in the post acts against the lower end of the latch to hold the end 62 over the flange 55 but permits retraction of the latch when it is desired to remove the spindle. As illustrated in Fig. 2, the upper end of the latch has a portion 63 which engages the post 44 and prevents contact of the latch with the peripheral surface of the flange 55 and the end of the latch is spaced slightly above the upper surface of the flange. Thus the latch is normally maintained out of engagement with the spindle so that no frictional drag on the rotative movement of the spindle is imposed thereby, whereas the latch prevents any appreciable vertical movement of the spindle during the operation of the machine.

Secured to the upper end of the spindle 54 is a tubular, downwardly and outwardly extending take-off arm 66, the lower end of which is concentric with the walls 28 and 30 as viewed from above (see Fig. 3). As the wire is removed from the coil 27 by the feed rolls 10 and 12, the movement of the wire through the take-off arm causes the lower end of this take-off arm to move around the coil to lift each convolution of the wire therefrom. The outlet of the take-off arm is preferably located in the plane of the periphery of the guide roll 14 as indicated by the broken line X—Y (Fig. 1). The guide roll is so disposed with respect to the feed rolls 10, 12 that the wire leaves the guide roll in the same plane, as indicated by the line Y—Z. The path taken by the wire as it passes from the take-off arm, over the guide roll to the feed rolls is generally along the line X—Y—Z, although it may deviate slightly from this line due to the slack in the wire and the twist therein as it leaves the loosely wound coil. By so locating the outlet end of the take-off arm and the guide roll relatively to one another and to the feed rolls, there is no appreciable tendency for the wire to climb out of the groove in the guide roll with the resultant tendency of the wire to whip and interfere with the smooth operation of the feed rolls. The tendency of the wire to whip is also maintained at a minimum inasmuch as the path of travel of the wire from the container to the feed rolls is not unduly long. The take-off arm thus serves as a means for dispensing wire from the container 25 at a fixed location with respect to the guide roll 14 and the feed rolls 10, 12.

To the lower or intake end of the take-off arm 66 is secured a coil spring 78 through which the wire passes from the coil 24 into the arm 66. The spring 78 may move laterally and vertically relatively to the coil and to the take-off arm to accommodate itself to changes in the position of the wire at the point of its withdrawal from the coil. In view of the loosely wound nature of the coil, as indicated in Figs. 2 and 3, and the fact that the convolutions of the wire are laid more or less at random during the formation of the coil, the convolutions of wire are not of uniform diameter and are not all concentrically disposed. As a result of this, the coil spring 78 will move almost continually relatively to the take-off arm during the withdrawal of wire. Due to its resilience, when the spring moves from its normal position as shown in full lines in Figs. 2 and 3, to some other position as indicated by the dotted lines, it will tend to return to its normal position, with the result that the spring is caused to vibrate. Such vibratory movement is indicated diagrammatically by the two broken-line positions of the spring in Fig. 3. The vibratory movement thus imparted to the spring is greatly augmented by the intermittent movement of the take-off arm caused by the intermittent operation of the wire feeding rolls 10 and 12. The vibrations of the spring act on the wire as it passes into the take-off arm to shake each convolution of the wire loose from the remainder of the coil as it is withdrawn therefrom. This substantially eliminates any tendency for more than one convolution of the wire to be lifted from the coil at a time and thus greatly reduces the load on the wire feeding means.

At the lower end of the spring 73 is inserted, or otherwise secured thereto, a hollow wear-re-

sisting ring 80 which prevents wear that would otherwise occur between the wire and the spring if the wire passed over the lower edge of the spring as it is being fed. A cover 82 of frusto-conical form substantially encloses the coil of wire 24 to keep dirt from getting thereon. The cover rests on the upper edge of the wall 30 and forms with this wall and the support 26 a substantially enclosed container for the wire. An opening 84 is provided at the upper portion of the cover 82 to accommodate the movement of the take-off arm during operation of the machine. Holes 86 in the support 26 facilitate sweeping any dirt out of the receptacle that may pass therein through the opening 84.

The support 26 for the wire may be made sufficiently large to accommodate a coil of wire of any desired size. In order to place a coil on the support, the cover 82 is removed and the take-off arm 66 is removed with the spindle 54 by retracting the latch 58. After the coil has been inserted between the walls 28 and 30, the spindle is replaced and latched in place and the cover 82 is also replaced. The end of the wire of the coil 24 is passed through the ring 80, spring 78, and the take-off arm 66 and fed over the guide roll 14 to the feed rolls 10 and 12. As these latter rolls operate to feed the wire to the fastening instrumentalities, the withdrawal of wire from the coil 24 will cause the take-off arm 66 to move around the coil, and the spring 78 will move at this time relatively to the take-off arm in accordance with variations in the position of the wire at its point of withdrawal from the coil. By reason of the resilience of the spring 78, a vibrating movement will be set up which will be amplified by the intermittent operation of the feed rolls and the consequent intermittent movement of the take-off arm. This vibratory movement of the spring shakes the wire and separates each convolution as it is withdrawn from the remainder of the coil so that the wire is readily uncoiled and no excessive load is imposed on the feeding means.

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

1. The combination with a fastener-forming machine having a guide roll and means located below the axis of rotation of said guide roll for feeding wire to the fastener-forming instrumentalities, of means carried by said machine for supporting a loosely wound coil of wire in a definite position with respect to and below said guide roll, and a rotary take-off means for uncoiling wire from said coil so that the wire passes tangent to the guide roll and thence to said feeding means.

2. The combination with a fastener-forming machine having a guide roll and means located below the axis of rotation of said guide roll for feeding wire to the fastener-forming instrumentalities, of means carried by said machine for supporting a loosely wound coil of wire in a definite position with respect to and below said guide roll, and a rotary take-off means for uncoiling wire from said coil, the path of wire from the take-off means to the guide roll and from the guide roll to the feeding means being disposed in a common plane.

3. The combination with a fastener-forming machine having a guide roll and means located below the axis of rotation of said guide roll for feeding wire to the fastener-forming instrumentalities, of means carried by said machine for supporting a loosely wound coil of wire in a definite position, and a rotary take-off means for uncoiling wire from said coil so that the wire passes tangent to the guide roll and thence to said feeding means, said supporting means being located intermediate the base of the machine and said guide roll to provide a relatively short distance between said rotary take-off means and said guide roll.

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