Aug. 26, 1924. 1,506,276

F. H. STOLP

MACHINE ELEMENT

Filed March 23, 1922 2 Sheets-Sheet 1

Fig. 1

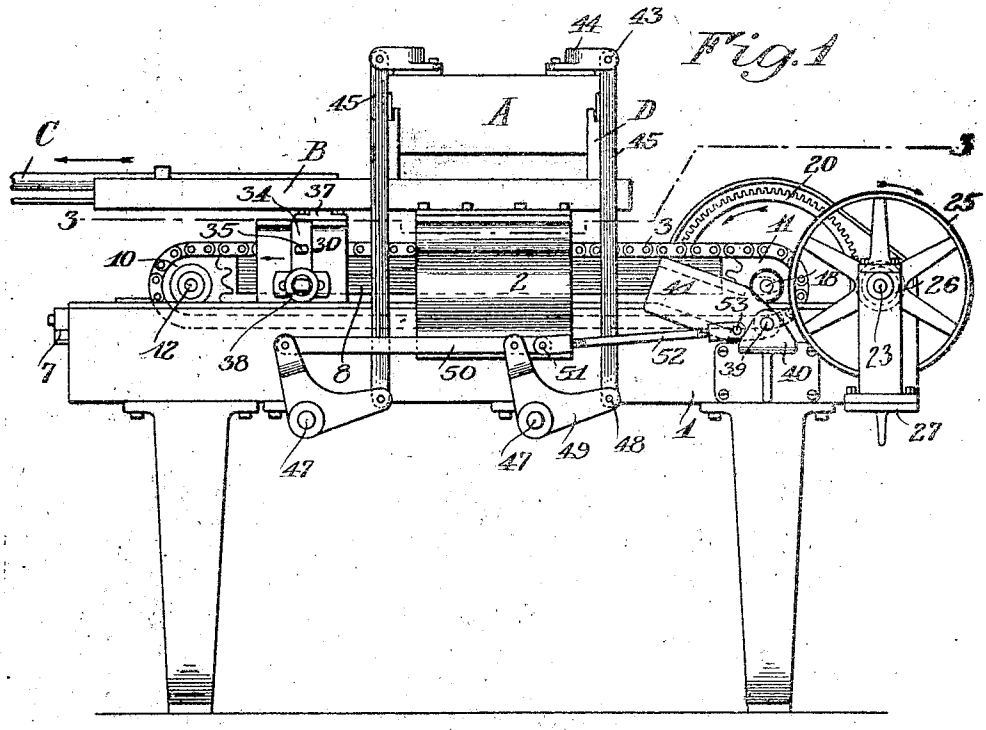
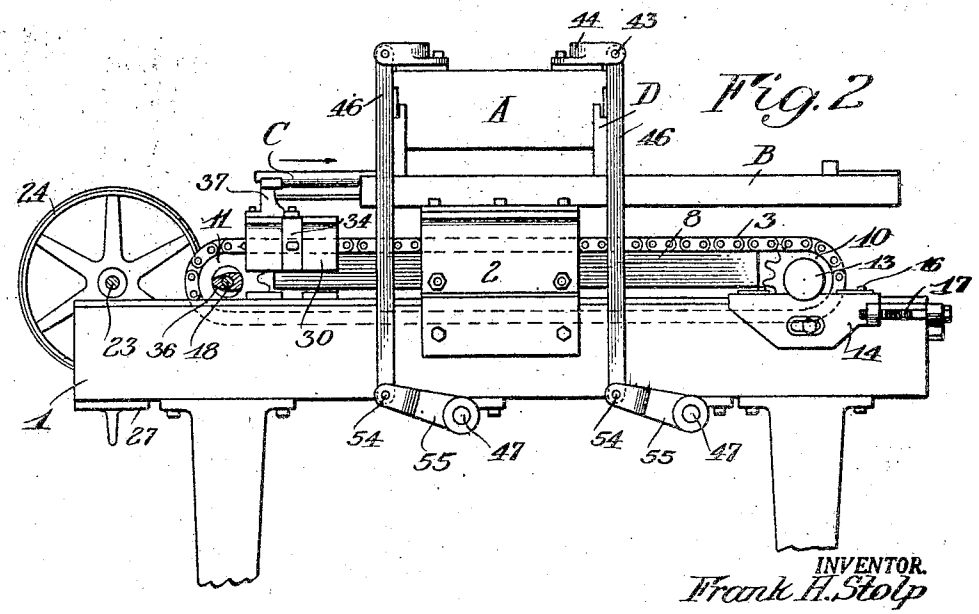


Fig. 2



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Fig. 3

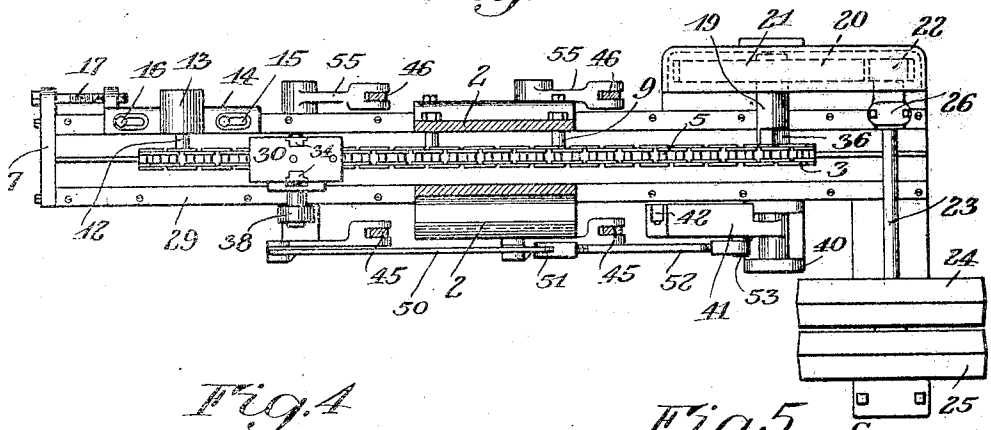


Fig. 4

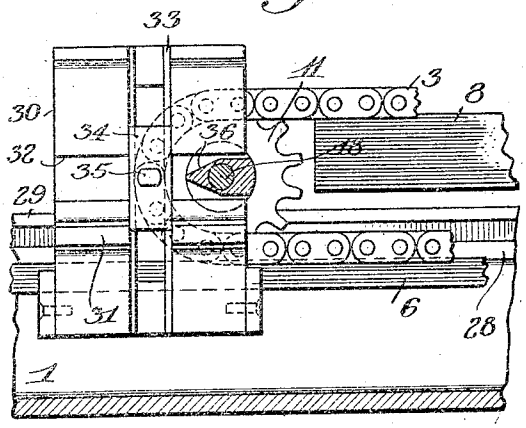


Fig. 5

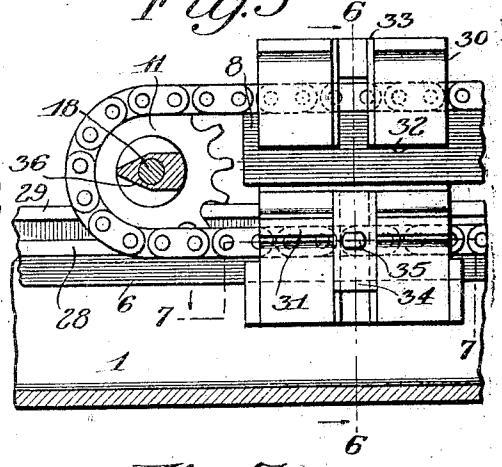


Fig. 6

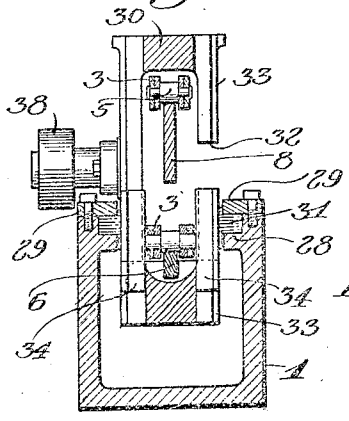


Fig. 7

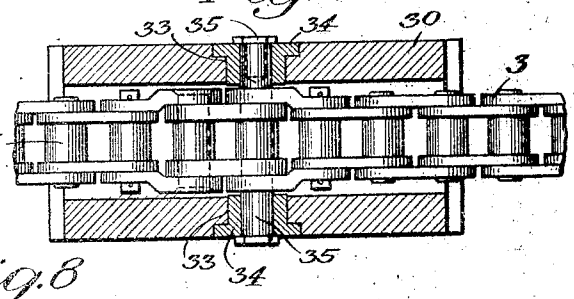
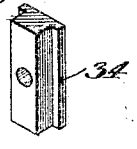


Fig. 8



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Patented Aug. 26, 1924. 1,506,276

UNITED STATES PATENT OFFICE.

FRANK H. STOLP, OF GENEVA, NEW YORK, ASSIGNOR TO THE STOLP COMPANY, INC., OF GENEVA, NEW YORK, A CORPORATION OF NEW YORK.

MACHINE ELEMENT.

Application filed March 23, 1922. Serial No. 546,143.

To all whom it may concern:

Be it known that I, FRANK H. STOLP, of Geneva, in the county of Ontario and State of New York, have invented certain new and useful Improvements in Machine Elements; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the reference numerals marked thereon.

My present invention relates to machinery and machine elements, and more particularly to converting rotary motion into reciprocatory motion, and it has for its object to provide a simple and practicable mechanical movement of this kind that will produce uniform reciprocation of a driven part or reciprocate two driven parts relatively in accurate timed relationship. To these and other ends the invention consists in certain improvements and combinations of parts, all as will be hereinafter more fully described, the novel features being pointed out in the claims at the end of the specification.

In the drawings:

Figure 1 is a side view of a machine constructed in accordance with and illustrating one embodiment of my invention;

Fig. 2 is a similar view of the other side of the machine partly in vertical section and with the moving parts in different positions;

Fig. 3 is a top view of the machine partly in horizontal section on the line 3—3 of Fig. 1;

Fig. 4 is an enlarged fragmentary vertical section through one of the sprocket bearings and the frame of the machine showing the carriage in side elevation;

Fig. 5 is a view similar to Fig. 4 but showing another position of the same parts;

Fig. 6 is a section on the line 6—6 of Fig. 5;

Fig. 7 is an enlarged horizontal section through the carriage, and

Fig. 8 is a perspective view of one of the sliding blocks, with which the carriage is fitted.

Similar reference numerals throughout the several views indicate the same parts.

In the present instance I have shown my improved mechanism embodied in a tube forming machine of the nature described in my prior Patent No. 1,327,641, dated January 13, 1920, in which machine I have formed lock seam metal tubing by first bending a flat blank into a doubled or U shape and then, in a relatively transverse direction pushing it through stationary dies by means of a reciprocating mandrel. The present invention is particularly adapted to perform the work of directing and correlating the movements of the bending mechanism and the mandrel in such machine, and I may therefore state preliminarily that in the accompanying drawings A represents a vertically movable bending die or tool, B a fixed die plate and C a horizontally reciprocatable mandrel. The effect desired is to have A raise and lower in a certain timed relationship to the horizontal movement of C.

Referring more particularly to the drawings, 1 indicates the bed of the machine, preferably of the channel or U shape indicated in Figure 6. Secured to opposite sides thereof at about its center are standards 2 which bridge or straddle the mechanism hereinafter described and rigidly support the die plate B upon which are vertical guides D for the bending tool A. The bed is traversed from end to end by the upper and lower reaches of an endless flexible carrier 3 in the present form of a heavy sprocket chain of the roller type, the rollers thereof being indicated at 5 in detail in Figure 7. The lower reach of the chain rolls and is guided upon a longitudinally extending supporting bar 6 within the bed 1 and itself secured at the ends thereof as at 7, while the upper reach is supported by a similar bar 8 that is carried by bolts 9 (Figure 3) projecting laterally and inwardly from one of the standards 2. The chain is run on a pair of sprockets 10 and 11 at opposite ends of the machine and supported from one side only of the bed. The sprocket 10 is carried on a stud shaft 12 (Figure 3) projecting from a bearing 13 on a bracket 14 slotted at 15 to receive bolts 16 by means

of which it is adjustably mounted on the bed 1 to permit tightening of the chain or carrier. This is accomplished by a lead screw 17 extending through lugs on the supporting plate 7 at one end of the bed and on the bracket 14 respectively.

The other sprocket 11 is the driving sprocket and is carried on a shaft 18 supported by a more extended bearing 19. On the opposite end of the shaft 18 is a gear 20 within a housing 21 meshing with a pinion 22 on a drive shaft 23 having fixed and loose pulleys 24 and 25 for the application of power from a prime mover in the usual manner. The shaft 23 is supported in suitable bearings 26 on the bed and on a suitable bracket 27 extending therefrom.

The bed 1 is provided interiorly at its top with oppositely disposed guides or ways 28 beneath gibs 29 and in these ways is adapted to travel a yoke shaped cross head 30, the shape of which is best shown in Figure 6. Lateral ribs 31 thereon engage the ways 28, and the cross head as a whole encompasses the chain and its supports though at one side it is cut away as shown at 32 to clear the bolts 9 and the sprocket shafts in a manner hereinafter referred to. On opposite sides it is itself provided with central vertical ways 33 in which slide blocks 34 the form of which and their cooperation with the ways is shown in Figures 7 and 8. These blocks are secured to the chain or carrier 3 by a bolt or shaft 35 extending therethrough from side to side and through one of the rollers 5 thereof in the turning axis of two of the links.

As a result of these arrangements there is imparted to the cross head 30 a practically continuous reciprocatory motion of uniform velocity as to the major portion of its travel. Assuming that the parts are in the position of Figure 1, and the chain 3 travelling in the direction of the arrow, the cross head 30 will be carried at the same speed until it reaches the center of the sprocket shaft 12. At this point the shaft 35 will be carried downwardly on the pitch line of the sprocket and the cross head will slow up correspondingly, so that as the said shaft reaches the dead center the cross head will be practically at rest because there is a lost motion due to the blocks 34 travelling downwardly relatively to the cross head on its ways 33. As soon as the shaft 35 and block passes the dead or horizontal center of the sprocket it will begin to gradually move the cross head 30 in a reverse direction, and when it reaches the vertical center of the shaft 12 again the velocity of the cross head will be restored and will continue uniformly and equal to that of the chain until the other sprocket is reached at the rear end of the machine where the motion will be repeated in an upward direction. The heavy bearing 19 of this other sprocket shaft 18 is cut away or tapered horizontally, as shown at 36, to give clearance for the movement of the blocks 34.

It will be seen that these reciprocations of the cross head are relative to the die plate B (which has a slot in its bottom not shown) and as the mandrel C is mounted on the cross head 30 by means of a bracket 37 it will be pushed in and out of the die. In such a machine unless the rectilinear movement of the mandrel is uniform buckling of the thin stock acted upon is apt to occur.

To avoid confusion in comparing the figures of the drawing, it should be borne in mind that as between Figures 1 and 2 not only are opposite sides of the machine shown, but the cross head is in different positions in the two views. It will also be noted that the blocks 34 are long enough to bridge the cut-a-way portion 32 of the cross head, and they have occasion to pass from one side to the other of such openings only during the extremity of movement of the cross head in the region of the sprockets.

The timed movement of the bending element A is effected by means of an actuator on the cross head 30. This is in the present form of a laterally projecting roller 38. Pivoted to the right hand end of the machine (Figure 1) at 39 in a bracket 40 is a vibratory guide member 41, the guideway 42 in which is adapted to receive the actuating roller 38 and is shown in perspective in Figure 3. This guide member 41 normally stands inclined or cocked at an angle to the path of movement of the cross head 30 and its actuating roller, as shown in Figure 1. When the cross head travels to the right in Figure 1 on the lower reach of chain 3 the actuating roller 38 enters the guideway 42 and vibrates the member 41. It passes out briefly at the opposite end while the sliding blocks 34 are rising on the sprocket 11, and then as the cross head resumes its movement up the bed in the other direction the actuator re-enters the guideway and again depresses the guide member 41. These vibrations of the latter operate the vertically movable bending element A through the following mechanism:

The element A as before described slides in the vertical guides D and has pivotally connected to it at 43 through brackets 44 a pair of links 45 on one side of the machine and a similar pair 46 on the opposite side. The links 45 are fixed to shaft 47 extending transversely beneath the bed by being pivoted at 48, in each instance to one arm of a bell crank lever 49. The other arms of these bell cranks are connected for joint movement by a link 50, and this link in turn is pivoted at 51 to a connecting rod 52 hav-

ing a wrist-pin connection 53 with the vibratory member 41. On the other side of the machine the links 46 are pivoted at 54 to arms 55 fixed to the shaft 47. It will be seen from this that each actuation of the vibratory member 41 will draw downwardly on the links 45 and 46 and operate the element A.

Through the practice of my invention a very even and powerful reciprocating movement may be developed with an accurately timed movement of a coordinated device such as the element A herein shown.

I claim as my invention:

1. The combination with a bed, an endless flexible carrier having upper and lower reaches traversing said bed in opposite directions and means for driving the carrier, of a cross head reciprocatable on the bed, a slide transversely movable on the cross head and carried by the carrier, a vibratory guide member pivoted to the bed to normally stand at an angle to the path of the cross head and an actuator on the latter adapted to cooperate with the guide member and vibrate same.

2. The combination with a bed, an endless flexible carrier having upper and lower reaches traversing said bed in opposite directions and means for driving the carrier, of a cross head reciprocatable on the bed, a slide transversely movable on the cross head and carried by the carrier, a vibratory member having a guideway therein pivoted to the bed at one side of the path of the cross head to normally stand at an angle thereto and a laterally projecting roller on the cross head adapted to enter the guideway of the vibratory member and vibrate the same.

3. The combination with a bed having sprockets arranged in spaced relationship thereon, an endless sprocket chain meshing with the sprockets and having upper and lower reaches traversing said bed in opposite directions and means for driving one of the sprockets, of tracks on the bed supporting the respective reaches of the chain, a cross head reciprocatable on the bed, and a slide transversely movable on the cross head and carried by the sprocket chain.

4. The combination with a bed having sprockets arranged in spaced relationship thereon, an endless sprocket chain meshing with the sprockets and having upper and lower reaches traversing said bed in opposite directions, and means for driving one of the sprockets, of a yoke shaped cross head reciprocatable on the bed to embrace both reaches of the chain, a longitudinal support for the upper reach of the chain having a lateral supporting arm, the cross head being cut away at one side to clear said arm, and slides transversely movable on opposite sides of the cross head and connected to the carrier, one of said slides being adapted, during its movement, to bridge the cutaway portion of the cross head.

5. The combination with a bed, an endless flexible carrier having upper and lower reaches traversing said bed in opposite directions and means for driving the carrier, of a yoke shaped cross head reciprocatable on the bed to embrace both reaches of the carrier, a slide transversely movable on the cross head and connected to the carrier, a standard on the bed straddling the carrier and the path of the cross head, a fixed element supported by the standard and a cooperating reciprocatable element carried by the cross head.

6. The combination with a bed, an endless flexible carrier having upper and lower reaches traversing said bed in opposite directions and means for driving the carrier, of a yoke shaped cross head reciprocatable on the bed to embrace both reaches of the carrier, a slide transversely movable on the cross head and connected to the carrier, a vibratory member having a guideway therein pivoted to the bed to normally stand at an angle thereto, an actuator projecting laterally from the cross head adapted to enter the guideway of the vibratory member and vibrate the same, a standard on the bed straddling the carrier and the path of the cross head, a fixed guide on the standard, a reciprocatable element in the guide, a bell crank lever on the bed, a link connecting one arm of the bell crank lever to the reciprocatable element and a connecting rod between the other end of the bell crank and the vibratory member.

7. The combination with a bed, an endless flexible carrier having upper and lower reaches traversing said bed in opposite directions and means for driving the carrier, of a yoke shaped cross head reciprocatable on the bed to embrace both reaches of the carrier, a slide transversely movable on the cross head and connected to the carrier, a vibratory member having a guideway therein pivoted to the bed to normally stand at an angle thereto, an actuator projecting laterally from the cross head adapted to enter the guideway of the vibratory member and vibrate the same, a standard on the bed straddling the carrier and the path of the cross head, a fixed guide on the standard, a reciprocatable element in the guide, a bell crank lever on the bed, a link connecting one arm of the bell crank lever to the reciprocatable element, a connecting rod between the other end of the bell crank and the vibratory member, a fixed element on the standard and a cooperating second reciprocatable element carried by the cross head to move transversely to the path of the first mentioned reciprocatable element.

8. The combination with a pair of reciprocatable elements movable relatively in timed relationship, of a bed, an endless flexible carrier having upper and lower reaches traversing said bed in opposite directions, means for driving the carrier, a cross head reciprocatable on the bed and arranged to operate said elements, a slide transversely movable on the cross head and carried by the carrier, a vibratory guide member pivoted to the bed to normally stand at an angle to the path of the cross head, said guide member being connected to operate the other element, and an actuator on the cross head adapted to cooperate with the guide member and to vibrate the same.

FRANK H. STOLP.