Dec. 7, 1926. 1,609,291

E. BULLIS

PRESS MACHINE

Filed June 4, 1924 4 Sheets-Sheet 1

Fig. 1

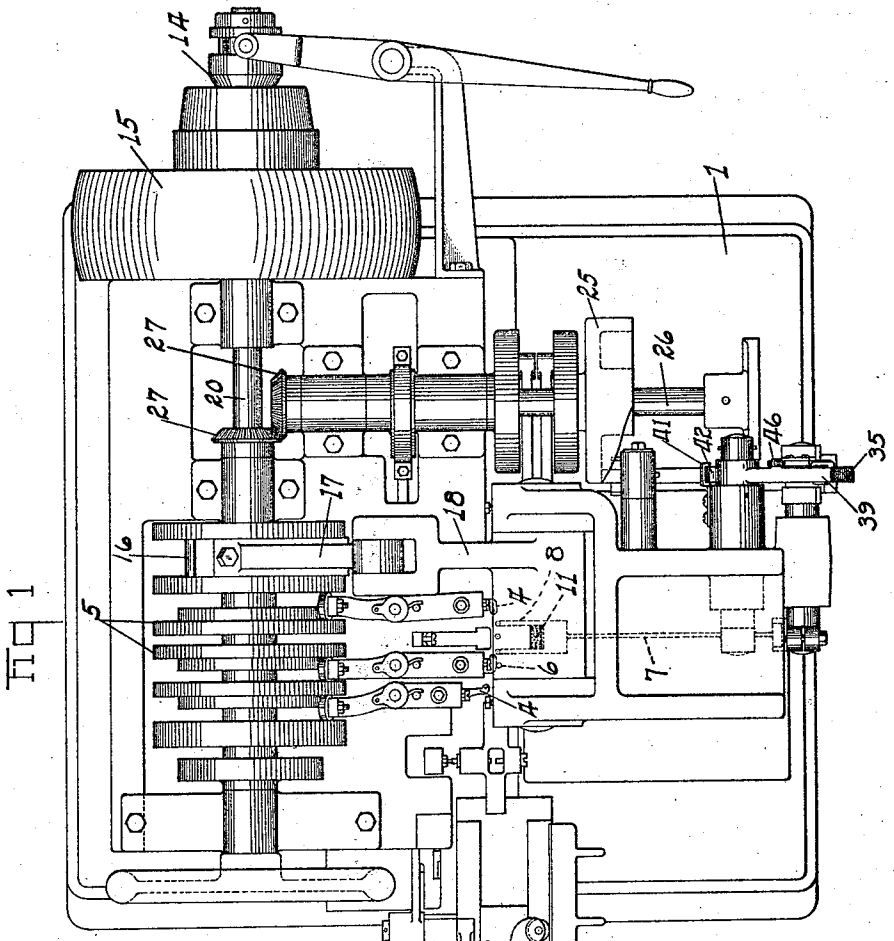
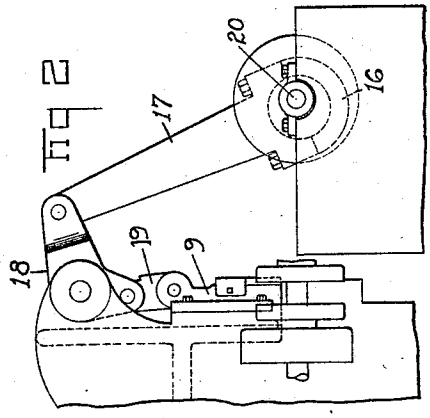


Fig. 2



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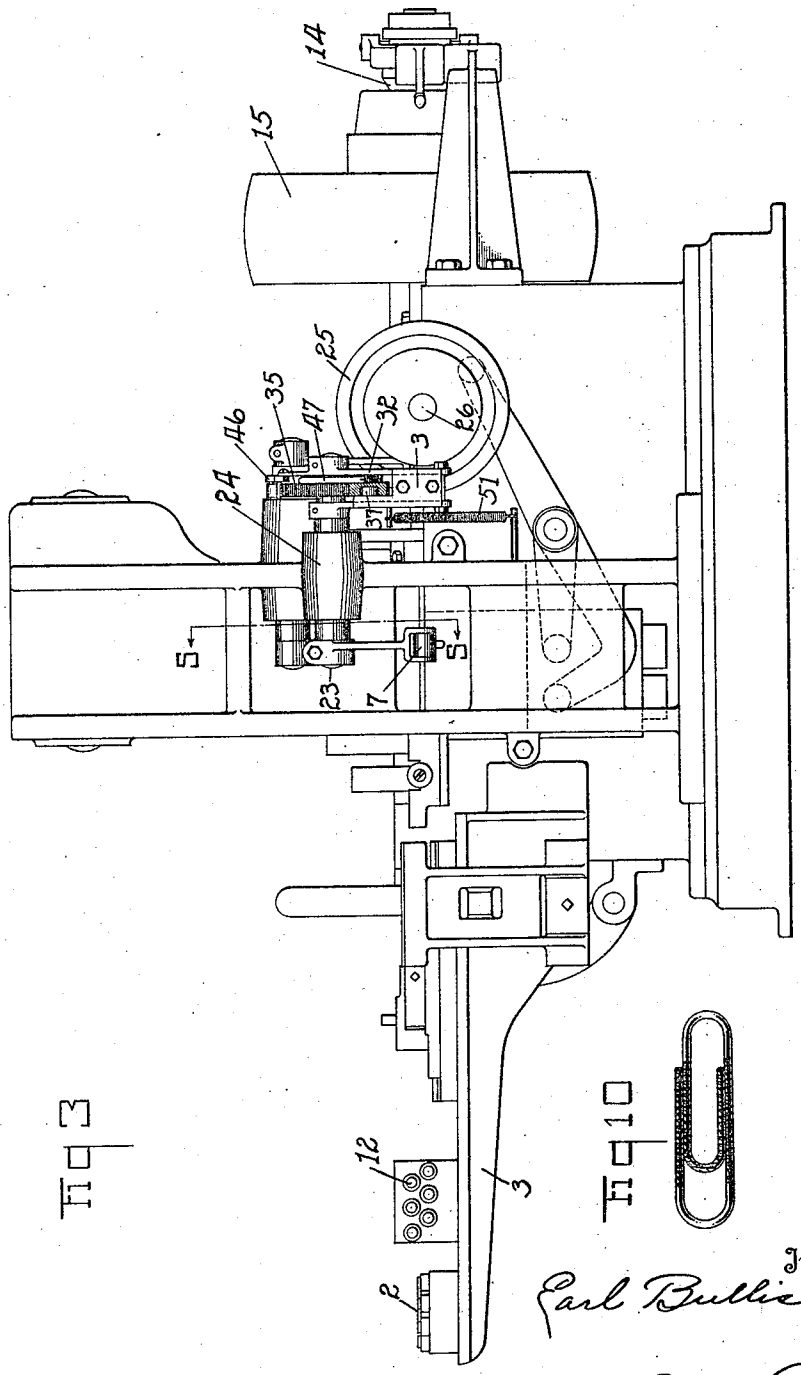

Fig 3

Fig 10

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PRESS MACHINE

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Fig 4

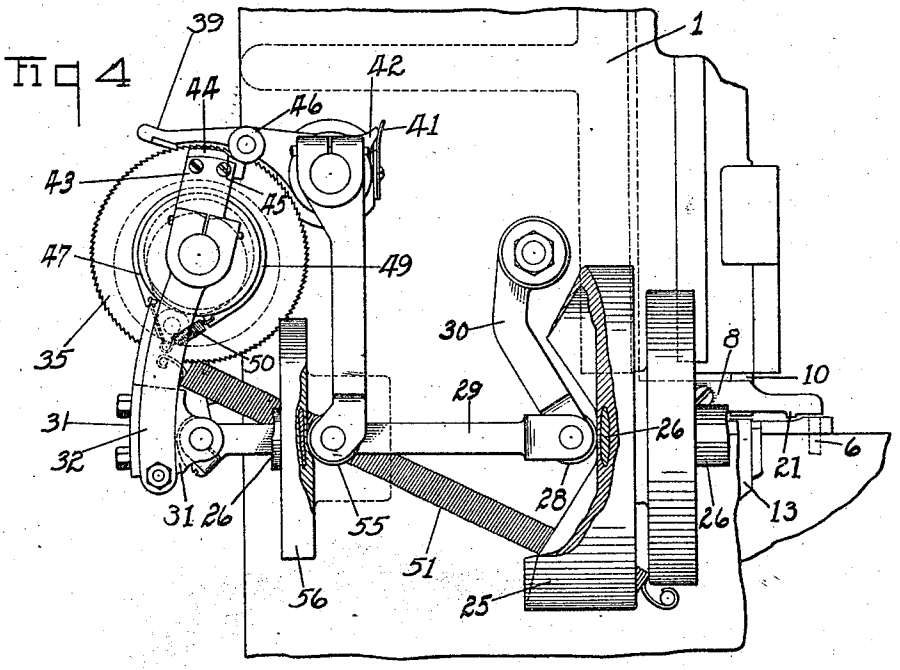

Fig 5

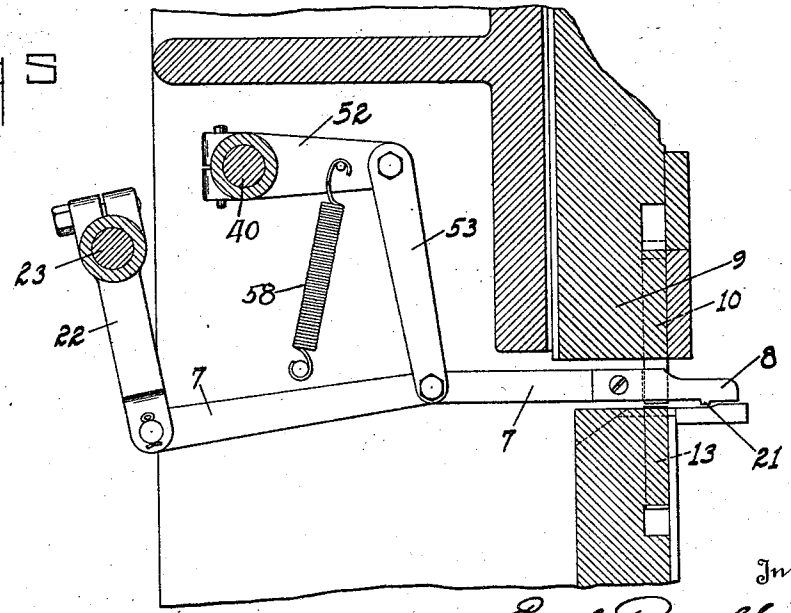

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Fig 6

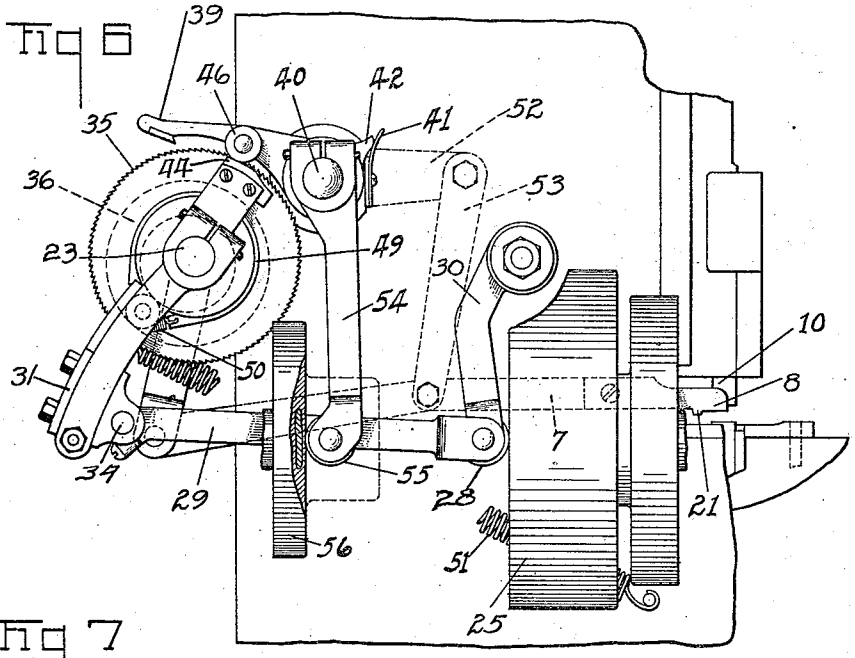


Fig 7

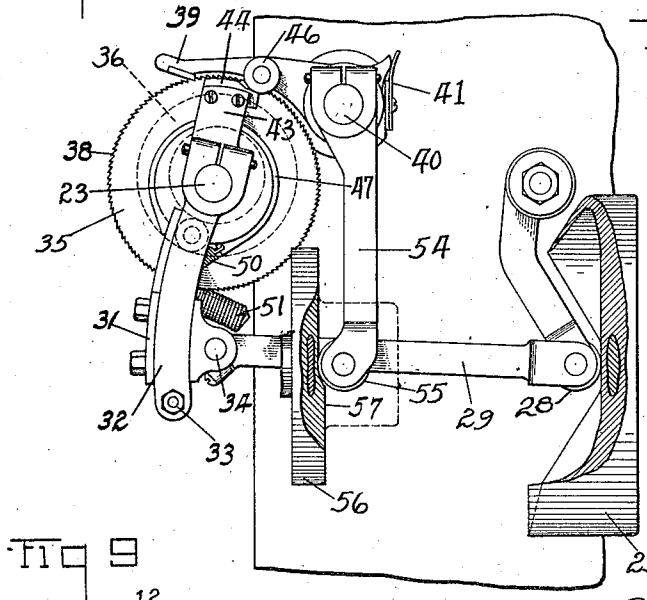


Fig 8

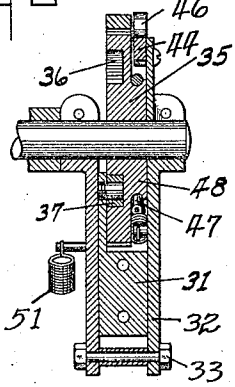
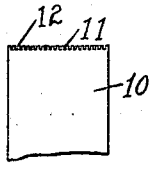


Fig 9



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Earl Bullis

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Patented Dec. 7, 1926. 1,609,291

UNITED STATES PATENT OFFICE.

EARL BULLIS, OF AMSTERDAM, NEW YORK, ASSIGNOR TO COLLETTE MANUFACTURING COMPANY, OF AMSTERDAM, NEW YORK, A CORPORATION OF NEW YORK.

PRESS MACHINE.

Application filed June 4, 1924. Serial No. 717,694.

My invention has for its object to provide in a die press machine a means for constantly changing the relation of the work to the die so as to cause all substantially infinitesimal juxtaposed portions to be progressively subject to the performance of the die on the work. The invention particularly provides a means for roughening the engaging surfaces of paper clips having paper engaging portions that lie substantially within the same plane, by dies that operate upon the surfaces of the clips as fast as they are formed. In the preferred form or embodiment of my invention the clips are placed in substantially infinitesimal and constantly changing relation to the die to produce practically an obsolute uniform wear of the die and prevent local depressions of the die surfaces. This greatly extends the life of the dies since it prevents slipping of the clips while the dies are operating upon them into, at first imperceptible, recesses produced in previous operations which greatly reduces the life of the dies and causes deformation of the clips. The invention also consists of other features and advantages which will appear from the following description and upon examination of the drawings.

The invention may be contained in structures of different forms and to accomplish a variety of purposes. To illustrate a practical application of the invention I have selected a structure containing the invention as an example of such structures and I shall describe it hereinafter. The structure selected is illustrated in the accompanying drawings.

Fig. 1 of the drawings is a top view of a clip-forming machine to which my invention is applied and illustrates a top view of a structure containing my invention. Fig. 2 is a side view of a part of the machine. Fig. 3 is a front view of the machine. Fig. 4 is a side view of a part of the mechanism shown in Figs. 1 and 3. Fig. 5 is a sectional view taken on the line 5—5 indicated in Fig. 3. Fig. 6 illustrates the mechanism shown in Fig. 4 in a slightly different position. Fig. 7 illustrates a completion of the movement of the mechanism shown in Fig. 5. Fig. 8 is a sectional view of a part of the mechanism shown in Fig. 7. Fig. 9 illustrates an enlarged side view of the end of one of the dies. Fig. 10 illustrates a view of the clip produced by the machine.

The clip-forming machine in connection with which the particular embodiment of my invention that has been selected for purposes of illustration is used, is of a type known in the art. The machine has the usual bed or table and supporting frame parts 1. The wire, from which the clips are formed, is passed through wire-straightening rollers 2 located on an arm 3 extending from the bed and then to wire-bending fingers 4 that are operated by cams 5 that co-act with suitable disappearing pins 6 to bend the wire and form the clip. The clip thus formed surrounds the pins 6 and is located on the top of the bed 1. The disappearing pins 6 are then withdrawn from the top of the bed 1 by suitable mechanism leaving the clip on the bed free to be operated upon. Usually they are delivered from the machine. My invention provides particularly a means for roughening the surface of the wire at this point of the formation of the clip.

When the disappearing pins 6 are drawn below the top of the bed of the machine, the clip is shifted so as to be operated upon by a plunger having a suitable die for roughening the paper-engaging surfaces of the clip. A rake bar 7 having fingers 8 engages the clip as the pins 6 disappear and then draw the clip from the position in which it is bent to form to a predetermined definite point with reference to the dies 10 and 13. One die is connected to the plunger 9 and the other die is secured in the bed. They have roughened surfaces 11. The roughened surfaces 11 may partake of any form that will produce gripping or paper-engaging surfaces on the clip. The die is preferably provided with closely positioned grooves or channels 12 cut across the end of the die as shown enlarged in Fig. 9, which produce raised ridges extending transverse the wire of which the clips are formed.

The plunger is actuated by the driving shaft 20 that is connected by a suitable clutch 14 to the driving pulley 15. An eccentric 16 is located on the shaft 20 and is connected by means of a link 17 to a bell crank lever 18 which is connected by means of a link 19 to the plunger 9. One of the arms of the bell crank lever 18 and the link 19 form a toggle joint connection between the axis of the rotation of the bell crank lever 18 and the plunger 9, to force the plunger 9 downward to the extreme point of its movement during each reciprocatory movement of the

bell crank lever 18. Each time the plunger is raised the fingers 8 draw a clip to a point between the dies 10 and 13. The fingers 8 are located on the opposite sides of the die 10 so that they can engage the clip and draw it between the upper and lower dies and hold the ends of the clip until the clip has been engaged by the dies. The fingers may be provided with downwardly extending lugs or bosses 21 that will draw the clips from between the dies as succeeding clips are placed in position.

The dies, by their pressure on the surface of the clip, cut or groove the clip and form raised portions on the clip to form closely positioned transverse ridges that cause the clip to cling to sheets of paper that may be secured by each clip to just the proper degree for general commercial purposes. Inasmuch as this requires considerable pressure and although the die may be hardened, yet the continuous operation of the machine, which is exceedingly rapid in its performance, will cause slight wear locally in a very short time if the clip is placed indiscriminately between the dies since there will be irregular breaking down of the fine ridges of the faces of the dies which will soon grow into depressions that extend transverse the ridges. This is due to the fact that as soon as any one of the ridges break locally, portions of succeeding clips, when indiscriminately placed, that may be positioned in close proximity to the break, when subjected to the pressure of the upper die, either break the adjoining ridges or make a larger break in the said ridge. This progressively increases and finally produces irregular depressions in the surfaces of the dies as the portions of the clip will slip into these depressions when the upper die strikes the clips. This causes deformation of the clips since a portion of it will be bent into the shape of the depression while other portions are sustained on the top of the ridges of the dies. This deformation will be made permanent by reason of the fact that the surfaces on opposite sides of the clip are worked upon, which causes the clip to maintain the deformation into which it is forced by reason of the breaking down of the dies. Substantially the same results are produced when the succeeding clips are placed in positions that are materially spaced from each other particularly where in the operation of the machine, the clips succeeding a certain number are brought into the same definite positions. Such placement, as a matter of fact, merely divides the portions of the dies into as many parts as there are definite positions into which the clips are placed, with the result that such a die will last somewhat longer than a die having a width substantially that of the clip but the die will soon break down along the lines where the wire, of which it is formed, is located and cause deformation of the clip as a whole, and irregular and inefficient engaging surfaces.

By my invention the clips are so placed that the areas of the dies that operate upon corresponding parts of the succeeding clips are contiguous, which produces an absolute uniform wear throughout the total area of the surfaces of the dies. The contiguous areas that thus progressively operate on the clips in sequence will not break down locally since a single operation on a clip will not locally break down the ridges and consequently there will be only an imperceptible wear on the dies. This extends the life of the dies to an unexpected length at a great saving to cost of operation and the prevention of the deformation of clips which otherwise increases imperceptibly and results in mixing deformed clips with perfect clips which renders boxes of the clips useless, or, at least, rejectable.

In order to thus differentially and progressively position the clips relative to the surfaces of the dies, the rake bar 7 is connected to an arm 22 which is pinned to the shaft 23 supported in suitable bearings formed in bosses 24. The shaft 23 is moved angularly by means of a cam 25 that is connected to a shaft 26. The shaft 26 is connected to the driving shaft 20 by means of the beveled gears 27. The cam 25 operates upon a roller 28 located in the bifurcated end of a link or push rod 29. A pivoted arm 30 is connected to the frame or bed 1 of the machine and to the link or push rod 29 to hold the roller 28 in engaging relation relative to the actuating surface of the cam 25. The other end of the rod 29 is pivotally connected to a slide 31 that is secured between the arms 32. The arms 32 are arcuate in form and are keyed or pinned to the shaft 23. They are secured together at their outer ends by the bolt 33. Rotation of the cam 25 thus oscillates the arm 22 to move the rake bar back and forth. The rake bar 7 is always moved to the same point rearwardly, that is, towards the clip-forming mechanism but the forward movement of the rake bar, that is, towards the dies, progressively changes by a very minute amount. This clip placing movement of the rake bar is controlled by the slide 31 which is progressively shifted along the arcuate arms 32 to vary the effective length of the arms and, consequently, the effective movement of the arm 22, as produced by the cam 25. The rake bar 7 is moved rearwardly always to the same position when a clip is engaged, by reason of the fact that the center of the arc of the arcuate arms 32 is the center of the roller 28, which prevents the shifting of the slide 31 from changing the point at which the rearward stroke of

the rake bar is completed. The forward stroke, however, is controlled by the gradual changing position of the slide 31. This movement of the slide 31 which results in succeeding variations in the movements of the rake bar, is caused by a cam 35 having a channel 36. The cam 35 is located on the shaft 23 and between the arms 32. A roller 37 is located in the channel and is connected to the slide 31. Rotation of the cam 35 on the shaft 23 shifts the slide 31 between the arms 32 to produce a uniform change in the movements in the rake bar as the cam is rotated. Thus the cam 35 is rotated very short angular distances between the succeeding strokes of the rake bar to vary the completion and delivery point of the forward stroke of the rake bar.

The cam 35 is given step by step movements during each rearward stroke of the rake bar. The periphery of the cam is provided with closely positioned teeth 38 that are progressively engaged by the dog 39. The dog 39 is rotatable on the shaft 40 and is spring-pressed by means of the spring 41 connected to a boss forming part of the frame or bed 1. The dog 39 has a projecting lug 42 against which the spring elastically presses to normally cause engagement of the dog with the ratchet formed on the periphery of the cam 35. A short arm 43 is connected to the shaft 23 and is so positioned to control the times at which the dog 39 will engage the ratchet. The arm 43 may be formed integrally with one of the arms 32. The arm 43 thus oscillates with the arms 32 and the shaft 23. The upper end of the arm 43 has a cam block 44 that is provided with a depression 45 and the dog 39 has a roller 46 that rides on the block 44, the block and the roller being so positioned as to permit the dog 39 to move into engaging relation with the ratchet 38 during short periods of the movement of the arm 43. The dog drops into engaging position relative to the ratchet near the end of the rearward movement of the rake bar and engages to hold the ratchet for a very short period while the levers 32 complete the motion.

On the return of the rake bar the roller 46 is raised by the movement of the block 44 to lift the dog 39 from the ratchet. The cam 35 then continues to move with the shaft 23. This moves the cam 35 a minute step and raises or lowers the slide 31 to shorten or lengthen the effective arm a still less amount as measured between the centers of the pin 34 and the shaft 23. In order to retain the cam 35 in the position to which it is moved step by step, it is frictionally held by means of the strap 47 that surrounds a hub or boss 48 formed on the face of the cam 35 concentric with the shaft 23. The hub or boss 48 may be grooved and a suitable strap of round leather 49 may be secured in the groove, one end of the strap being connected to one of the arms 32 and the other end of the strap being connected to the same arm 32 through a spring 50. The spring 50 places the strap under tension to frictionally and yet yieldably connect the cam 35 to the arms 32 and cause it to move with the shaft 23 except when it is held by the dog 39. The cam 35 operating through the cam roller 37 thus operates to exceedingly shorten the step by step radial movements of the slide and produce very minute differential delivery movements of the rake bar. The step by step movement of the cam 35, as determined by the cam block 44, may be such that when the width of the die is divided by the variation in subsequent movements of the rake bar, it will result in a complex fraction having a relatively large denominator, which would cause the work to be subjected to portions of the die that are disposed in spaced relation, and in some subsequent series of operations, contiguous portions of the die will operate on the work.

The return movement of the arms 32 and consequently the rake bar may be performed by the spring 51. The spring 51 may be connected to any one of the parts actuated by the cam 25 and to a relatively fixed member. As shown it is connected to one of the arms 32 and to the bed 1.

When the rake bar 7 moves to engage a clip it is raised a short distance in order that the fingers 8 may be placed over the clip and so as to prevent the fingers from pushing the clip to one side during the return movement of the rake bar 7. In order to raise the rake bar 7 at this point it is connected to an arm 52 by means of a link 53. The arm 52 is pinned to the shaft 40 and an arm 54 is also pinned to the shaft 40 and is provided with a roller 55 that rides on a cam 56 having a raised portion 57 to move the arm 54 and consequently the arm 52 short angular distances. The arm 52 thus raises the rake bar 7 at predetermined and desired times in order to cause the fingers 8 to move over the top of the clip preparatory to engagement of the clip. When engagement is to be made the roller 55 passes off from the raised portion of the cam 56 to permit the fingers 8 to engage the clip. The downward movement of the fingers 8 may be produced by the spring 58, that is connected to the arm 52 and the bed. The spring holds the roller 55 against the cam. The cam 56 is connected to the shaft 26 to which also the cam 25 is connected, consequently the cams 56 and 25 rotate together to cause engagement and movement of the clip to its delivery point between the dies, whereupon the plunger is depressed to roughen the paper-engaging surfaces of the clip, the parts being connected together as described to produce their operations synchronously.

I claim:—

1. In a press machine, a plunger member, a die connected to the plunger member, a mechanism for locating the work relative to the die and means for controlling the mechanism to place the work so that overlapping portions of the die will operate on the work in subsequent operations of the die.

2. In a press machine, a plunger member, a die connected to the plunger member, a mechanism for locating the work relative to the die and means for controlling the mechanism to place the work so that overlapping portions across the die will progressively operate on the work in subsequent operations of the die.

3. In a press machine, a plunger member, a die connected to the plunger member, a mechanism for locating the work relative to the die and means for controlling the mechanism to place the work so that overlapping portions across the die will progressively operate on the work in succeeding operations of the die.

4. In a press machine, a plunger member, a die connected to the plunger member, a mechanism for locating the work relative to the die so that portions of the die which are located in spaced relation will operate on the work in succeeding operations of the die, and means for controlling the mechanism to place the work so that overlapping portions of the die will operate on the work upon completion of a series of operations of the die.

5. In a press machine, having a die and means for operating the die, a mechanism for engaging and moving the work to a die operating position and means for causing variations in the work-delivering point relative to the die in succeeding work-deliveries and for maintaining a substantially constant work engaging point of the mechanism from which it is moved to the die operating positions.

6. In a press machine a die having forming surfaces extending across the die means for operating the die, a mechanism for engaging and moving the work to die operating positions for subjecting the work to predetermined parts of the surfaces of the die and means for causing variations in the work-delivering point relative to the die in succeeding work deliveries.

7. In a machine, a reciprocatory member for positioning the work in the machine, an oscillatory member connected to the reciprocatory member for operating the reciprocatory member, a slide movable along the oscillatory member, means connected to the slide for operating the oscillatory member, and an automatic means for operating the slide during periods in the movements of the oscillatory member for varying the position of the work in the machine.

8. In a machine, a reciprocatory member for positioning the work in the machine, an oscillatory member connected to the reciprocatory member for operating the reciprocatory member, a slide movable along the oscillatory member, means connected to the slide for operating the oscillatory member, and a cam connected to the slide for shifting the slide relative to the oscillatory member, and means for operating the cam during periods in the movements of the oscillatory member for varying the position of the work in the machine.

In testimony whereof, I have hereunto signed my name to this specification.

EARL BULLIS.