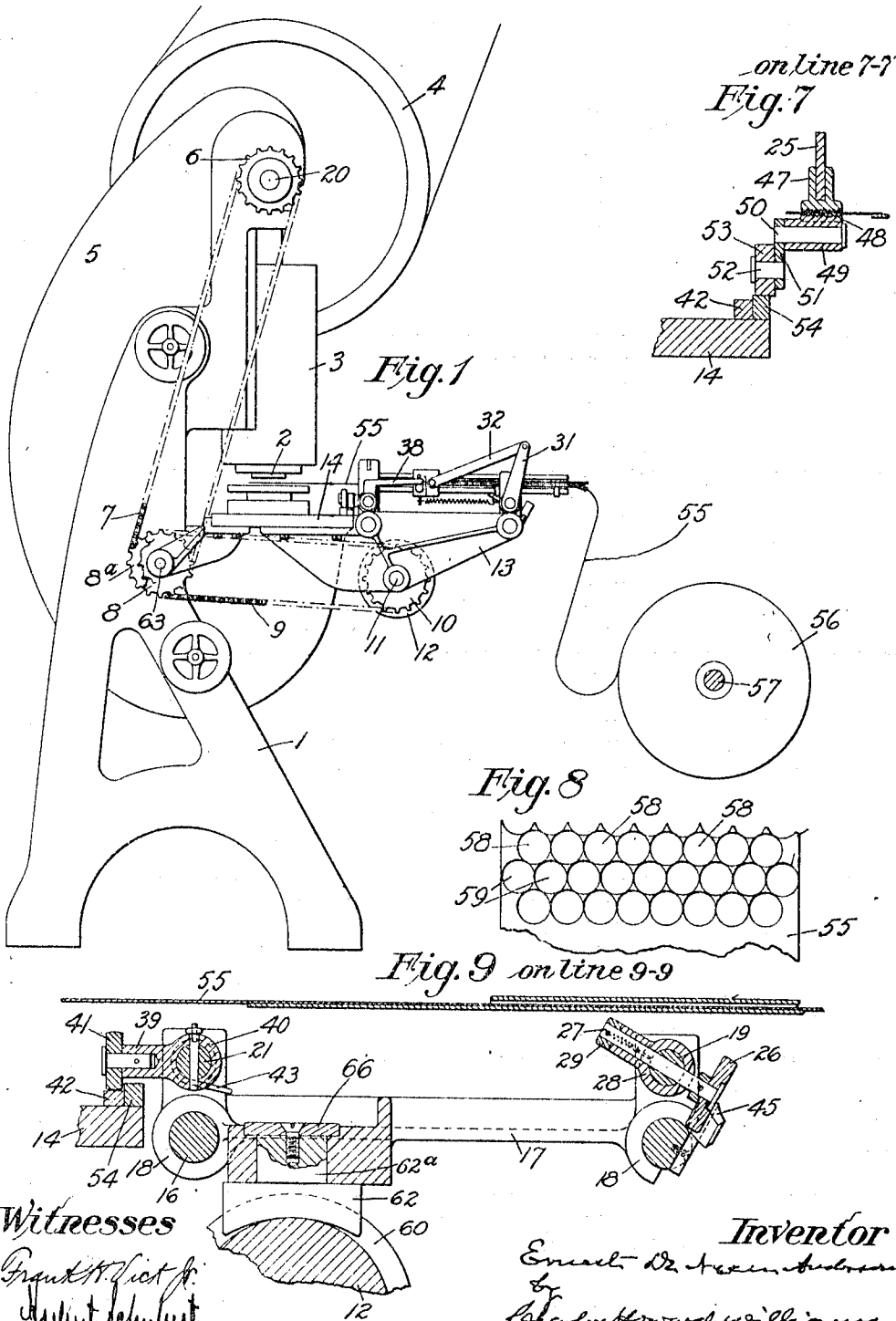


E. DE N. ANDERSON.
FEEDING MECHANISM FOR BLANKING AND FORMING MACHINES.
APPLICATION FILED APR. 29, 1910.

1,053,694.

Patented Feb. 18, 1913.

4 SHEETS-SHEET 1.



Witnesses

Frank W. Dick Jr.
Arthur Schmitt

Inventor

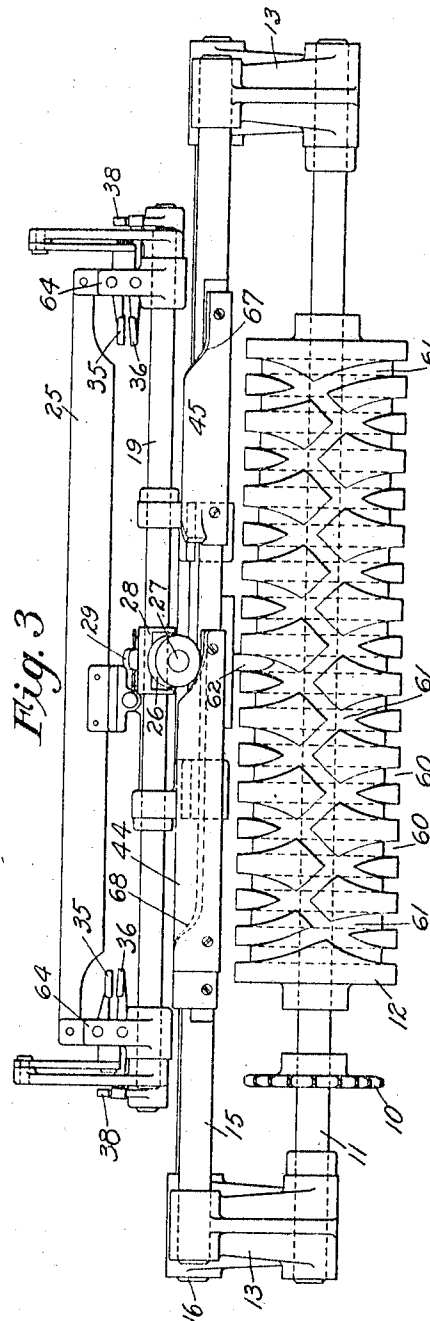
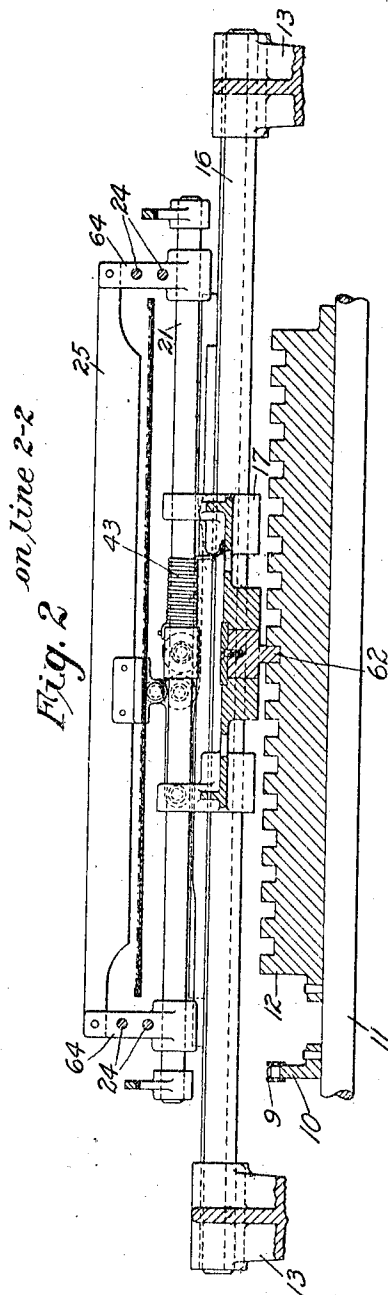
Emmet D. Anderson
By Charles Howard Williams
Attorney.

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4 SHEETS-SHEET 2.



Witnesses
 Frank H. Pict for
 Inventor

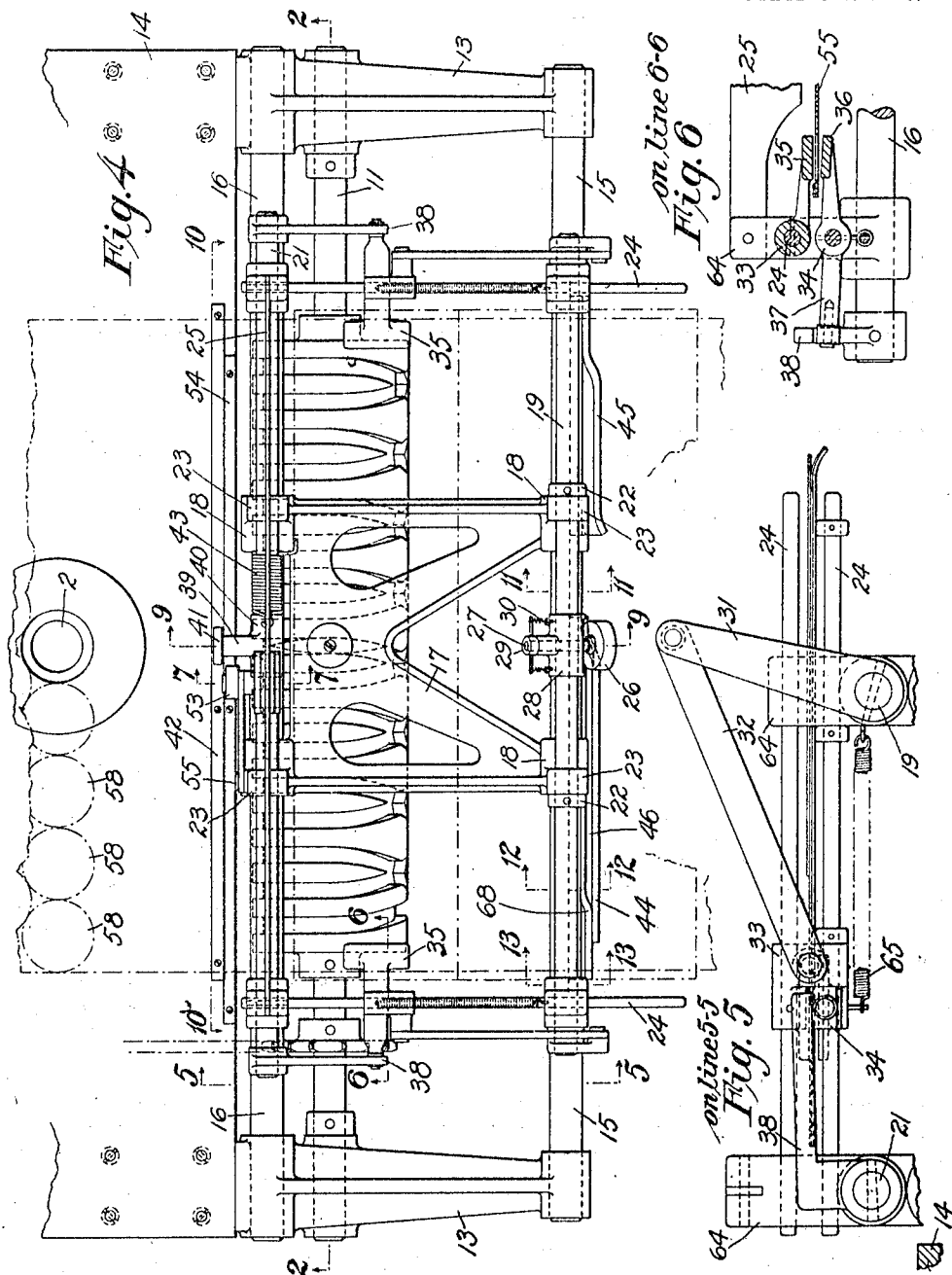
Inventor
 Ernest Debeaux Anderson
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4 SHEETS—SHEET 3.



Witnesses

Ernest De N. Anderson
Charles Howard Williams

Inventor

Ernest De N. Anderson
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Attorney.

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4 SHEETS-SHEET 4.

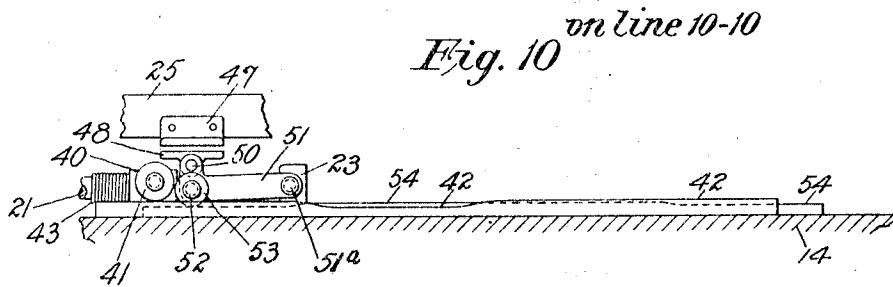


Fig. 11 *on line 11-11*

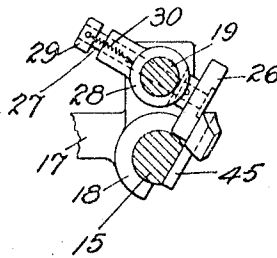


Fig. 12 *on line 12-12*

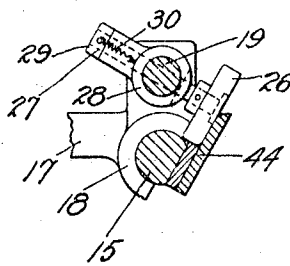
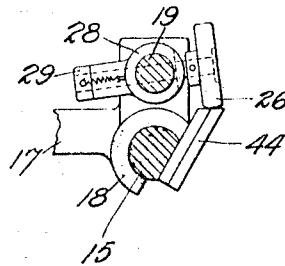


Fig. 13 *on line 13-13*



Witnesses

Grant A. Vick Jr.
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Emmet De N. Anderson
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UNITED STATES PATENT OFFICE.

ERNEST DE NEEN ANDERSON, OF NEW YORK, N. Y., ASSIGNOR TO UNION PAPER COMPANY, OF NEW YORK, N. Y.

FEEDING MECHANISM FOR BLANKING AND FORMING MACHINES.

1,053,694.

Specification of Letters Patent.

Patented Feb. 18, 1913.

Application filed April 29, 1910. Serial No. 558,343.

To all whom it may concern:

Be it known that I, ERNEST DE NEEN ANDERSON, a citizen of the United States of America, residing at New York city, in the
5 county of New York and State of New York, have invented certain new and useful Improvements in Feeding Mechanism for Blanking and Forming Machines, of which the following is a specification, reference
10 being had therein to the accompanying drawing.

This invention refers to a feeding mechanism for blanking and forming machines of a class used for manufacturing boxes of
15 paper, paste-board or other material, or parts of boxes, especially the part which serves as an end or top or bottom or other parts of packages of a certain type; and more particularly the invention relates to
20 feeding mechanism for the punch or die devices of a machine of the type alluded to for delivering paper stock or other material in a continuous web to the die in such a manner that the effect of the operation of
25 the die thereon will be to cut the required parts therefrom with a minimum waste of material.

Heretofore, in the operation of a die and punch device, or either, in a machine making
30 paper receptacles or packages of various kinds, it has been customary to pass the paper sheet or board below the punch and allow the latter to cut therefrom the parts to be used as tops, bottoms, ends, or other
35 parts of boxes, without utilizing all the material possible, but allowing a considerable wastage at the sides of the cuts. My present invention aims to avoid this, and the particular style of feeding contrivances
40 which are made use of to manipulate and adjust a continuous or endless blank or sheet in such a way that the feed is "staggered", so to speak; that is to say, after one transverse line of cuts is made by the punch and
45 die, the next adjoining transverse line of cuts takes place in such a manner that the several holes intervene between the holes of the preceding series, thus taking up a large part of what would otherwise be lost material and utilizing it in the making of the
50 bottoms or ends formed by the second series of cuts, (for the transverse lines of cuts are brought closer together) and in the next adjoining series a similar staggering occurs,
55 and so on, whereby excellent results are at-

tained in saving and economy of material without in the least impairing the symmetrical shape of the resulting box parts.

The invention therefore consists essentially in an improved and simplified feeding
60 ing mechanism for a blanking and forming machine having die or punching devices for cutting circular or other shaped box parts from paper stock or similar material in such a manner that the waste of material left
65 between the several cuts, and which does not go into the resulting circular parts, is reduced to a minimum; and the invention also embraces numerous details and peculiarities in the construction, arrangement and combination of parts substantially as will be
70 hereinafter described and claimed.

In the accompanying drawings illustrating my invention, Figure 1, is a side elevation of my improved feeding mechanism for
75 blanking and forming machines. Fig. 2 is a partial transverse sectional view on the line 2, 2, of Fig. 4. Fig. 3 is a front elevation of the principal parts of the feeding mechanism including the cam drum and the
80 traveling carriage. Fig. 4 is a top plan view of the machine. Fig. 5 is an enlarged detail side elevation viewed at the line 5, 5 of Fig. 4. Fig. 6 is a detail section of one of the clamping devices on the line 6, 6 of Fig.
85 4. Fig. 7 is a detail section on the line 7, 7, of Fig. 4. Fig. 8 is a plan view of one of the blank strips out of which the machine blanks and forms, bottoms or covers or other parts of boxes, and the like, and indicates
90 the small amount of waste material between the cuts. Fig. 9 is an enlarged detail transverse section on the line 9, 9, of Fig. 4. Fig. 10 is a partial rear elevation on the line 10, 10, of Fig. 4. Fig. 11 is a cross-
95 section on the line 11, 11, of Fig. 4. Fig. 12 is a cross-section on the line 12, 12, of Fig. 4. Fig. 13 is a cross-section on the line 13, 13, of Fig. 4.

Similar characters of reference designate
100 corresponding parts throughout the different figures of the drawing.

The main supporting framework of the machine is designated by 1, and it obviously
105 may have any desired form. This frame contains a punch 2 operating within a carrier 3, and in association with a die below it the punch being driven from a shaft 20 actuated by a pulley 4, said shaft being carried in the upper part of a frame section 5, 110

which is upheld by the main framework 1. On the shaft 20 is a sprocket wheel 6 from which through a chain 7 motion is imparted to a sprocket wheel 8^a on a shaft 63 journaled in the frame 1 at a point below the machine bed 14. A chain 9 transmits motion from a sprocket wheel 8 on shaft 63 to the shaft 11, passing around a sprocket wheel 10 on the latter shaft. Shaft 11 is journaled in the side castings 13, 13, of the main frame, which castings project horizontally forward from the framework 1, and their outer ends are connected together by a horizontal rod or bar 15, and at points contiguous to the machine bed 14 are connected together by another similar horizontal rod or bar 16. The two horizontal rods 15 and 16 are rigid and stationary and serve as supports for the horizontally-movable carriage 17 which is equipped with various grips or clamps for holding the paper web or stock and properly delivering it to the action of the die. The shaft 11 which is carried by the castings 13 at a point below the plane of movement of the traveling carriage 17 has thereon a cam mechanism comprising an elongated drum 12 wherein is cut a multiplicity of properly-shaped cam grooves to be hereinafter more fully explained, and by the action of which the traveling carriage 17 is caused to reciprocate transversely back and forth across the machine carrying with it the paper or other material on which the die 2 is acting.

Although it is not necessary in this explanation of the main frame and the punch and die to enter into any accurate and detailed explanation of the precise construction thereof, it will be understood that the punch 2 may be circular or of any other form, and that it may be actuated by any convenient mechanism within the carrier 3, such as is common in machines of this class. Ordinarily this punch 2 will be forced downward through material like paper or pasteboard placed beneath it in such downward movement, cutting out a section from said paper, after which the punch will be lifted from the die or retracted into proper position for another punching action. The revolution of the top shaft 20 is properly geared to the punch to enable it to perform its function, and this same revolution takes place in correspondence with the revolution of the cam drum, whereby the feed frame 17 is caused to travel in the right direction, such harmonious movement between the cam drum and the means for driving the punch device being secured through the connecting medium of chains, sprocket wheels and the like, or other equivalent and well known devices.

The traveling carriage 17 may have any desired shape, being usually of a general angular form, and located in a horizontal

position, with bearings or sockets 18 at the corners, through which the rods 15 and 16 pass, and by means of which the frame is supported slidably on said rods and thereby enabled when properly actuated to move in one direction or the other, from one side of the machine to the other side, along the length or a part of the length of the said parallel horizontal supporting guide rods 15 and 16. Of course, the frame 17, for the sake of simplicity and lightness, may have any skeleton form desired, and there may be as many or as few of the sockets or bearings 18 as will enable it to be properly supported for its necessary movement.

Frame 17 carries in its front part a horizontal rod 19 and opposite thereto at the rear a similar horizontal rod 21 which is parallel to rod 19, said rods passing through bearings 23. These rods are properly secured rigidly to the frame 17 either by means of collars 22 pinned thereto alongside of the bearings through which said rods 19 and 21 pass, or in any other manner, but this secure attachment is of such a kind that the rods will be bodily carried back and forth by the frame 17 during its reciprocatory movement, but not of such a character as will prevent the said rods from rotating to a greater or less degree within the bearings 23, 23 on the frame 17 at front and back. These rods 19 and 21 are connected together near their ends by the horizontal rods 24, and at the rear of frame 17 above rod 21, and adjoining the table 14 is a horizontal bar 25 between which and the shaft 21 there is a short intervening space. The rods 24 are preferably arranged in pairs at each end of the machine (see Fig. 6), each pair being located in a vertical plane with one rod above another. These rods are supported near their ends in standards 64 which provide loose bearings for them, so that they are capable of being reciprocated back and forth horizontally through said bearings. The horizontal rear bar 25 is secured by suitable means to those uprights 64 nearest to the die 2 of the machine.

Castings 33 are pinned, or otherwise securely fastened to one or both of the rods 24. These castings 33 carry rigidly supported thereon clamping jaws 35, there being one of these at each side of the machine. Opposite to each clamping jaw 35 is another coacting clamping jaw 36, having a socket 34 supported loosely on the lowermost of each pair of rods 24, and provided with a projecting arm 37 carrying at its outer end an anti-friction roller. Thus at each side of the machine, I provide in this manner a pair of clamps, each pair consisting of the two members 35 and 36, between which the material to be fed to the action of the die is gripped and tightly held for the purpose of enabling it to be carried

forward, as will be hereinafter more fully explained. The jaw 35 of each clamp is supported rigidly relatively to the jaw 36, while the latter is movable toward and away from the jaw 35 in consequence of the oscillation of the socket 34 on its supporting rod. The movable jaw in each case is actuated by an arm 38 which is rigidly affixed to the shaft or rod 21, there being thus two arms 38, one at each end of shaft 21, so that in this way the two movable members of the two clamps at the opposite sides of the machine may be simultaneously actuated whenever the rod 21 is oscillated or rotated. This oscillation of the rod 21 is accomplished by means of a pin 39 whose hub 40 is securely fastened to the rod 21. Pin 39 has on its outer end a head or roller 41 which rides upon a track 42 whenever the carriage 17 travels to the right or left. The track 42 has a differential level, being higher at certain points, and lower at other points, (see Fig. 10, where it is lower at the middle and higher at the ends) so that as the finger 39 and this roller or head 41 ride along over said track 42, said finger will be at times lifted and at other times depressed, and by this operation the shaft or rod 21 will be oscillated and the arms 38 correspondingly actuated, thereby depressing the levers 37 and opening or closing the jaws 36. On the shaft or rod 21, alongside of the hub 40, is a coiled spring 43 attached to the frame 17 at one end and to the hub 40 at the other end, and so tensioned as to force the pin 39 downward and bring its wheel or head 41 constantly upon the edge of the track 42. The particular contour of the path afforded by the track 42 will be hereinafter more fully explained.

The front horizontal rod 19 is provided at each end with an upwardly extending crank arm 31. See Fig. 5. Links 32 are pivotally connected to the upper end of these crank arms 31, and also to the movable castings 33, which, as I have pointed out, are securely attached to the rods 24. The oscillation of the front rod 19 in its bearings will obviously throw the upwardly projecting crank arm 31, in one direction or the other, as the case may be, thereby moving the links 32, and causing the castings 33 and their attached rods 24 to be reciprocated horizontally in one direction or the other, either forward or back. This movement obviously carries the pairs of paper gripping clamps 35 and 36 and thus moves the continuous web of paper or other material toward the die or punch. The return movements of the clamps to their former position is brought about by the springs 65 which are attached to the castings 33 and to some stationary part of the frame, as standards 64. The oscillation of the shaft 19 which is requisite to perform this forward

movement of the clamps may be occasioned by various means, and one form of means employed for the purpose which is successful in actual practice consists essentially of a roller 26 (see Fig. 9) carried by a pin 27 which passes through the rod 19 and also through a hub 28 surrounding said rod 19 near its middle point. The hub 28 has a projecting tubular part through which also the pin 27 passes, and to the outer end of said pin is fastened a collar 29. Springs 30 attached to the hub 28 are likewise attached to projecting pins or fingers on the collar 29, and these springs 30 have the function of urging the collar toward the hub 28 and its socket, and thus causing the head or roller 26 to be normally kept in its outermost position as shown in Fig. 9. When anything acts to push the roller 26 toward the hub 28, it is obvious that the springs 30 will be extended temporarily, but they will act to promptly return the roller 26 to its projected position as soon as the retruding agency is removed therefrom. The main frame of the machine alongside of the front rod 15, and contiguous to the front rod 19 belonging to the movable frame 17, is provided with tracks 44, 45 and 46 in connection with which the roller 26 rides and is shifted during the reciprocatory movement of the frame 17. The special contour of these tracks, consisting as it does of ups and downs, depressions, and elevations and gaps, together with surfaces or edges of unequal elevation, causes the roller 26 to shift its position in various ways during the movement of the frame 17, and this change of position oscillates the rod 19, and thereby moves the arm 31, the links 32, the castings 33, the rods 24, and the paper gripping devices. Thus it will be seen that by means of the roller 41, operating on the track 42, the jaws of the side clamps for the edges of the paper are opened and closed; and by means of the roller 26 running on its irregular tracks in front these side clamps are bodily moved forward in the direction of the punching die after the paper has been gripped thereby, being returned after release from the paper by the springs 65.

The rear bar 25, supported by standards 64, carries near the middle portion thereof a stationary jaw 47 forming a part of a center gripping device which is intended to grip the front end of the paper at that point, the other part of said gripper consisting of a second jaw 48 which is carried by a sleeve 49 containing a pin 50, see Fig. 7. Pin 50 is supported in the end of a lever arm 51. Adjacent to the pin 50, said lever arm 51 is provided with another pin 52 which carries a roller 53, which runs on a track 54, said track being placed alongside of the above-mentioned track 42. The lever arm 51, extends to a point near the corner of the mov-

able frame 17 where it is pivotally hung by means of a pin 51^a to said corner 23. Thus the lever arm 51 is arranged to move in a vertical plane on its pivot 51^a, its opposite end carrying the roller 53 that runs on the track 54, and carrying also the pin 50 which supports the movable part of the paper grip or clamp operating at this point; for it will be seen that when the jaw 48 grips tight against the jaw 47, it will fixedly hold a sheet of paper, paste-board or other material. The vibration of the lever 51 and the consequent opening and closing of the jaws of this center clamp is controlled by means of the roller 53 that runs on the track 54. This track is not of the same level edge throughout, but is irregular according to fixed conditions, having therein depressions and elevations, and as the roller 53 runs thereon the effect will be to open and close the jaw 48. This track 54 is lower at the ends than in the middle portion, and as the clamp is closed when the high part of the track elevates the roller 53 it will be seen that the clamp will be open when the traveling carriage 17 is at the limits of its travel, and will be exerting a gripping effect when the carriage is running along the middle portion of its travel.

55 designates a long continuous piece of paper stock which is fed into the machine from a roll of material 56 which is supported on a shaft 57 at some suitable point contiguous to the feeding mechanism. In the delivery of the paper to the machine there must be enough slack to allow it to follow its crosswise movement easily as shown in Fig. 1. The forward end of the paper 55 is placed beneath the punch 2, as shown in dotted lines in Fig. 4, and the operation of the punch on the paper, paste-board or other material, produces the result of cutting circular or other shaped pieces from the paper, as indicated at 58 in Fig. 4, and also in Fig. 8. In order to insure the proper delivery of the web 55 to the die, it is necessary that it should be caused to travel not only forwardly, but also after each forward movement it must travel transversely beneath the die, so that the latter may execute a series of cuts therein from one edge across to the opposite edge in a straight line, as shown in Figs. 4 and 8; and it will be understood that as soon as one transverse series of cuts is completed, the paper will be fed forward so as to bring it in position for a second transverse movement, in order that the next series of cuts may be executed alongside of the first series. Furthermore, and right here comes in the vital part of my present improvement, it is not sufficient to merely feed the paper forward in position for the making of the next series of cuts alongside of and opposite to those of the preceding series, but also at the instant of this forward feeding impulse the paper must be

given a slight lateral or sidewise thrust, which will "stagger" the second line of cuts, so to speak, and cause them to be made at points between those of the preceding series as well as in a second series parallel to the first, as shown at the points 59 in Fig. 8.

The transverse movement of the carriage 17, which carries the end of the paper web 55 across the bed 14 so that it may be subjected to the action of the punching die is effected by mechanism consisting essentially of the drum 12 which, as I have already described, is driven by the sprocket 10 on its shaft 11. In the drum 12 are cut numerous circumferential grooves 60 which are parallel to each other for a certain portion of their curvature, but throughout the rest of their length have an inclined curved path, as shown at 61, whereby each groove in some cases connects with the next succeeding groove, and in some cases with the second succeeding groove, so that a shoe engaging one of the circumferential grooves will, during the revolution of the drum, be transferred into the next succeeding groove or into the second succeeding groove, as the case may be, and then transferred again when the proper point is reached, so that in this manner it will be caused to travel through a horizontal path parallel to the axis of the drum.

62 denotes such a shoe which is carried by the frame 17, and is preferably curved on its lower edge, as shown in Fig. 9, to enable it to more readily engage the grooves 60, but the arc of the curvature of the engaging edge of the shoe 62 is not concentric with the arc of the bottom portion of the groove 60 of the drum, for the ends of the shoe 62 are preferably flared off so that the connection of the same with the groove may be of a simpler and easier form, giving thereby a better movement of the parts.

The mode of conducting the shoe to the frame may vary widely. One form is given in the drawings which show the shoe 62 having a swivel pin 62^a held loosely in frame 17. At each end of the drum 12, the curved connecting portions 61 of the cam grooves lead from one such groove only to the next succeeding groove, and not to the second, as is the case with the balance of these curved connecting portions of the cam grooves, and hence when the shoe 62 is traveling under the influence of these end curved connecting portions of the cam grooves, the effect will be to shift the carriage 17 only a part of the distance which it is at other times ordinarily shifted during the rest of its travel and during one complete revolution of the cam drum, for it is obvious that during one such revolution the shoe 62 will only pass from one of the circumferential grooves into the next circumferential groove, and this will only thrust the carriage trans-

versely the length of the distance between one groove and the next groove, whereas during the balance of the revolutions of the cam drum until the other end thereof is reached, it is obvious that one revolution of such drum will be sufficient to thrust the shoe 62 and the carriage for a distance equal to the distance from one of the circumferential grooves 61 to the second one from it. This inequality of the movement of the carriage and the paper supported thereon at different intervals without any change in the rate of revolution of the actuating drum, or the number of such revolutions, causes the shifting of the paper in the way that is required to produce the staggered effect of the round holes which is necessary to save wastage of the paper which is left as the result of the cutting out of the different holes.

The action of the lateral clamps is dependent upon the movement of the rollers 26 and 41. Roller 26, as has already been pointed out, runs upon the tracks 44, 45 and 46, which has an irregular and broken contour, as is indicated in plan view in Fig. 4 and which is brought out more clearly in the several sectional views of Figs. 11, 12 and 13, wherein the position of the roller 26 at different times during the travel of the carriage 17 across the machine is indicated. It is seen by reference to these figures, how the roller 26 is at one time at one angle and at another time at another angle, and that in being shifted from one position to the other through the contour of the tracks on which it travels, the shaft 19 is caused to oscillate to a greater or less extent, the result of which is to actuate the arms 31 and thereby move the lateral clamps forward.

The action of the roller 41, in connection with the lateral clamps, and also of the roller 53, is shown more clearly in Fig. 10, where the respective contours of two parallel tracks 42 and 54 is lucidly and graphically shown (see also the sectional view of Fig. 9). Roller 41 operates on track 42 and roller 53 runs on track 54. The track 42 has a depressed section at a point between its ends, whereas the track 54 is depressed at the ends lower than for a certain central distance between said ends. When the roller 53 is at the ends of the track 54 the jaws 47 and 48 are open, but when the roller 53 is on the high part of the track 54 the jaws 47 and 48 will be tightly closed. When the roller 41 is upon the end portions of the track 42, the effect on the end arms 38 is to depress the jaw carrying levers 37 of the lateral clamps and close the jaws 36 against the jaws 35, thereby tightly grasping the paper. When said roller 41 is running on the depressed central portion of the track 42, the reverse action of the levers 38 will take place with the result that the jaws 35 and 36 of the lateral clamps will be opened and the paper

released. Therefore it will be understood that when the carriage 17 is near the central part of its travel, the lateral clamps will be open because the roller 41 will be on the depressed section of the track 42; while at this time the central front clamp, consisting of jaws 47 and 48, will be closed because the roller 53 will be on the high part of the track 54. When the carriage 17 is at either end of its transverse travel, the central front clamp will be open, because, as shown in Fig. 10, the roller 53 will be on one of the depressed ends of track 54, thus allowing the jaws 47 and 48 to separate, while simultaneously the roller 41 will be on one of the high parts of its track 42, causing the lateral jaws to be closed.

Referring to the front bars or rails 44, 45 and 46 in association with which the roller 26 operates during the back and forth travel of the carriage 17, in order that the movement of said roller 26 may oscillate the shaft 19 and thus pass the lateral clamping devices toward the punching mechanism at certain times, it will be seen that it is preferable to locate the bars 44 and 46 with a gap between them, and to relate them in their positions to the rod 15 and the shaft 19 as indicated in Figs. 9, 11, 12 and 13. If we assume that the carriage 17 is in the position shown in Fig. 4, and that it travels toward the right in the direction shown by the arrows at 11, the position of the roller 26 when it reaches the inclined bar 45 is shown clearly in Fig. 11, for when the roller 26 first contacts with the end of the bar 45, the curved tip of said bar will cause the roller 26 to be thrust inwardly, thereby expanding the springs 20 by removing the nut 29 from the end of the socket 28; and as the carriage 17 continues toward the right and the roller 26 rides behind the inclined bar 45, it will continue to occupy this thrust in position until it reaches the end of the stroke and starts to return. When it reaches the end the cut away part of the bar 45 at 67 allows the roller 26 to fly out into its normal position, being released at this time from the rear face of the bar 45, and then when the carriage 17 moves toward the left and carries the roller 26 with it, the latter will ride upon the upper horizontal edge of the bar 45, being lifted up by the curved part of said edge at 67, and this action will oscillate the shaft 19 and cause it to result that the lateral clamps will be thrust forward toward the punching die carrying the paper forward to the extent of the movement of the clamps, and the clamps will be held in engagement with the paper in this forward position while the roller 26 is moving upon the upper edge of the bar 45; but when the gap between the bar 45 and the bar 44 is reached and the roller 26 falls off the end of bar 45, it is

obvious that the springs 65 will come into action and draw the lateral clamps back into their former position in which they will remain until the roller 26 reaches a point near the end of the left hand travel of the frame 17 where it will be raised by the curved part 68 of the rear bar 46 which is directly behind the bar 44. The gripping of the paper by the lateral clamps takes place, as I have already explained, in such a way that the grip is maintained except when the carriage 17 is near the central of its travel, at which time the center clamp is alone gripping and holding the paper, for the side clamps must, of course, have the paper in their grasp promptly when they are moved forwardly toward the punching die by the movement of the roller 26 into the position which it occupies in Fig. 13. It is obvious, of course, that the tracks 42 and 54 at the rear of the machine overlap each other to a greater or less extent, so that there are times when both the center clamp and the lateral clamps concurrently grip the paper; but it is essential that the center clamp should be released from the paper at the times when the lateral clamps are to operate to give it the forward impulse, and it is also essential that the center clamp should hold the paper alone very firmly when the lateral clamps have been released from the paper and are being thrust back into their normal position to grip it again further back. Pursuing the movement of the roller 26 during its further travel across the machine under the action of the reciprocating frame 17, it will be noted that after it leaves the track 45 and passes the gap between the track 45 and the track 44 it will ride easily behind the track 44 which is inclined, but will not be thrust in so as to expand the springs 30; and when the lifting curve 68 is reached the roller 26 will then pass from its inclined position, as indicated in Fig. 12, to its uplifted position as indicated in Fig. 13, the position it occupies when the shaft 19 is being oscillated and the lateral clamps thrown back; and when the reverse movement of the carriage takes place and the roller 26 moves again toward the right, it will ride upon the upper edge of the track 44 as shown in Fig. 13, keeping in this position until near the center of the transverse travel of the frame 17, during all which time the clamps will remain in the position to which they have been thrust forward until the roller 26 drops off the end of the track 44 into the gap between the track 44 and 45 and allows thereby the shaft 19 to oscillate back again into its former position under the action of the springs 65 which draw back the clamps and the levers which operate the latter. Thus it will be seen that the tracks 44, 45 and 46 differ from each other

as to length, position and relation, and the object of this difference is to enable the roller 26 which controls the movement of the lateral clamps to cause said movement to take place at the right point of time. When the paper stock is fed forward toward the die by this movement of the lateral clamps, the carriage is either beginning its travel toward the left or is about to conclude one of these transverse travels, as is apparent from what I have just said regarding the lifting of the roller 26 by means of the curved edge 67 of track 45, or the curved edge 68 of track 46, and simultaneously, as I have already pointed out, with the active movement of the lateral clamps for carrying the paper forward occurs the movement to the left which causes the staggering of the position of the cuts. This is manifest when it is noticed how the curved portions 61 of the grooves in the cam 12 are arranged, there being such a curved part when the right hand end of the drum 12 which enables the shoe 62 to be transferred from one of the circumferential grooves 60 to the next one instead of to the second one from it, and there being also near the left hand end of the drum 60 another one of these curved connecting grooves 61 by which the shoe 62 is transferred from one circumferential groove to the next succeeding one, so that in the travel of the carriage 17 from the right toward the left there is an apparently short movement of the carriage at the beginning and one at the end of the travel, while the movements between these are longer. When speaking of these movements, of course, the paper is referred to and the movements are those which carry it under the die, so that the latter may execute its cutting action, and the variation in the length of the movement as produced by the different curves which connect the grooves in the cam causes the staggering result from which so much follows in the operation of my machine in saving paper stock from waste.

From the previous description of the construction and relative arrangement of the various parts, the operation will be perceived in a general way by those skilled in the art, especially when it is noted what action takes place in the movement of the roller 26 along the upper edge of the tracks 44 and 45 and the curved parts 67 and 68 near the extremities of said tracks 45 and 44. Repeating briefly what has already been said, it will be seen that the paper 55 is delivered into the machine above the bed 14 by the lateral clamps which are caused to grip the paper and hold it during its movement with certain exceptions as noted, and then at times these clamps are caused to move forward toward the die or punch a short distance carrying the paper stock along and

placing the latter in position for the die to punch a new row of holes. The grasp of the paper by the lateral clamps is maintained for a part of the time, while the paper is being fed transversely across the machine; but when the end of this transverse movement is reached these clamps will themselves be moved forward. When the lateral clamps move forward, the center front clamp will form no obstruction to such forward movement, for having been previously released by the proper action of the roller 53, the paper is slipped forward through said clamp. After the paper has so been fed forward, the center front clamp will again grasp it and hold it during the subsequent transverse movement of the carriage 17. This movement will be repeated continuously during the entire operation of the machine, the carriage 17 reciprocating from one side to the other and carrying with it the paper. At each reciprocation, after one row of holes has been cut, the clamps at the sides operate to move the paper forward, and then at the proper time after such forward movement these clamps at the sides are released, while the paper is being held by the center front clamp, for the springs 65 clearly shown in Figs. 4 and 5 operate them to draw back the lateral clamps after being so opened and released from the paper.

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

35 1. In a feeding mechanism for blanking and forming machines, the combination of means for feeding a continuous strip of material along a group of parallel lines, means for feeding it at an angle to said parallel lines, said latter feed taking place at intervals, and means for changing the distance of the feed at certain points in said parallel lines, said means consisting essentially of a revolving drum having cam grooves cut therein of proper form to cause the required change of feeding distance.

2. In a feeding mechanism for blanking and forming machines, the combination of means for feeding a continuous strip of material along a group of parallel lines, means for feeding it at an angle to said parallel lines, said latter feed taking place at intervals, and means for changing the distance of the feed at certain points in said parallel lines, said means consisting of a cam drum having circumferential grooves cut therein and curved connecting grooves between said circumferential grooves, some of which curved connecting grooves connect together a different number of circumferential grooves than do the other curved connecting grooves.

3. In a feeding mechanism for blanking and forming machines, the combination of means for feeding a continuous strip of material along a group of parallel paths, said

means including a reciprocating carriage and clamping mechanism thereon for gripping the paper stock, means for feeding the stock at an angle to said parallel paths, said means including mechanism for imparting intermittent motion to the clamping devices both for causing them to grip and to be fed bodily forward, and means for changing the distance of feed at certain points in the parallel lines of movement, said means comprising essentially a cam drum arranged to actuate the reciprocating carriage.

4. In a feeding mechanism for blanking and forming machines the combination of means for feeding a continuous strip of material along parallel transverse lines, means for changing the distance of this feed at certain points in certain lines, means for feeding the stock at an angle to said group of parallel lines, and means for causing the latter feed to be intermittent at equal intervals, which means includes a clamping mechanism holding the stock, and a second clamping mechanism, the first clamping mechanism acting to feed the paper forward once for each transverse movement, and the second clamping mechanism acting to hold the paper when released by the first clamping mechanism.

5. In a feeding mechanism for blanking and forming machines, the combination with means for feeding a continuous strip of material back and forth along parallel paths, of means for changing the distance of the feed at certain points in said paths, means for feeding the stock at an angle to said parallel lines, said latter feed being for equal distances and taking place intermittently, and said means including clamps reciprocable to cause the intermittent forward feed of the stock, and a part of said clamping means operating to hold the stock when released by the use of the clamping means.

6. In a feeding mechanism for blanking and forming machines, the combination of a reciprocating carriage, clamping mechanism thereon for gripping the paper stock, a cam device for reciprocating the carriage so that it will travel at times a different distance from the travel at other times, and automatic mechanism for controlling the opening and gripping of the clamping mechanism and the movement forward of the same in delivering the paper stock to the cutter.

7. In a feeding mechanism for blanking and forming machines, in which a continuous web of paper stock or other material is brought under the action of a die or punch, the combination of a reciprocating carriage for carrying the paper along parallel paths, a cam device for propelling said carriage unequal distances at different times so that the paper may be offered to the cutter so as to stagger the cuts in one row relatively to those in an adjoining row, a clamp supported

by the carriage and gripping the paper at or near the edges, a clamp also supported by the carriage and gripping the paper, during the time when the other clamp is released from the paper, an automatic means for opening and closing the clamps at the proper time and for moving a part of the clamping mechanism bodily forward with the paper at certain times, said automatic mechanism including oscillatable shafts and levers connected therewith, which levers are controlled by irregular tracks on which they move.

8. In a feeding mechanism for blanking and forming machines, in which a continuous web of paper is fed forward by intermittent impulse to the action of a die or punch, the combination of a reciprocating carriage for moving the paper along groups of parallel lines, means for causing said carriage to travel intermittently for uniform distances along lines of travel, clamping devices supported on the carriage for gripping the paper at the edges, which clamping devices are moved bodily forward with the paper toward the die at the end of each reciprocation of the carriage, another clamping mechanism supported on the carriage for holding the paper when released by the lateral clamps, and automatic means including levers and irregular tracks on which they slide for actuating the various clamps in closing and unclosing and throwing forward.

9. In a feeding mechanism for blanking and forming machines, in which a continuous web of paper is fed forward by intermittent impulses to a die or punch, the combination of a reciprocating carriage for moving the paper along groups of parallel lines, a cam device for actuating said carriage, said cam device having circumferential grooves cut therein and curved connecting grooves between said circumferential grooves, some of which curved connecting grooves connect together a different number of circumferential grooves from the other curved connecting grooves, clamps on the carriage for gripping the edges of the paper, another clamp likewise on the carriage for holding the paper when released by the first named clamps, means for moving the latter clamps forward carrying the paper therewith, said means including a rotatable shaft,

a lever, irregular tracks on which the lever works, and means for opening and closing the clamps.

10. In a feeding mechanism for blanking and forming machines, the combination of means for feeding the stock along a group of parallel lines, said means including a reciprocating carriage and clamping mechanism thereon for gripping the paper stock, means for changing automatically the distance the stock is moved for the first cut in each new row simultaneously with the advance movement of the material for said new row, so that the cuts in any one row may alternate with those in the preceding row, clamps for gripping the paper, an auxiliary clamp for holding the paper when released by the first clamps, tracks of uneven elevation for controlling automatic mechanism whereby the clamping devices are caused to be active or inactive and certain of the clamps are caused to be thrown forward, and springs for returning the latter clamps to their normal position after each forward impulse.

11. In a feeding mechanism for blanking and forming machines, the combination of a reciprocating carriage for feeding the stock along parallel paths, a cam drum having grooves cut therein and operating to actuate the carriage in such a way that it may travel at different distances at certain points in some of the lines of travel, a pair of lateral clamps for gripping the edges of the paper, another clamp for holding the paper when released by the lateral clamps, automatic leverage connections for opening and closing said clamps, a pair of tracks whose edges are of unequal elevation from end to end on which the said automatic mechanism travels and whereby it is controlled, automatic mechanism for throwing the pair of lateral clamps forward toward the die, irregular tracks for controlling the movement of this automatic mechanism, and means for returning the lateral clamps to their normal position after being thrown forward.

In testimony whereof, I affix my signature in presence of two witnesses.

ERNEST DE NEEN ANDERSON.

Witnesses:

HOWARD H. WILLIAMS,
HERBERT SCHUBERT.