

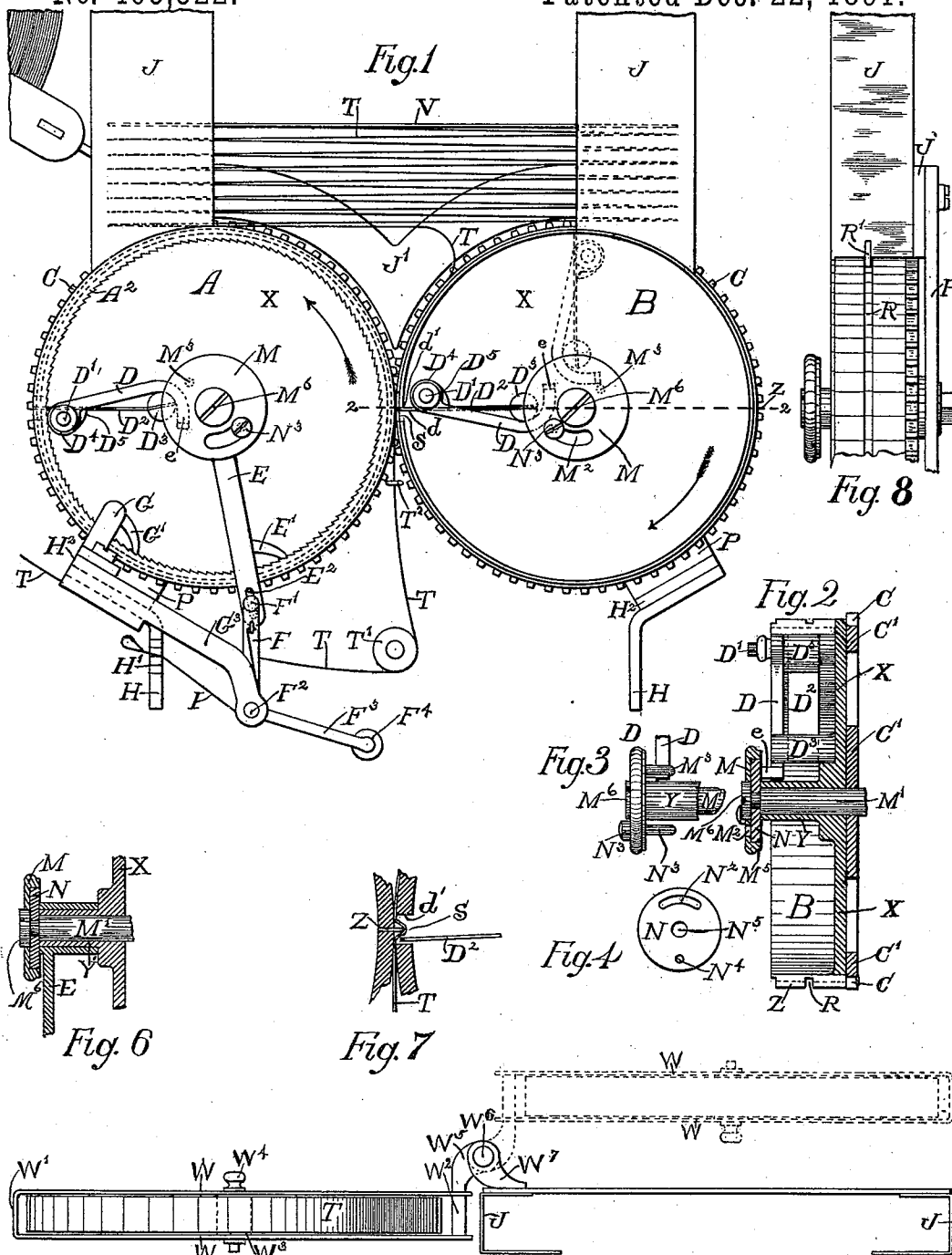
(No Model.)

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MACHINE FOR FOLDING STRIPS OF PAPER, &c.

No. 465,522.

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Attest:

Henry Appleton
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Fig. 5

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UNITED STATES PATENT OFFICE.

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MACHINE FOR FOLDING STRIPS OF PAPER, &c.

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To all whom it may concern:

Be it known that we, JAMES T. EARLE, a citizen of the United States of America, and a resident of Covington, in the county of Kenton and State of Kentucky, and JOSHUA J. GOOD and HOPE REDMON, both citizens of the United States, and residents of Cynthiana, in the county of Harrison and State of Kentucky, have invented certain new and useful Improvements in Machines for Folding Strips of Paper and Like Material, of which the following is a specification.

While our invention may be employed for various purposes, one of the principal objects of the invention is to be employed as an auxiliary in connection with a recording apparatus of various kinds.

In the accompanying drawings, making a part of this specification, and to which reference is hereby made, Figure 1 is a front elevation of the mechanism, illustrating our invention. In this figure a portion of the reel wound with paper for supplying the machine and of the frame for upholding the reel is omitted for lack of room. Fig. 2 is a cross-section in the main horizontal plane of the right-hand cylinder, taken at the dotted line 2 2 of Fig. 1 and showing that face of the section which faces upward in Fig. 1. Fig. 3 is an elevation of the pins for successively actuating the trip-lever and the preferred mechanism for holding these pins and rendering them adjustable. Fig. 4 is an elevation of either face of the inner of the two disks shown in Fig. 2. Fig. 5 is a top view of the mechanism shown in Fig. 1 and showing the preferred form of device for holding the reel of paper. Fig. 6 is a section of the hub and fixed journal of the left-hand cylinder shown in Fig. 1, and also showing in section the manner in which the lever carrying the pawl for rotating the cylinders is hung, in connection with the said journals and the disks for supporting the tripping arms or fingers. Fig. 7 is an enlarged view of those portions of the cylinders A and B which in Fig. 1 are in juxtaposition and illustrating the mode in which the paper is folded and seized by the gripping mechanism. Fig. 8 is a view of the end of one of the guideways and of the adjacent portion of the cylinder and illus-

trating the manner in which the tooth or projection R' of the guideway enters the peripheral groove R of the cylinder.

In this machine are two cylinders, respectively indicated by the letters A and B. Each cylinder rotates on an axis M' concentric with it. The preferable mode of supporting this axis is by securing its rear end fixedly to the supporting-frame P, as shown. Each cylinder has a radial back or connection X, whereby it is connected with that central portion of it which forms its journal-bearing, revolving upon the axis M'. This journal-bearing is preferably extended forward, in which event it forms a hub, which may be indicated by Y. The bearing Y' may be secured in place and from slipping forward or rearward along the axis M' by any suitable means. In the present illustrative instance the bearing is prevented from sliding rearward by means of the presence of the supporting-frame P, as hereinafter specified. While the disk or plate N is primarily designed for a different and more important function, we utilize it to prevent the bearing Y from slipping forward on said axis. The disk N is located at the end of the shaft, and the hub is extended out forwardly until its front end bears against this disk N. Thus each cylinder is at all times kept in the same radial plane and is free to turn. The arrangement of each cylinder on its respective axis is such that the peripheral surface of one cylinder shall be opposite the peripheral surface of the other cylinder. These cylinders come nearly into contact at one point, substantially as indicated in Fig. 1 of the drawings. These cylinders revolve simultaneously, and being of the same peripheral diameter they revolve at the same speed. Mechanism to accomplish this simultaneous rotation is employed, and that here used, as shown, consists of gear CC. Each cylinder is provided with such a gear C, forming a complete circle and extending beyond the plane of the periphery of the cylinder sufficiently far to engage the gear of the other cylinder at the point where the cylinders themselves meet, as aforedescribed. This gear may be affixed directly on the edge of the periphery of the cylinder. For convenience of construction we provide an extra dis-

cal plate C' or annular rim having radial arms connected to a hub or bearing located upon axis M' and turning thereon. This discal plate C' is fixed to the rear side of the radial
 5 back or plate X of the cylinder, and consequently the plate C' and the cylinder C at all times rotate together. On the peripheral edge of this plate C' are formed the gear—i. e., the teeth C.

- 10 At the point where the cylinders come most nearly into contact with one another the distance between them is such as to permit the strip of paper or other flexible material which is to be folded to pass between the peripheral
 15 opposing faces of the cylinders and at the same time be sufficiently pressed between them as to be drawn forcibly forward and upward as the cylinders rotate and at the same rate of speed as that at which the pe-
 20 riphery of each cylinder travels.

- Mechanism for imparting a rotary movement is present, and the preferred kind of such mechanism consists as follows: On the inner edge of one of these hollow cylinders
 25 is located a ratchet A², whose teeth point backward from the direction in which the periphery of the cylinder is to be rotated. One end of a lever-arm E is pivotally swung on a pivot of which axis M' is a center. This arm E is
 30 hung on the hub Y' between the disk N and a shoulder of the hub Y', and is thus prevented from slipping laterally along the said axis. The lever also keeps the hub (shortened for the purpose of thus admitting the lever E to the axis M') from slipping forward
 35 on the axis and thus moving out of place. The lower end portion of this lever is suitably connected to mechanism for imparting to it a reciprocatory motion, and one kind of such mechanism will be shortly hereinafter
 40 described.

- To the lever E is pivotally connected one end of a pawl E', whose pointed free end successively engages teeth in the ratchet-gear A².
 45 As the lever E is advanced—namely, moved from left to right—the pawl E' engages a tooth of the ratchet and rotates the cylinder to an extent substantially that of the movement of lever E along a curved line described by the pivot connecting the pawl to the said lever.
 50 The rotation of cylinder A also rotates cylinder B. As the lever E is moved backward—viz., from right to left—in order to place it and the pawl E' in readiness to impart another
 55 forward movement to the cylinders A and B, all retrograde movement of the cylinders is prevented by a device, as pawl G', whose free end in the meantime engages a tooth of the ratchet-gear A². The other end of this pawl
 60 G' is pivotally connected to a proper support, as G, in turn connected to a fixed support, in this instance a part H² of the frame.

- Of course the shape and details of construction of the supporting-frame P may be and
 65 are to be varied to suit the particular taste of the maker, and where our invention is to be employed in connection with a recording ap-

paratus the particular construction of the said frame is to be varied to suit the requirements of the recording machine or apparatus to which our invention is to be applied or at-
 70 tached.

In the drawings the supporting-frame P extends up back of the cylinders, as before indicated, and near its bottom is provided with the flanges H², extending forward, and each
 75 of said flanges H² is in turn respectively connected to the upper end of the respective vertical legs H H. The latter are in turn connected to any suitable base or support. Further description of such base or support is
 80 omitted, as being deemed unnecessary.

The lever E is to be reciprocated by suitable mechanism, and where this folding device is connected with a recording-instrument
 85 which, prior to the paper or other flexible substance to be folded, writes or otherwise marks thereon the requisite characters the lever E is preferably connected to the mechanism of such instrument, and so that the
 90 marking upon the paper and the folding of the paper previously marked shall be synchronous.

A convenient device of our invention for reciprocating the lever E is shown and is as follows: A right-angled lever having arm F and arm F³ is at the point of its angle pivoted by pivot F² to a fixed support G³, which may, as shown, be fixed to the adjacent flange
 95 H². That end of lever F which is free to oscillate is connected to the lower end of lever E, the mode in which such connection is made being by a slot E² in the adjacent end of the lever E, and a pivot or wrist F', fixed in the
 100 said end of lever F and moving in the said slot E² of lever E. End flanges or heads are preferably present on the respective ends of said pivot F' to keep it in place in levers F and E. The free end of arm F³ of this right-angled lever carries a roller F⁴, pivoted thereto.
 110 Elevation of the free end of the arm F³—viz., at the point F⁴—moves the arm F from right to left, and also the free end of the arm E in the same direction; and the pawl is thus shifted from right to left along the ratchet
 115 A². Mechanism, preferably automatic, returns the lever E and pawl E' to their first position. In the present instance a bent spring I, pivotally oscillating on the pivot F², has one end fast to the arm F, near the upper end of the latter, and the other end engaged on a
 120 projection on a stationary piece, as leg H. We provide a series of such projections, forming a rack H'. The higher the adjacent end of spring I is placed in the rack H' the more pressure it exerts to return the pawl E' and its said attendant mechanism from left to right to its first position. The pressure of
 125 the spring I against the projection on which it is placed operates to retain it there. As the pawl E' moves from left to right it carries with it the adjacent portion of the cylinder A, and hence rotates both of the cylinders A and B.
 130

We will now proceed to describe the devices more particularly involved in connection with the cylinders A and in the grasping and folding and storing of the paper.

5 Within each cylinder is an elastic or spring-actuated arm D^2 . For convenience and compactness the spring and arm are one, as shown, the arm being made of spring metal, steel preferred. The rear end of this arm—
10 that is, that end which is nearest the center of the cylinder—is set in a non-rotatable stud D^3 , fixed to the back X of the cylinder and projecting forward from the said back. In the peripheral edge of each cylinder is a cross-slot S, and the free end of the spring is located in said slot. The spring-arm D^2 is set in this stud at such an angle that when not deflected by the devices hereinafter described, and by human agency, the free end d will always press against the upper edge or side of the slot S. This end of this spring-arm D^2 is preferably beveled to quite a sharp edge. One end of a tripper-arm D is pivoted by a pivot D' to the back of the cylinder, while
25 the other end, curved substantially as shown for a purpose hereinafter described, is free to oscillate. Fixed to the sleeve D^4 , which is pivoted on pivot D' and carries said tripper-arm D, is a stud D^5 , whose outer end portion
30 rests against the side of the spring-arm D^2 . The effect of this relation and conjunction of parts is that when the free end e of the tripper-arm is, in cylinder B as it stands, moved upward, or, in cylinder A as it stands, moved
35 downward—viz., in each case away from the adjacent stud D^3 —the tripper-arm will turn the outer end of the short stud or arm and press it against the spring-arm D^2 , and thus cause the latter to yield and the end of the
40 latter to move away from the side d' of the slot and leave a space between said side d' and the said end d of the latter. The spring-arm D^2 is to be twice thus operated by the tripper-arm D during a revolution of the cylinder. For the purpose of thus operating it we provide two studs—viz., M^3 and N^3 . The stud D^3 forms two functions—viz., that of holding the spring-arm D^2 and also that of a stop for the arm D. If it were not for this stop, the movement of the arm D from the recoil of the spring would throw the end e beyond the path of the projections M^3 N^3 , thus rendering the tripping mechanism inoperative; also, without the stop D^3 , if the workmanship on sleeve D^4 should be defective said recoil movement might tend to again throw spring-arm D^2 away from side d of the opening and release the paper. When the folding mechanism is in operation, these studs M^3 and N^3
50 are stationary, and for the purpose of rendering them thus stationary they are preferably fixed to the stationary journal or axis M' ; but in order to render the operation of the folding device at all times accurate and effective it becomes essential, in the first instance, when the parts of the machine are put together, and sometimes subsequently as

the parts wear, and that unequally, to readjust the stud M^3 and the stud N^3 in relation to one another and to the other working portions of the machine. For these reasons we
70 have made provision whereby these studs can be adjusted and readjusted as desired. The following devices of our invention respectively hold the studs and render them adjustable. A discal plate M carries the stud M^3 . This plate is also provided with the concentric slot M^2 . A discal plate N has a concentric slot N^2 and a hole N^4 interiorly screw-threaded. Both of the discal plates have a
80 central opening or perforation N^5 . The shank of a screw N^3 passes through the slot M^2 and is screwed through the opening N^4 and projects inwardly beyond the inner face of the disk N, substantially as shown in Fig. 3. The stud M^3 is fixed in the disk M and passes through the slot N^2 of the disk N and projects beyond the inner side of the disk N. The relative positions of the hole N^4 and the slots N^2 and M^2 and the stud M^3 are such that
90 abundant opportunity is afforded for changing the relative positions of the studs M^3 and N^3 so as to properly operate the tripper-arm. Such adjustment is accomplished by unscrewing the screw N^3 and changing the position
95 of the stud M^3 in relation to the position of the stud N^3 as necessary, and then fixing the studs in such position by screwing forward the screw N^3 and tightly clamping disk M between disk N and the head of the said screw N^3 .
100 The desired stationary position of these studs and disks in reference to the cylinder to which they belong is obtained by passing the shank of screw M^5 through the central opening in each of the disks M and N and screwing it into the adjacent end of the journal M' —viz., into an interiorly-screw-threaded opening in the said journal—and tightening the said screw on said disk N, substantially as shown more particularly in Fig. 2. To enable the two disks
105 to be quickly and accurately combined together concentrically, the disk M has an outlying peripheral flange M^5 extending inwardly from the inner face of this disk. Within this flange and closely fitting thereto the disk N is placed. On that side of the periphery of each cylinder and diametrically opposite where slot S is located is a transverse folding-blade Z, preferably quite thin, substantially as shown in the figures of the drawings, and more particularly in Fig. 7.

Above the cylinders are located the guideways or storage-receptacles J J, one over each cylinder, as shown. Each guideway is open at that side of it which faces toward a vertical plane passing between the cylinders.

J' is a yoke connecting together the opposite guideways J J, and in turn connected to the back P of the device.

In order to properly compress the folded paper and prevent the latter from prematurely rising up out of the guideways, a strip or piece V of metal or other suitable material extends across the tops of the cylinders, and

one end is located in one guideway and the other end in the other guideway, and as fast as the folded paper is introduced beneath it, it rises in the guideways.

5 In the periphery of each cylinder is a longitudinal groove R, extending around the cylinder. At the foot of the outer wall of each guideway is a lug R', which fits into the guideway and prevents the folded end of
10 paper from passing beyond said point.

The mode in which our invention operates is as follows: The strip T' of paper or other flexible material fed to our machine is passed when necessary under a suitable guide-roller
15 T' and thence upward and through the guideway T² and thence between the cylinders A and B, as shown. The strip T passes between the cylinders as the latter are rotated. One of the slots S—say, for example, that of cylinder B—first comes close to the cylinder A,
20 and so that the slot will be in a plane passing through the axes of both journals M' M' of said cylinders. In reaching this position the tripper-arm has been moved by the stud N³, and the end d of the spring-arm D² has been forced down from the side d' of the slot S, and in this position the slot comes in juxtaposition with the folding-blade, and the latter enters the slot S. As the folding-blade enters
30 the slot S it forces the strip T into the slot, as shown in Fig. 7. As the cylinders continue to be rotated the end e of the tripper-arm slips off the stud N³ and the spring-arm returns to the side or edge d' of the slot S, the folding-blade in the meantime passing out of the slot. Thus the end d of the spring-arm grasps the strip between it and the edge d' of the slot S and firmly holds it there in position, and at the same time there folds the strip.
40 As the rotation of the cylinders is continued this end d of the spring-arm D² carries the strip thus folded up and to the right over the cylinder B into the right-hand guideway and on down to the right-hand or outer wall of the said guideway. When nearing this latter point, the end e of the tripper-arm D is moved by the stud M³ and the end d of the spring-arm D² is again moved away from the edge d' of slot S, and the folded edge of the strip
50 T, up to this time carried in the said slot S, is released therefrom. Should this folded edge perchance stick in the slot, the stud R in the groove R' will cause it to be withdrawn therefrom. The plate V rests upon the folded edge and keeps it from rising too high in the right-hand guideway. After the cylinders are rotated a short distance farther the slot S of the other cylinder A and the end d of its spring-arm D² held away from the edge d' of said slot come into conjunction with a folding-blade of the cylinder B, and that portion of the strip T between said folding-blade and slot is forced into said slot and is there folded in the same manner as the preceding fold of
65 said strip was made and is carried up and to the left over the cylinder A into the left-hand guideway J, and when near the left-hand wall

of the latter is released and leaves the slot S in the same manner as the preceding fold left the slot S of cylinder B. The plate V rests
70 upon this new fold and holds it down upon or close to cylinder B. As the cylinders continue to be rotated these operations are continued until all of the record necessary to be made on said strip is completed. When a
75 record has been previously marked on the strip, as will usually be the case, the folded strip can be readily lifted out of the guideways, examined and referred to, and then replaced for future use. Any desired length of
80 the folded strip can be detached and can be conveniently filed in the folded form.

The strip is at all times furnished in a compact and convenient form.

A convenient and compact device of our invention for holding the spindle and the strip of paper or equivalent material rolled thereon and to be fed to our machine is shown in Figs. 1 and 5, and consists as follows, viz: A frame consisting of parallel sides W W and end
90 pieces W' W² carries the spindle W³, the journal W⁴ of the latter being respectively journaled in the respective sides W W. On this spindle is wound the strip T to be fed to our folding device, either directly or through a
95 recording-machine, and thence to our folding device. The frame W W W' W² is provided with a bracket W⁵, affixed to the end W²—viz., that end nearest the folding device—and this bracket W⁵ is pivoted by vertical pivot
100 W⁶ to the bracket W⁷, fixed to the adjacent end of the folding device or to a fixed support near the latter.

At any time when the folding-machine is not in use the frame W W W' W² and its spindle with strip wound thereon can be swung around and thrown back against the back of the folding device out of the way, as shown by dotted lines in Fig. 5. When to be used, it is returned to the position shown in
110 black lines in said Fig. 5.

While the various features of our invention are preferably employed together, one or more of the said features may be used without the remainder, and in so far as applicable one or more of the said features may be used in connection with mechanism for folding strips of paper of a description other than the one herein specified.

What we claim as new and of our invention, and desire to secure by Letters Patent, is—

1. The combination of the two rotatable cylinders A and B, each provided with devices at periphery for seizing and folding the strip T passing between them, and the tripper-arm D, having its end curved, and studs M³ and N³, against which the ends of the respective tripper-arms strike as the cylinders revolve, substantially as and for the purposes specified.

2. The combination of the two rotatable cylinders A and B, each provided with devices at periphery for seizing and folding the strip

T passing between them, and the tripper-arm D, having its end curved, and studs M³ and N³, against which the ends of the respective tripper-arms strike as the cylinders revolve, and the stop D³, against which the tripper-arm strikes after being released from its operating-stud, substantially as and for the purposes specified.

3. The combination of the two rotatable cylinders A and B, and the tripper-arm D, having its end curved, and studs M³ and N³, against which the ends of the respective tripper-arms strike as the cylinders revolve, and the stops D³, against which the tripper-arm strikes after being released from its operating-stud, and the spring-arm D², held in said stop D³, substantially as and for the purposes specified.

4. In combination with the cylinders, a reciprocating arm D², and a tripper-arm having a stud D⁵ for actuating the said arm, and the studs M³ and N³, and the disks M and N, provided with devices for rendering the studs M³ and N³ adjustable, substantially as and for the purposes specified.

5. In combination with the cylinders, a reciprocating arm D², and a tripper-arm having a stud D⁵ for actuating the said arm, and the disks M and N, the disk M having slot M² and stud M³ and the disk N having slot N², through which passes said pin M³, and also having screw-hole N⁴, through which is screwed the stud N³, the latter clamping the disk M to the disk N, substantially as and for the purposes specified.

6. In combination with the cylinders, a reciprocating arm D², and a tripper-arm having a stud D⁵ for actuating the said arm, and the disks M and N, the disk M having slot M² and stud M³, and the disk N having slot N², through which passes said pin M³, and also having screw-hole N⁴, through which is screwed the stud N³, the latter clamping the disk M to the disk N, each disk having a central opening and secured to the fixed journal M', the disk M having outlying flange M⁵ and the disk N fitting within said flange and against disk M, substantially as and for the purposes specified.

7. The combination of the cylinders and mechanism therewith, substantially as described, for seizing and folding the strip, the reciprocating lever pivoted on an axis concentric with the cylinders, and pawl E', pivoted to the said reciprocating lever, and ratchet A², fixed to the cylinder and turning therewith, substantially as and for the purposes specified.

8. The combination of the cylinders and mechanism therewith, substantially as described, for seizing and folding the strip, the reciprocating lever pivoted on an axis concentric with the cylinders, and pawl E', piv-

oted to the said reciprocating lever, and ratchet A², fixed on the side of the periphery, and the teeth pointing inward, substantially as and for the purposes specified.

9. In combination with the cylinders and mechanism therewith, substantially as described, for seizing and folding the strip, the reciprocating lever E, and pawl E', connected thereto, and ratchet A², connected to the cylinder, the lever being swung from the journal M' and connected to the right-angled lever F F³, the latter being pivoted at its bend by pivot F² to a fixed support, as G³, substantially as and for the purposes specified.

10. In combination with the cylinders and mechanism therewith, substantially as described, for seizing and folding the strip, the reciprocating lever E, and pawl E', connected thereto, and ratchet A², connected to the cylinder, and pawl G', pivoted to a fixed support, as G³, substantially as and for the purposes specified.

11. In combination with the cylinders and mechanism therewith, substantially as described, for seizing and folding the strip, the reciprocating lever E, and pawl E', connected thereto, and ratchet A², connected to the cylinder, the lever being swung from the journal M' and connected to the right-angled lever F F³, the latter being pivoted at its bend by pivot F² to a fixed support, as G³, and spring I, engaging lever F and fixed detent at a point, as H, suitable for straining the spring, substantially as and for the purposes specified.

12. In combination with the cylinders and mechanism therewith, substantially as described, for seizing and folding the strip, the reciprocating lever E, and pawl E', connected thereto, and ratchet A², connected to the cylinder, the lever being swung from the journal M' and connected to the right-angled lever F F³, the latter being pivoted at its bend by pivot F to a fixed support, as G³, and spring I, engaging lever F and ratchet H, substantially as and for the purposes specified.

13. In combination with the rotatable cylinders provided with mechanism for seizing and folding the strip T, the guideways J J, located above their respective cylinders, and the plate or strip V, located in the said guideways and operated by means of its weight, substantially as and for the purposes specified.

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