(No Model.) 3 Sheets—Sheet 1.

J. N. NUTT.

PAPER FOLDING MACHINE.

No. 538,622. Patented Apr. 30, 1895.

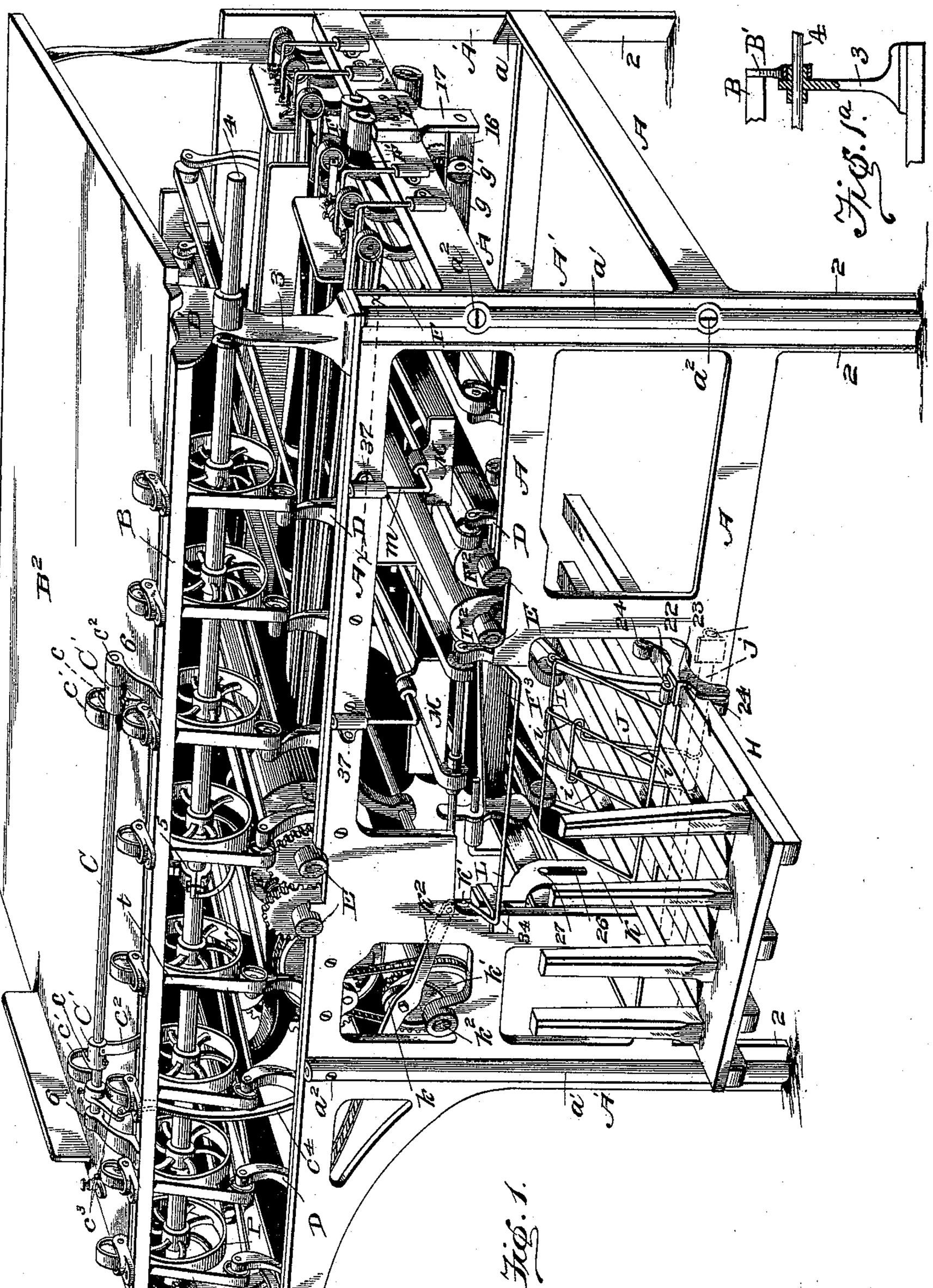

Fig. 1.

Fig. 1a.

Witnesses:

W. M. Dashiell

David W. Gould

Inventor.

Jasper N. Nutt,

By Wm Hunter Myers.

Attorney.

(No Model.) 3 Sheets—Sheet 2.

J. N. NUTT.

PAPER FOLDING MACHINE.

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Fig. 2.

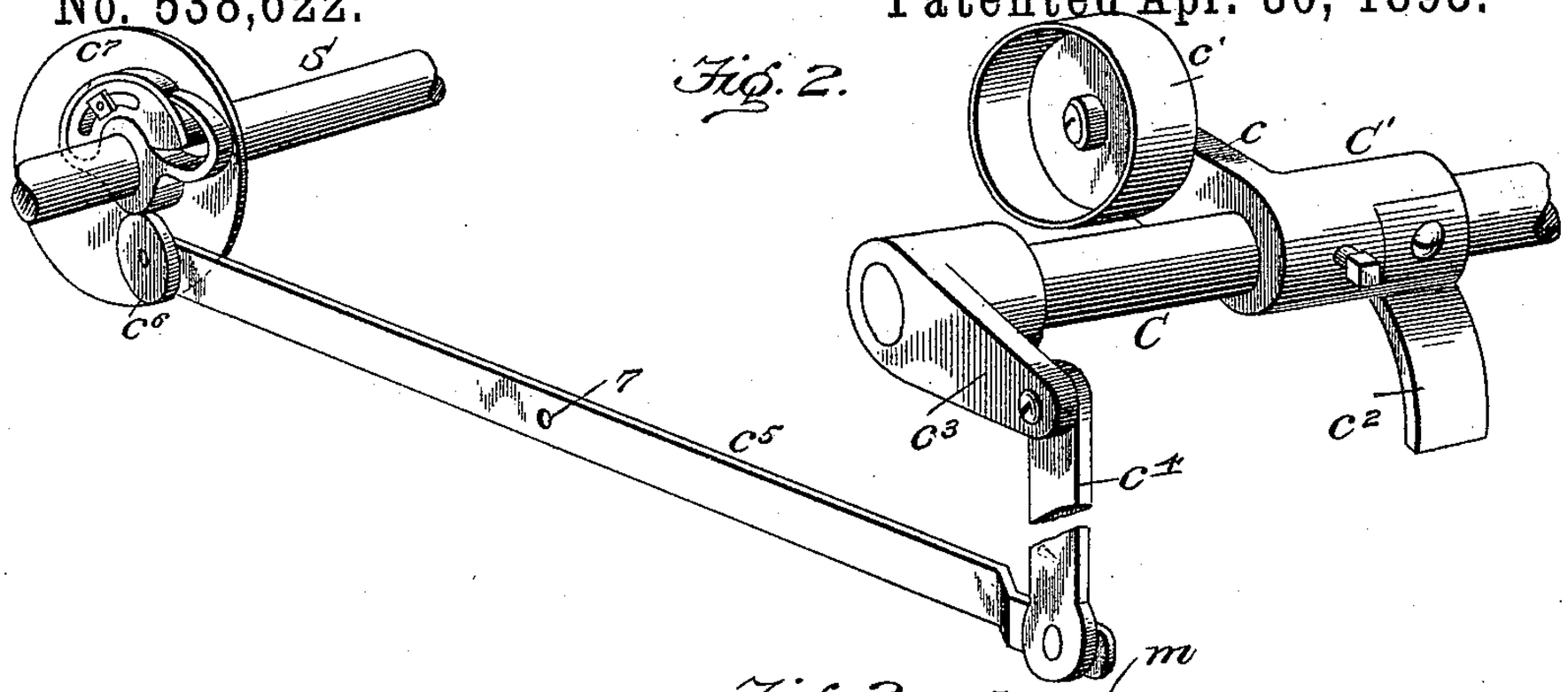


Fig. 3.

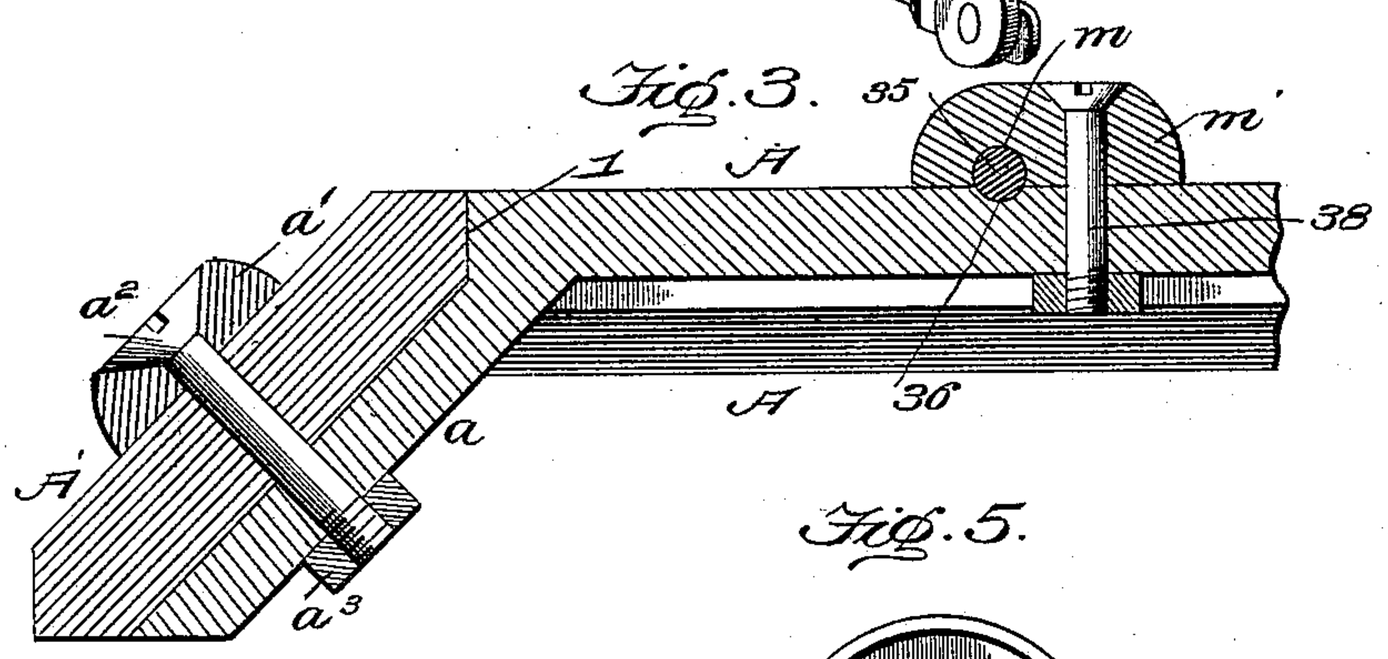


Fig. 4.

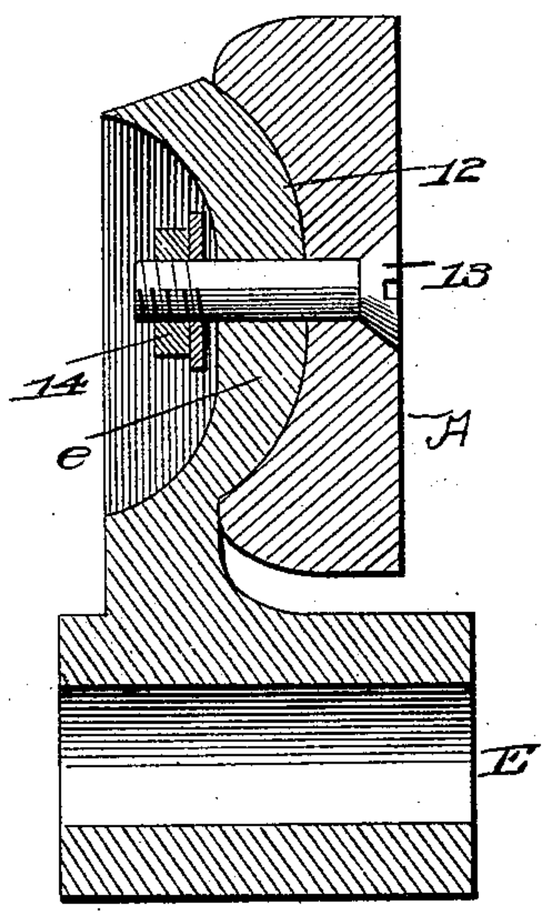
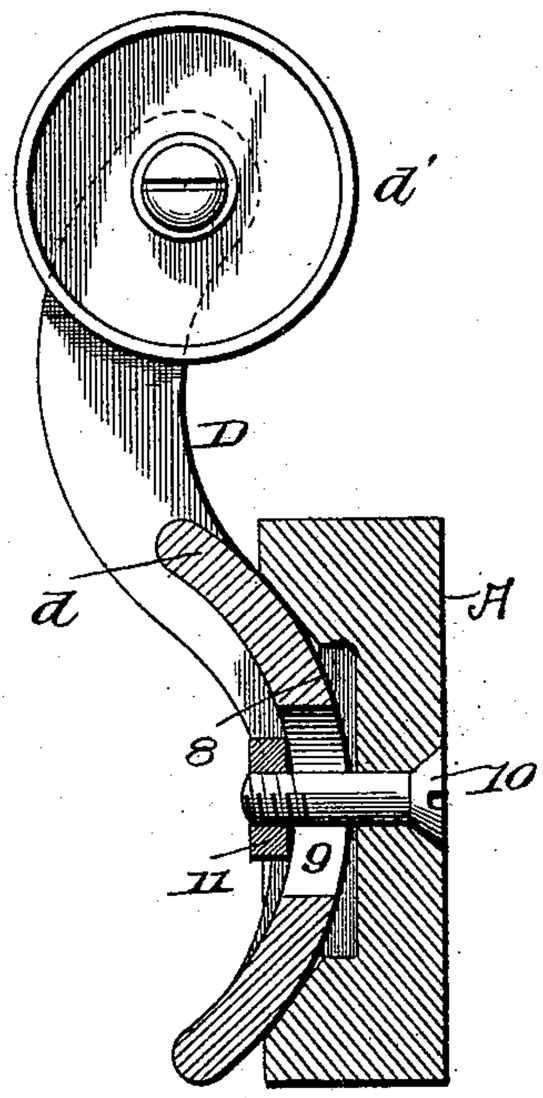


Fig. 5.



Witnesses:

Wm. E. Dashiell.

David D. Gould.

Inventor.

Josper N. Nutt,

By Wm. Hunter Myers.

Attorney.

(No Model.) 3 Sheets—Sheet 3.

J. N. NUTT.

PAPER FOLDING MACHINE.

No. 538,622. Patented Apr. 30, 1895.

Fig. 6.

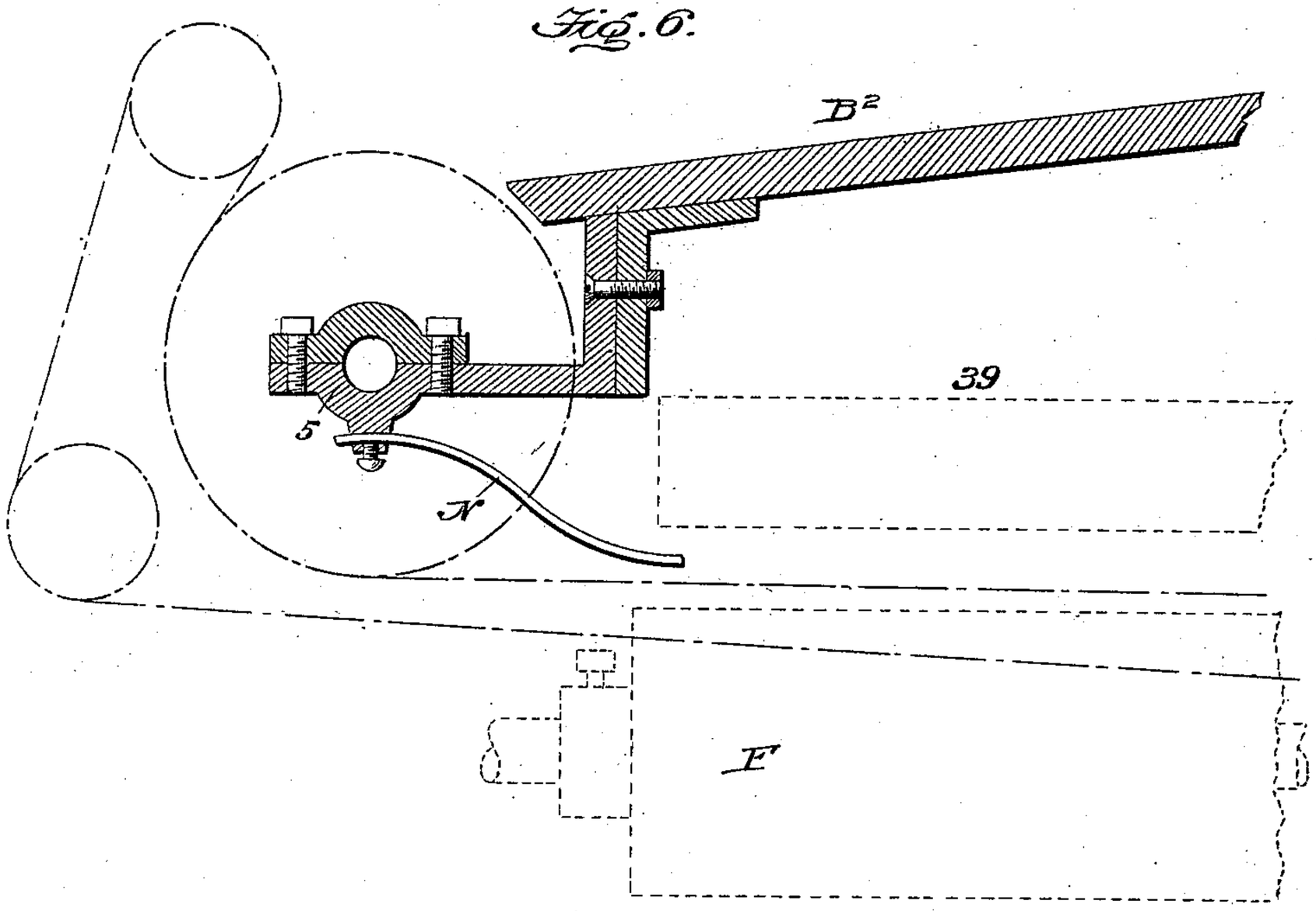


Fig. 7.

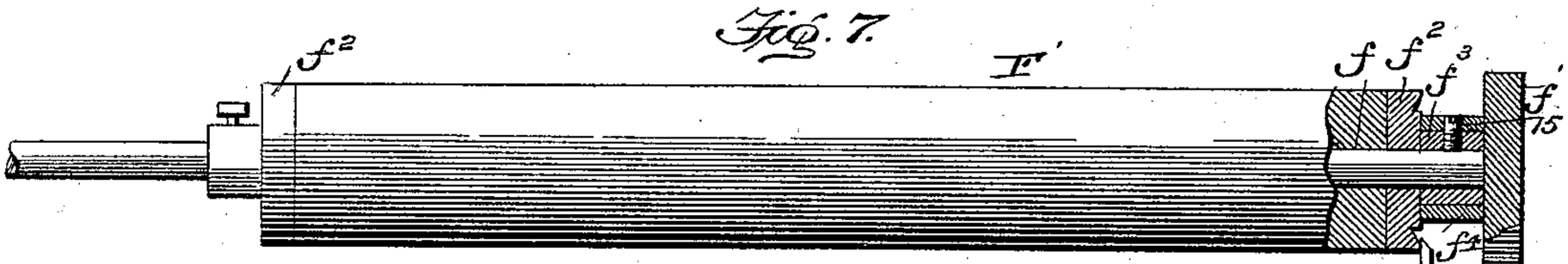


Fig. 8.

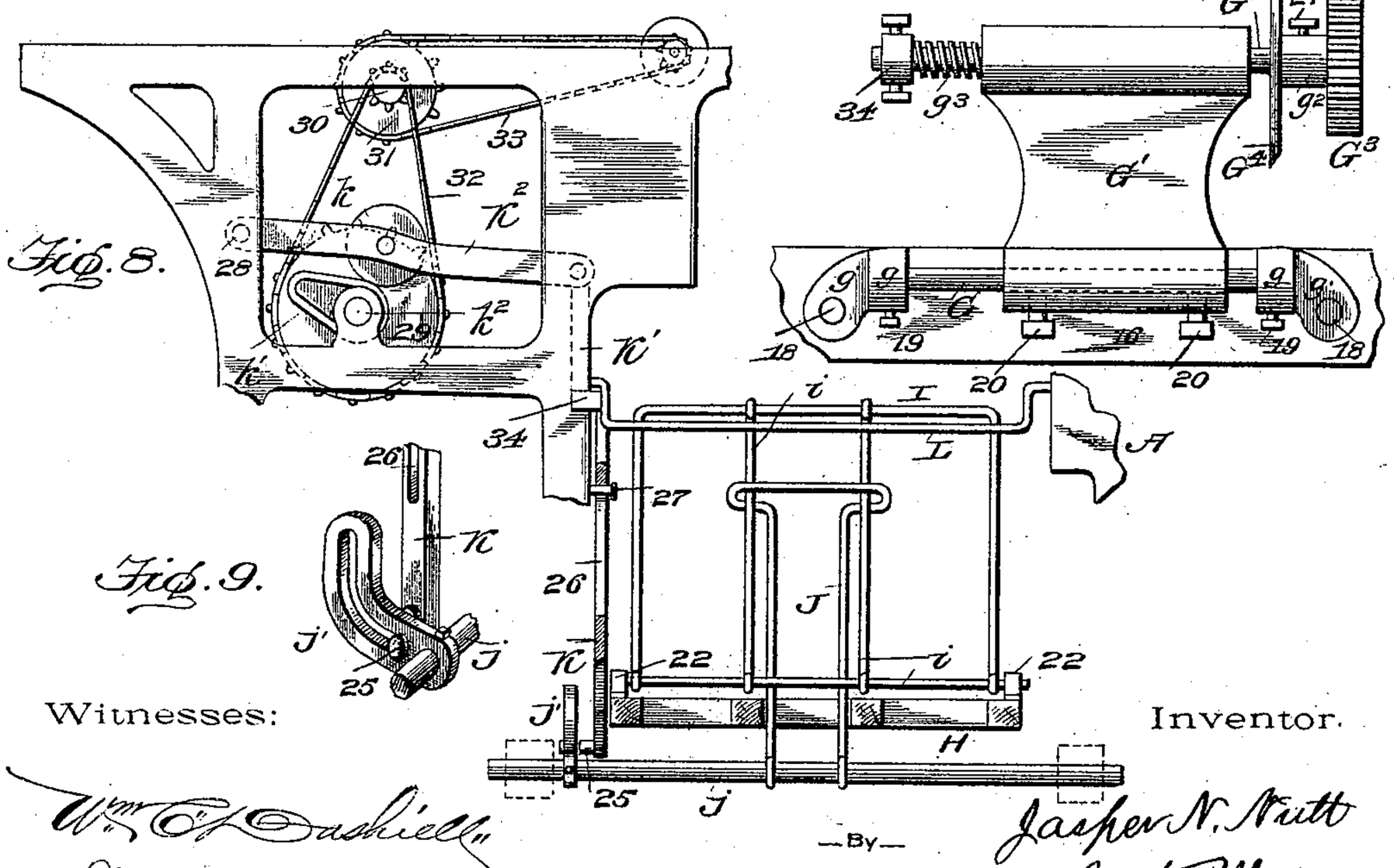


Fig. 9.

Witnesses:

Wm. C. Dashiell

David W. Gould.

Inventor.

Jasper N. Nutt

By Wm. Hunter Myers

Attorney.

UNITED STATES PATENT OFFICE.

JASPER N. NUTT, OF SIDNEY, OHIO.

PAPER-FOLDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 538,622, dated April 30, 1895.

Application filed June 16, 1894. Serial No. 514,737. (No model.)

To all whom it may concern:

Be it known that I, JASPER N. NUTT, a citizen of the United States, residing at Sidney, in the county of Shelby and State of Ohio, have invented certain new and useful Improvements in Newspaper-Folding Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to newspaper-folding machines; and it comprehends the several novel features stated below; first, an improved construction of the frame, whereby firmness coupled with lightness is attained; second, an auxiliary frame at the top of the machine, which supports the drop-roller and feed-stop mechanism, the leading-in tape-rollers, and the box which centrally supports the feed-pulley shaft and carries a guard-wire which leads back over the first-fold rollers; third, the construction of the drop-roller and feed-stop mechanism, consisting of hubs mounted on a rock-shaft and each provided with an arm carrying a drop-roller and a feed-stop secured to the hub; fourth, the construction of the tape-roller stands, whereby they are rendered adjustable to tighten or loosen the tapes in a convenient manner; fifth, the construction of the boxes in which the folding-rollers have their bearings, whereby their adjustment with relation to each other to meet the requirements of paper of different thicknesses is readily accomplished; sixth, the construction of the trimmer mechanism, affording means for its ready adjustment and also for throwing the cutter out of operation; seventh, the construction of the fly and the provision of means for supporting the folded papers on the rack in an upright position when the fly is out of contact with them.

The invention will first be described in connection with the accompanying drawings, and then pointed out in the claims.

Figure 1 of the drawings is a perspective view of a folding-machine embodying my improvements. Fig. 1ª is a detail sectional elevation illustrating the manner of mounting the auxiliary frame on the standards. Fig. 2 is a broken perspective detail view illustrating the drop-roller and feed-stop mechanism and the means for operating the same. Fig. 3 is a horizontal sectional view on the line x x, Fig. 1, of a portion of the machine-frame, illustrating the construction of the same and also the means for attaching the stop-arms thereto. Fig. 4 is a vertical sectional detail view illustrating the construction of the folding-roller bearings and their attachment to the frame. Fig. 5 is a vertical sectional detail view, partly in elevation, showing the construction of the tape-roller stands and their adjustable attachment to the frame. Fig. 6 is a diagrammatic view, partly in section and partly in elevation, of so much of the machine as is necessary to illustrate the guard-wire and its relation to the first-fold rollers and blade. Fig. 7 is a detail view in elevation, partly in section, of the trimming mechanism. Fig. 8 is a broken detail view in elevation illustrating the fly, the paper-brace, and the mechanism for operating them, the rack being shown in section. Fig. 9 is a broken detail perspective view of the means whereby the fly is operated.

Referring to the drawings, A represents the rails of the machine-frame, which are made of channel iron and formed at each end, on the inner side, with a web a, which stands at an angle of forty-five degrees to the straight portion of the rail, leaving a shoulder 1 at the junction of the web with the rail proper. Against these webs are set the flat corner-posts A′, which are beveled on their edges, as at 2, in order to fit closely against the shoulders 1, and are each formed with a central longitudinal strengthening-rib a', these posts being secured to the rail-webs by means of bolts a^2 and nuts a^3, all as clearly seen in Fig. 3.

It will be understood the frame is to be made as light as possible consistent with the strength and rigidity requisite in such structures. With this end in view, the angular webs and shoulders on the frame-rails and the flat corner-posts secured to the webs and bearing against the shoulders are very important features, in that while the frame may be made comparatively light, its corner joints will be rendered firm by the broad bearing afforded the corner-posts by the angular webs and by the shoulders against which the posts abut.

Above the main frame and at the front of

the machine is an auxiliary frame comprising a longitudinal rail B and two brackets B′, which support said rail and the front of the feed-board B^2, these brackets being loosely mounted on standards 3, (best seen in Fig. 1^a,) in which is journaled the feed-pulley shaft 4. On this frame is placed the drop-roller and feed-stop mechanism and the leading-in tape-rollers. By this means I am enabled to use small tape-rollers instead of the usual large tape-pulleys mounted on a shaft; and furthermore I provide a convenient support for the drop-roller and feed-stop mechanism, dispensing with a separate appliance for that purpose. In addition to the foregoing this auxiliary frame serves another useful purpose, in permitting the attachment thereto of a hanger 5 for giving central support to the feed-pulley shaft 4.

Relative to the drop-roller and feed-stop mechanism, C is a rock-shaft journaled in arms 6 secured to the upper side of the auxiliary frame, above the first-fold rollers. On this shaft are removably secured hubs C′, each provided with an arm *c* carrying a drop-roller *c*′. To each hub is also secured a feed-stop c^2, at such an angle relative to the drop-roller as that when one is in operative position the other will be out of operative position. It will be evident that by this construction both the drop-roller and feed-stop can be simultaneously adjusted on the rock-shaft to meet the requirements of sheets of different sizes, and this, too, simply by means of a single set-screw, thus materially simplifying and facilitating the work of the operator. To one end of the rock-shaft C is secured a crank c^3, to which is pivoted one end of a link c^4, the other end of said link being pivoted to the forward end of a lever c^5, which is pivoted at 7 to the frame and carries on its rear end a roller c^6, which engages with an adjustable cam c^7, mounted on the power-shaft S of the machine, this lever, cam, and shaft not seen in Fig. 1, but clearly illustrated in Fig. 2. By means of the adjustable cam the time in which the drop-rollers and feed-stops, respectively, are to remain in operative position can be regulated to suit paper of any size. These parts have three motions: First, the drop-rollers come down, gripping the paper between them and the feed-pulleys P, causing the paper to start in sufficiently to be caught between the tapes *t* and the feed-pulleys. They then make the second movement, the drop-rollers rising half-way up and remaining stationary, thus avoiding crimping or wrinkling the paper as it passes in and preventing the paper being torn by the stops. When the rear edge of the paper has passed beyond the drop-rollers the third movement is made, said rollers rising up the other half-way and thereby bringing the feed-stops down into position ready for the next sheet of paper.

In order to provide for an easy and convenient means of tightening and loosening the tapes I have devised a tape-roller stand D of peculiar construction. That portion of the stand which bears on the machine-frame is curved, as at 8, so as to conform to and fit in the depressed inner portion of the frame-rail, and is provided with a lateral flange *d*, which is slotted, as at 9, the stand being secured to the frame by a bolt 10, passing through the slot in the flange, and a nut 11, the head of the bolt being countersunk in the frame, all as clearly seen in Fig. 5. It will be noticed that by this construction the tape that passes over the roller *d*′ mounted on the stand will be tightened by lowering the stand and loosened by raising it; and, also, that when the stand is adjusted as desired, its flange will give it a broad bearing on the frame-rail, whereby lateral swinging and vibration of the stand are avoided.

Heretofore it has been extremely difficult to obtain a ready and accurate adjustment of the folding-rollers with relation to each other in order to suit the various thicknesses of paper passing between them, which difficulty I have overcome by the provision of novel means for attaching the roller-bearings to the frame. In Fig. 4 I have shown the frame-rail as having, at the points where the bearings are to be attached, concave depressions or sockets 12, instead of the usual channel depression. The roller-bearings E are each provided with a broad concavo-convex stem *e*, the convex portion being adapted to fit within one of the sockets 12 in the rail, in the nature of a ball-and-socket joint. A bolt 13 passed through the frame and stem, and secured by a nut 14 lying within the concavity of the stem, serves to hold the bearing in place. This construction results in permitting the rollers to be accurately and conveniently adjusted, by simply loosening the nut and swinging either bearing toward or away from the adjoining bearing; and when the nut is tightened on the bolt the entire concavo convex portion of the stem of the bearing lying within the socket will have frictional contact with the frame-rail, whereby the roller-bearing will be held with the rigidity required to insure accuracy in the action of the folding-rollers.

In Fig. 7 I have illustrated the trimming mechanism. One of the second-fold rollers F′, the shaft *f* of which carries at one end a gear-wheel *f*′, is clamped tightly between metal cutter-blanks f^2, each of which is provided with a sleeve f^3, over either of which is adapted to pass the hub f^4 of the gear-wheel, so that when the blank on one end is rendered unfit for use in trimming the roller may be turned end for end and the other blank used, the blanks and gear-wheel being secured to the shaft by set-screws 15. Below the second-fold rollers F′ is a rail 16, hung to brackets 17 attached to the frame. This rail supports a rod G, which is mounted in bearings *g*, each provided with a right-angular flange *g*′, which is bolted at 18 to said rail. This rod G is prevented from turning in its bearings by means of set-screws 19. On this rod G is mounted

the cutter-support G′, which is sleeved at its lower end to receive said rod and provided with set-screws 20, and also sleeved at its upper end to receive the cutter-shaft G^2, which extends through said sleeve a short distance on each side. On the outer end of this shaft is keyed a gear-wheel G^3, which meshes with gear-wheel f'; and a short distance inward from this wheel, in register with the outer edge of the cutting-blank f^2, is placed the cutter G^4, which is a sharpened disk provided with a sleeve g^2 adapted to pass over the shaft and a set-screw 21 for securing it to the shaft. Over the rear portion of the cutter-shaft G^2 is placed a coil-spring g^3, one end of which bears against a stop g^4, adjustably secured on the shaft, its other end bearing against the cutter-support. This spring tends to always keep the cutter in close contact with the blank.

By constructing and arranging the trimming mechanism as above described, I am enabled to adjust it to trim sheets of different sizes by simply shifting the roller F′ and its gear-wheel on the shaft, loosening set-screws 20, and sliding the cutter-support on the rod G, whereby I accomplish the desirable result without disturbing the cutter, gear-wheel, or tension-spring. Furthermore, by loosening set-screws 19 and permitting rod G to turn, the set-screws 20 remaining tightened, I can swing the cutter-support and all the adjusted parts back out of operative position.

In Figs. 1, 8, and 9 I have illustrated my improved apparatus for the delivery of the folded papers, which apparatus embraces the fly and the paper-brace, and mechanism for their timely operation. H represents the paper-rack, constructed and arranged in the usual manner. I is a rectangular paper-fly, formed of wire, and provided with immediate vertical cross-wires i, the fly being journaled at its lower end in bearings 22, secured to brackets 23, which carry the rollers 24 on and between which the rack works. Beneath the rack and in rear of the lower front rail of the machine-frame is a shaft j, mounted in suitable bearings attached to said frame. J is the fly-thrower, which consists of a wire bent so as to loop over the cross-wires i of the fly, the straight portions of the thrower extending downward and being secured to the shaft j. On the shaft j, near one end, is secured a slotted cam j', in which works a pin 25 extending laterally from a slide-bar K, which is slotted, as at 26, and held loosely to the frame by a headed pin 27 passed through said slot. To the upper end of the slide-bar is pivotally connected one end of a link K′, (seen in dotted lines in Fig. 8,) the other end of said link being likewise connected to one end of a lever K^2, the other end of said lever being pivoted to the machine-frame at 28. This lever carries a roller k, which engages with a cam k', fixed on the shaft k^2, which shaft, through sprocket-wheels 29, 30, and 31, and sprocket-chains 32 and 33, drives the first-fold rollers F. The slide-bar K carries near its upper end a finger 34, for a purpose hereinafter mentioned.

L is a paper-brace, for bracing the folded papers in a vertical position against the uprights of the rack. It consists of a wire bent at right angles in such manner as to make it slightly longer than the fly, and having its ends bent to form journals, which work in suitable bearings secured to the rear side of the machine-frame above the fly.

The operation of the fly and the paper-brace is as follows: On the revolution of the shaft k^2 and the cam k' carried thereon, the slide-bar K is, through the lever K^2 and link K′, given a vertically-reciprocating motion, which, by means of the slotted cam j' and the pin 25 working therein, imparts a rocking motion to the shaft j. In the drawings the fly is represented in position to receive the folded paper from the tapes, and the paper-brace in a position to bear against the folded papers in the rack. Now as the slide-bar moves upward the slotted cam j' causes shaft j to rock forward, imparting a like motion to the fly-thrower and the fly. During the time the pin 25 is in that portion of the cam-slot next the shaft the paper-brace remains in position against the folded papers in the rack; but as soon as the pin turns into the other angle of the cam-slot the finger 34 has reached the paper-brace and operates, as the upward motion of the slide-bar continues, to raise the paper-brace from operative position to allow the fly with the paper to pass under it. When the slide-bar has reached the highest position, the paper-brace is entirely up and the fly has placed the folded paper against the uprights of the rack. When the slide-bar starts downward the slotted cam operates to return the fly for the next paper, and the finger is carried downward from under the paper-brace, thus allowing the latter to drop to its operative position against the papers, where it remains until the fly is ready to place the next paper in position on the rack.

M are the stops which limit the movement of the paper on the tapes; and m are the stop-arms. In order to attach the arms of the stop to the machine-frame I have devised a clamp m', having a groove 35 in its inner side; and I also form a corresponding groove 36 in the frame, the two grooves, when placed together, being adapted to receive the stop-arm, this feature being clearly shown in Fig. 3. The clamp, as seen in Fig. 1, has an ear 37 on one side, through which passes a screw 38, securing the clamp and stop-arm to the frame.

Heretofore annoyance has frequently occurred from the paper, as it is fed into the machine and leaves the feed-pulleys, turning up and coming into contact with the folding-blade 39 over the first-fold rollers. This I have avoided by attaching a guard-wire N to the hanger 5, the free end of the wire extending slightly beyond the near end and to one side of the folding-blade and slightly above the tapes. By this means the paper is held

down onto the tapes until it is carried beneath the folding-blade.

As Fig. 1 of the drawings is introduced merely to show the application of my improved devices to a machine of common construction, I have deemed it unnecessary to describe any of the old parts, or to refer to any of them excepting those with which my improvements coact. It may be well, however, to indicate the positions of the various sets of folding-rollers, all of which are clearly shown, F being the first-fold rollers; F′, the second-fold rollers; F^2, the third-fold rollers, and F^3 the fourth-fold rollers.

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

1. In the frame of a newspaper-folding machine, the combination, with the rails provided at their ends with angular webs and having shoulders at the junction of the webs with the straight portions of the rails, of flat corner-posts secured to the webs and bearing against said shoulders.

2. In a folding-machine frame, the combination, with rails having integral webs at their ends, on the inner side, said webs standing at an angle of forty-five degrees to the plane of the rail and having shoulders at the junction of the webs with the straight portions of the rails, of corner-posts flat on the inner side and each provided with a longitudinal strengthening-rib on its outer side, said posts being secured to the webs and bearing against said shoulders.

3. In a newspaper-folding machine, the combination, with the main frame, of a swinging auxiliary frame located at the front of the machine and above the main frame, said auxiliary frame supporting the front end of the feed-board and carrying the leading-in tape-rollers.

4. In a newspaper-folding machine, the combination, with the main frame, of a swinging auxiliary frame located at the front of the machine and above the main frame, said auxiliary frame supporting the front end of the feed-board and carrying the leading-in tape-rollers and the drop-roll and feed-stop mechanism.

5. In a drop-roll and feed-stop mechanism, the combination, with a rock-shaft, of one or more hubs mounted thereon and each provided with a lateral arm, a drop-roll carried by the arm, and a feed-stop secured to the hub at an angle to said arm.

6. The combination, with the channeled frame-rail, of a tape-roller stand curved to enter the channel in the rail in a vertical position, that portion of the stand which enters the channel being slotted, and a fastening device passed through the rail and the slot in the stand, substantially as described.

7. The combination, with the channeled frame-rail, of a tape-roller stand formed with a lateral flange on one edge, the flanged portion of the stand being slotted and curved to enter the channel in the rail in a vertical position, a bolt passed through the rail, and slotted portion of the stand, and a nut for securing the bolt.

8. In a newspaper-folding machine, the combination, with a frame-rail having concave sockets in one side, of folding-roller bearings, each of which is provided with a stem convex on one side, the convex portion of said stem being adapted to fit within one of the sockets in the rail, and means for removably securing the bearing to the frame-rail.

9. In a newspaper-folding machine, the combination, with a frame-rail having concave sockets in one side, of folding-roller bearings, each of which is provided with a concavo-convex stem, the convex portion of said stem being adapted to fit within one of the sockets in the rail, a bolt passed through the frame-rail and the stem of the bearing, and a nut on the bolt lying within the concavity of the stem.

10. In a newspaper-folding machine, one of the folding-rollers loose upon its shaft, sleeved cutter-blanks between which said roller is clamped, a gear-wheel on one end of the roller-shaft and provided with a hub adapted to fit over either of the sleeves on the cutter blanks, and set-screws for securing said wheel and blanks to the roller-shaft, in combination with a revoluble longitudinally-adjustable cutter-shaft and a cutter removably secured thereon and adapted to operate in conjunction with one of said cutter-blanks, whereby the folding-roller may be turned end for end to present either blank to the cutter and the mechanism may be adjusted to trim paper of various sizes.

11. In a newspaper-folding machine, a horizontal rail rigidly fixed to the machine-frame, a rod journaled in bearings secured to said rail, set-screws in said bearings for preventing turning movement of said rod, a cutter-support sleeved on said rod and provided with set-screws to hold it tightly thereon, a cutter-shaft revolubly mounted in said support, a gear-wheel and a cutter secured on one end of said shaft, an adjustable stop secured on the other end of said shaft, and a coil-spring encircling the shaft and bearing against said stop and the cutter-support, in combination with one of a pair of folding-rollers longitudinally adjustable on its shaft, cutter-blanks between which said roller is clamped and with one of which the cutter coacts, and a gear-wheel on the roller-shaft and in mesh with the wheel on the cutter-shaft, whereby the cutter may be thrown out of contact with the cutter-blank when desired, and also the mechanism can be adjusted to trim different-sized papers without disturbing either the cutter or its tension device.

12. In a newspaper-folding machine, a rectangular wire fly having vertical central cross-wires, in combination with a rock-shaft, a fly-

thrower looped over the cross-wires and attached to the rock-shaft, and mechanism for automatically operating said shaft.

13. In a newspaper-folding machine, the combination, with the paper-rack, the fly, and the rock-shaft through which the fly is operated, of a paper-brace journaled in bearings attached to the machine-frame and adapted to press against the papers on the rack when the fly is not in contact with them, said brace being raised out of operative position by mechanism operating the rock-shaft.

14. In a newspaper-folding machine, the combination, with the rack, the fly, the rock-shaft through which the fly is operated, and the paper-brace journaled in bearings attached to the machine-frame and adapted to bear against the papers on the rack when the fly is not in contact with them, of a slotted cam attached to the rock-shaft, a slide-bar provided with a lateral pin working in the cam, a finger on the upper end of the slide-bar and resting under the paper-brace, a link pivoted to the slide-bar, a lever pivoted at one end to the link and at the other end to the machine-frame, a roller carried by said lever, and a revoluble cam with which said roller engages, the parts being so adjusted that when the slide-bar moves upward the paper-brace will be raised and the fly thrown forward, and as it moves downward the fly will be thrown backward and the brace will drop into position by gravity.

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

JASPER N. NUTT.

Witnesses:
WEB. W. ROBINSON,
J. E. RUSSELL.