

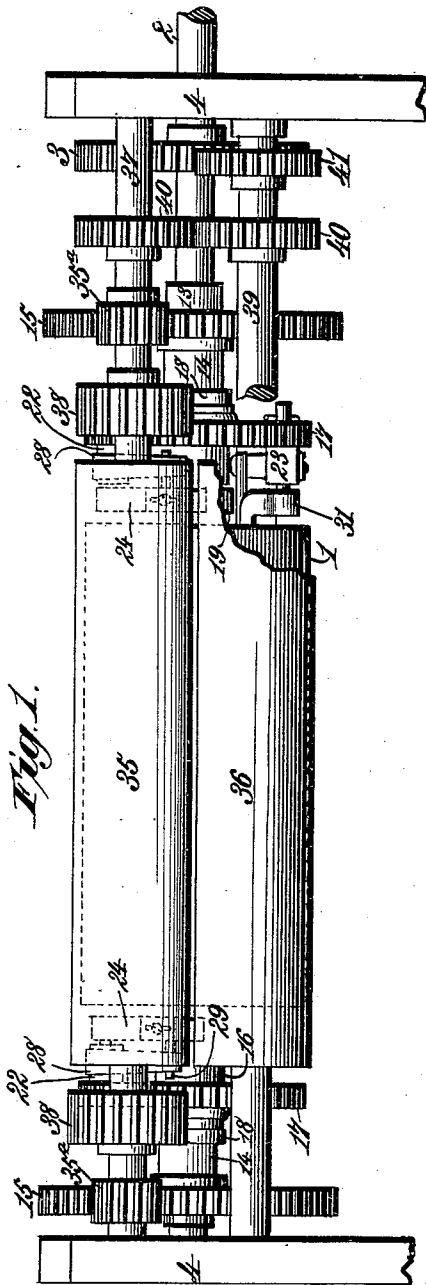
(No Model.)

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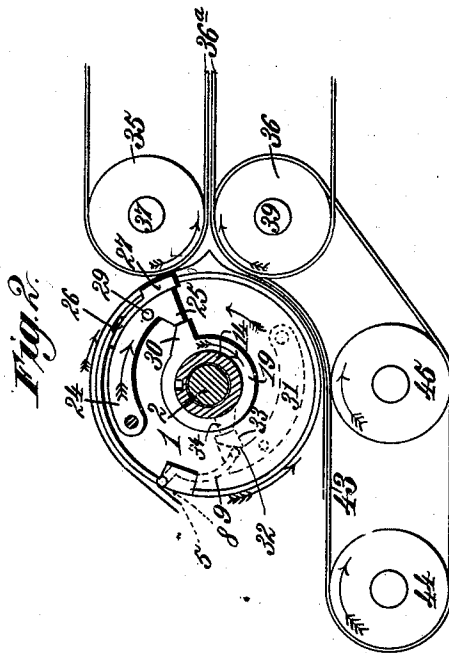
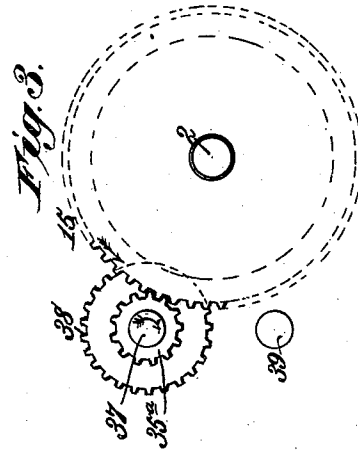
J. C. FOWLER.
PAPER FOLDING MECHANISM.

No. 473,068.

Patented Apr. 19, 1892.



Witnesses.
Robert Emmett.
J. A. Kullerford



Inventor:
Joseph C. Fowler.
By Janus L. Norris.
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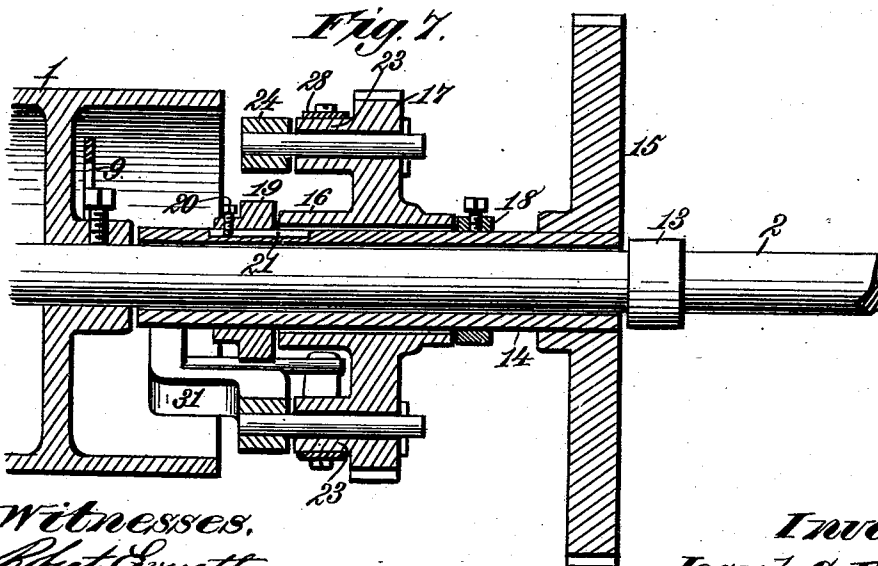
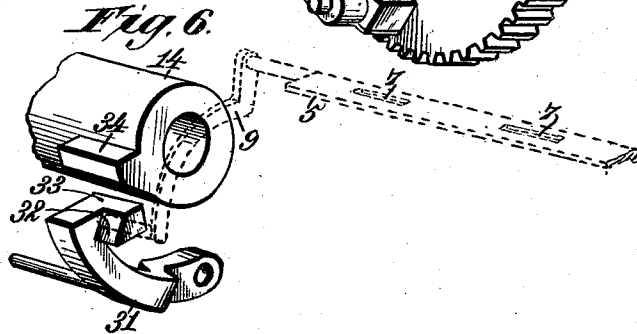
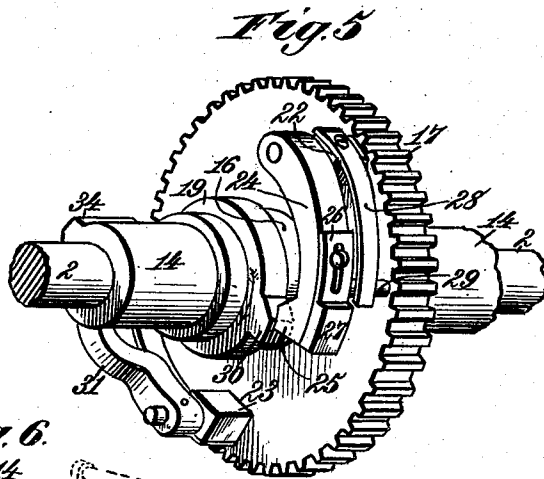
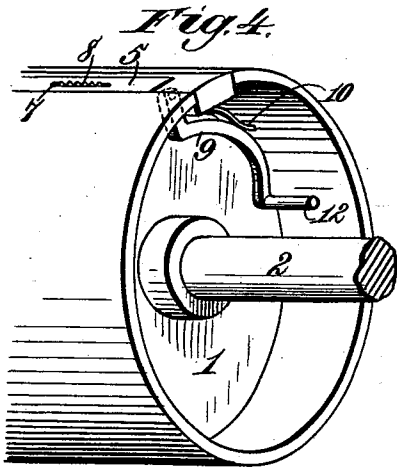
(No Model.)

2 Sheets—Sheet 2.

J. C. FOWLER.
PAPER FOLDING MECHANISM.

No. 473,068.

Patented Apr. 19, 1892.



Witnesses,
Phil. Smith,
J. A. Rutherford.

Inventor,
Joseph C. Fowler.
By *James L. Norris,*
Atty.

UNITED STATES PATENT OFFICE.

JOSEPH C. FOWLER, OF WASHINGTON, DISTRICT OF COLUMBIA.

PAPER-FOLDING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 473,068, dated April 19, 1892.

Application filed July 7, 1891. Serial No. 398,709. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH C. FOWLER, a citizen of the United States, residing at Washington, in the District of Columbia, have invented new and useful Improvements in Paper-Folding Mechanisms, of which the following is a specification.

My invention relates to folding mechanisms for perfecting-presses, and more especially for presses of the class shown in my pending application filed of even date herewith and numbered in Serial 398,708, in which I have described a perfecting-press wherein the sheet receives successively a first and second impression.

It is the purpose of my present invention to provide a folding mechanism adapted to the needs of presses of this type, but which may also be used with presses of a different organization, whereby the process of folding shall be rendered continuous, rapid, and automatic throughout.

My invention consists to these ends in the several novel features of construction and new combinations of parts hereinafter fully set forth, and then more particularly pointed out and defined in the claims which conclude this specification.

To enable those skilled the art to which my invention pertains to understand the construction and use of said invention, I will proceed to describe the same in detail, reference being had for such purpose to the accompanying drawings, in which—

Figure 1 is a front elevation of the folder. Fig. 2 is a vertical transverse section taken at the left-hand end of Fig. 1 near the end of the drum. Fig. 3 is an end view of the gear on the shaft of the folding drum or cylinder and the gearing of the upper folding-roll driven thereby. Fig. 4 is a detail perspective of one end of the folding cylinder or drum, part of the shaft being broken away and the sleeve removed. Fig. 5 is a detail perspective of the broken part of the drum-shaft absent from Fig. 4. Fig. 6 is a detail perspective of the tripping end of the sleeve on the drum-shaft, showing the latch or dog operated thereby with the clearing-plate in dotted lines. Fig. 7 is a central longitudinal section of one end of the folder-drum, showing the parts complete.

In the said drawings, the reference-numeral 1 designates the cylinder or drum of the folder, which consists of a metal shell of suitable length and having such diameter that the single sheet perfected by the press will extend nearly around its exterior. The drum is carried by a shaft 2, which extends beyond its ends. This shaft is provided at or near one end with a gear 3, rigid on the shaft, which is supported in suitable boxes of any preferred form mounted in standards 4.

In the cylindrical wall of the drum 1 is a longitudinal slot extending from end to end, and in said slot is arranged a clearing-plate 5, pivoted upon one edge and having apertures 7, through which, when the plate is closed to form a flush outer surface with the cylinder or drum, there project portions or sections of the edge of a serrated plate 8.

By removing portions of the toothed edge of an ordinary perforating-plate I obtain the pick-up device used in the folder, in which the points or serrations are preferably staggered or bent slightly out of line to enable them to pick up and securely hold the edge of the sheet. On the end of the clearing-plate 5 is rigidly mounted an arm 9, curved to lie wholly within the flanged end of the drum and pressed by a spring 10, by which the clearing-plate is constantly kept closed. Upon the free end of this arm is a finger 12, extending outward in parallelism with the shaft and substantially at right angles with the arm. The shaft 2 of the drum is prolonged at both ends and provided with collars 13, against which lie the ends of sleeves 14, loose on the shaft and provided at the outer ends with gears 15. Upon each sleeve 14 is mounted a hub 16, forming part of a gear 17, smaller than the gear 15 and loose upon the sleeve 14, where it is confined by a clamp-collar 18. Encircling the sleeve on the other side of the gear and next to the drum or cylinder is a collar 19, having a set-screw 20, which may be turned to engage with a groove 21 in the sleeve. The gear 17 is rendered adjustable upon the sleeve 14 by this construction, the purpose being to enable the folder to operate upon sheets of different size. To accomplish this, it is only necessary to move the gears 17 outward or inward to such points that the clamp-blocks 27 on the dogs 24 will engage

the unprinted margins of the sheet, which project beyond the ends of the drum 1. To permit this adjustment without unmeshing the gears 17 from the gears 38, the latter are constructed with a wide face, as shown in Fig. 1. It is unnecessary to state that the collar 18 is made adjustable in order to permit the adjustments of the gears 17 in both directions and at the same time permit lateral play of the hub 16 and gear 17.

Upon the flat face of each gear 17 are formed or mounted two opposite or nearly opposite blocks or bosses 22 and 23, upon the former of which is pivoted a dog 24, having upon its free end a projection 25, turned inward or pointed toward the shaft and provided upon its back with an adjustable plate 26, having a clamp-block 27 on its end. A spring 28, fastened by one end to the block 22 and pressing with the other upon a pin 29, throws the free end of the dog 24 inward. Upon the periphery of the collar 19 is a cam projection or rib 30, which can be brought by revolving either the collar or the gear, or both, into engagement with the projection 25 to throw the dog outward or toward the periphery of the gear 17. Upon the other block 23 is pivotally mounted a latch-dog or clearing-lever 31, which is bent outward or toward the end of the drum, and then in parallelism therewith, its free end lying nearly but not quite opposite the free end of the dog. Upon the end of the latch-dog or clearing-lever is a tripping-cam 32, formed upon and extending laterally from a point or projection 33, turned inward like the projection 25 upon the dog 24. This projection lies in the path of a cam-rib 34 on the inner end of the sleeve 14, carrying the gear 15, as seen in Fig. 5. Whenever this cam-rib engages the projection 33, the dog will ride up thereon and the tripping-cam 32 will be forced against the finger 12 on the arm 9, forcing it outward, and thereby swinging the lever and turning the clearing-plate 5 in such manner as to draw it off the points projecting through its apertures, as shown in dotted and full lines in Fig. 6.

Journaled immediately in front of the cylinder or drum 1 are folding-rolls 35 and 36, preferably somewhat longer than the drum, one of said rolls, as 35, being arranged to rotate very close to the surface of the cylinder but not in actual contact, while the roll 36 is in permanent surface contact therewith. The folding-rolls are geared together at one end, and the roll 35 has its shaft geared by pinions 35^a on its prolonged shaft with the gears 15 on the sleeves 14. I may run tapes or bands 36^a over these rolls, or I may use them without.

From the shaft 37 of the folding-roll 35 I gear back to the gears 17 by pinions 38 of wider face and having a diameter greater than that of the pinions 35^a. The shaft 37 of the roll 35 is geared to the shaft 39 of the other roll 36 by gears 40, and the roll 36 is driven by a gear 41 on the end of its shaft

meshing with the gear 3 on the shaft 2 of the cylinder 1.

The pinions 35^a are a little more than half the diameter of the gears 38, the pitch-lines of the latter coinciding with the prolonged peripheral plane of the roll 35. The diameters of the gears 15, on the other hand, are greater than the diameter of the drum 1, the diminution of the pinions 35^a plus the increase of diameter of the gears 15, which are driven by the pinions 35^a, giving one rotation of the sleeve 14 and collar 19 to two complete revolutions of the gears 17 and dogs 24.

The drum 1 is carried in a direction opposite to the revolution of the gears 17 and dogs 24 for the following reasons: The drum 1 is rotated in such manner that the edge of the sheet picked up by the device 8 shall pass beneath the drum, between it and the roll 36, and then over the top of the drum, as shown in Fig. 2. To produce a sudden or abrupt action of the tripping-cams or projection 30 and accurately locate the point of engagement, but avoid a shock which would cause rebound of the dogs 24, the cams 30 are caused to travel in the same direction with said dogs but not at the same speed. The dogs 24 must evidently move in the opposite direction of rotation, as regards the drum 1, because their clamp-blocks 27 move with the roll 35, which revolves in a direction contrary to that of the roll 36 and drum 1, the two latter moving together. This opposite revolution of the drum 1 and dog 24 is necessary in order that the two halves of the centrally-folded sheet may be drawn off the drum and the fold carried between the rolls 35 and 36 in the manner shown in Fig. 2. The dogs 24 are mounted on independent disks or gears 17, because they travel in a direction opposite to that of the drum and shaft 2. I utilize the gears 17, on which they are mounted, as a means for giving the necessary movement to the sleeves 14 and collars 19. The gears 17 are necessarily independent of each other, as they are at opposite ends of the drum.

The sheets are brought to the drum by tapes 43, running over rolls 44 and 45 and then over one of the folding-rolls 36. These rolls are revolved in opposite directions with the surface speed of the drum.

The drum revolves continuously in the direction indicated by the arrow; but the sleeve 14 and gear 15 and the gear 17 are rotated upon the shaft 2 in an opposite direction, the gear 17 making two revolutions to the one revolution of the sleeve 14 and gear 15, the former carrying the collar 19. The gear 17 is duplicated at each end of the drum-shaft, as also is the gear 15 and sleeve 14 and the collar 19 and the dog 24. The shaft 2 of the drum being the power-shaft of the folder, this gearing gives the desired results as to motion, and the same is readily adjusted by the size of the gears.

The paper sheets may be brought to the folder by any suitable automatic delivery,

such as tapes. The travel of the sheet is so timed with relation to the movement of the drum that the serrations or perforating extremities 8 will be brought by the rotary movement down upon the edge of the paper sheet and driven through the same, which is thereby picked up by the drum and drawn upon the latter. A central transverse line of perforations or other marking by which the fold may be located and guided is formed in the center of the sheet, and as this line is brought nearly but not quite opposite the tangent plane of the folding-rolls the projection 33 of the latch-dog or clearing-lever 31 makes engagement with the cam-rib 34 on the sleeve 14, thereby operating the arm 9 and swinging the clearing-plate 5, by which the edge of the paper is cast or stripped off the serrations of the pick-up device. An instant later, the line having meantime been brought into the tangent plane of the folding-rolls, the other and nearly opposite projection or cam 30 engages the projection 25 on the dog 24, throwing the latter outward and forcing the clamp-block 27 against the paper, which is crowded thereby against the roll 35, whereby that portion or half of the sheet lying above the line of fold is caused to travel with the roll 35 in a direction opposite to the movement of the cylinder. As the roll 36 is in permanent contact with the drum, the other and lower half of the sheet is normally carried with the cylinder, and thus it will be seen that the two halves of the sheet are being driven in opposite directions, and the only course it can take is to bend along the line of fold and pass in between the rolls 35 and 36, by which the fold is seized and the sheet drawn off, passing in folded form between the two rolls and being delivered by them or by their tapes. In the meantime the pick-up device has engaged a second sheet, on which the operation is repeated, the action of the folder being extremely rapid, simple, and accurate.

What I claim is—

1. In a paper-folding mechanism, the combination, with a drum having means of picking up the edge of the sheet as the latter is fed to said folding mechanism, of a pair of folding-rolls, one of which is in constant contact with said drum, a dog pivoted on a support on the shaft of said drum and having opposite revolution, an independent support moving in the direction of movement of the dog, but making one complete revolution in the same time occupied by the dog in making a plurality of revolutions, by which the dog is projected outward to press the sheet against the roll not in contact with the drum, and means for automatically disengaging the sheet from the pick-up devices, substantially as described.

2. In a paper-folding mechanism, the combination, with a continuously-revolving drum having a series of points or pick-up devices to engage the edge of the sheet, of an inde-

pendent support carrying a dog having a clamp-block and a nearly-opposite clearing-lever, a separate support carrying cam-ribs operating said dog and lever, and two folding-rolls, one in constant contact with the drum and the other having intermittent contact with the clamp-block on the dog, the support for the latter and that for the cam-ribs having movement in a direction opposite that of the drum, but at different speeds, substantially as described.

3. In a paper-folding mechanism, the combination, with a drum having a clearing-plate pivoted in a slot in its surface and provided with apertures to allow points or pick-up devices to project radially through the same, said clearing-plate being provided with a spring-closed clearing-lever, of a sleeve loose on the drum-shaft and carrying a gear provided with nearly-opposite pivotal supports, a dog and a clearing-lever pivoted thereon, a collar having independent movement on said sleeve and provided with cam-ribs, two folding-rolls, one in constant contact with the drum and the other having intermittent contact with the dog, and gearing rotating the feed-rolls in opposite directions and rotating the sleeve and collar in a direction opposite to the revolution of the drum, but at different speed, substantially as described.

4. In a folder for printing mechanisms, the combination, with a continuously-revolving cylinder or drum having a pick-up device, of a clearer to strip the paper therefrom, a pair of folding-rolls, one of which runs in contact with the surface of said cylinder, the second folding-roll being in surface contact with the first, sleeves loose on the shaft of the cylinder and having gears meshing with pinions on the shaft of one of the folding-rolls, gears loose on said sleeves, dogs pivoted on the said gears and provided with projections and having clamp-blocks upon their free ends, collars positively connected to the sleeves and provided with cam-ribs, a latch-dog or clearing-lever pivoted to one of said gears and having a free end provided with a point or projection adapted to engage a cam-rib on one of the collars a little in advance of the action of the dog and clamp-block to actuate the clearer, and means for conveying the sheets to the cylinder, substantially as described.

5. In a folding mechanism, the combination, with a continuously-revolving cylinder or drum having a pick-up and a clearer, of two folding-rolls, one running in continuous surface contact with the cylinder and with the other folding-roll, clamp-blocks mounted on supports pivoted to independently-rotating gears concentric with the cylinder, a lever to operate the clearer, and means for operating the dog and lever and for feeding the sheets to the cylinder automatically, substantially as described.

6. In a folding mechanism, the combination, with a continuously-revolving cylinder or

drum having a pick-up device and provided
with a clearer, of means for automatically
forming the fold and drawing the sheet off
the cylinder, the same consisting of two fold-
5 ing-rolls having contact with each other, one
of said rolls having continuous surface con-
tact with the cylinder, dogs carried by piv-
oted supports revolving oppositely to the cyl-
inder, means for actuating the clearer, and
10 devices operating the dogs an instant later to
press clamp-blocks carried by them against

the paper on the cylinder and press it against
the folding-roll which is out of contact with
the cylinder, substantially as described.

In testimony whereof I have hereunto set 15
my hand and affixed my seal in presence of
two subscribing witnesses.

JOSEPH C. FOWLER. [L. S.]

Witnesses:

GEO. W. REA,

JAMES A. RUTHERFORD.