

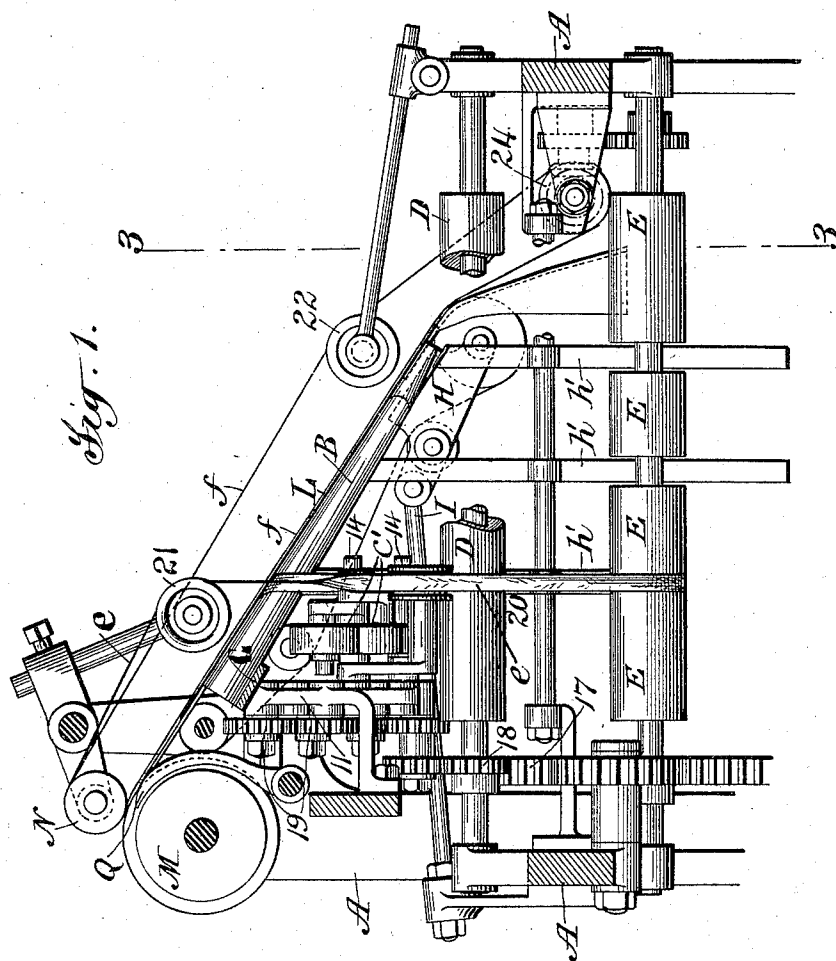
(No Model.)

3 Sheets—Sheet 1.

L. C. CROWELL.
FOLDING APPARATUS.

No. 582,009.

Patented May 4, 1897.



Attest:
George H. Betts
T. F. Kehoe.

Inventor:
Luther C. Crowell
By Philipp Munson Phelps

Atty's

(No Model.)

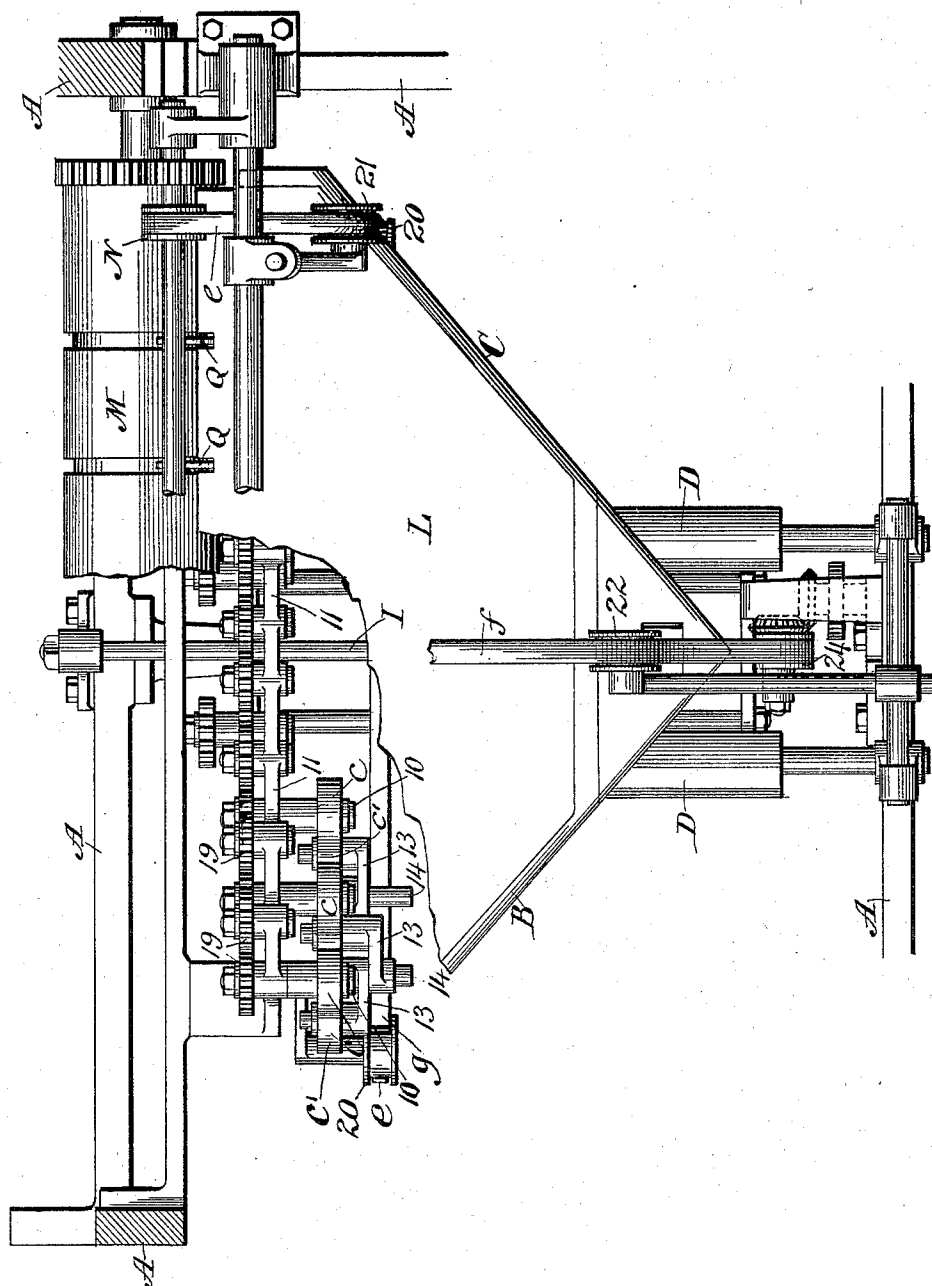
3 Sheets—Sheet 2.

L. C. CROWELL.
FOLDING APPARATUS.

No. 582,009.

Patented May 4, 1897.

Fig. 2.



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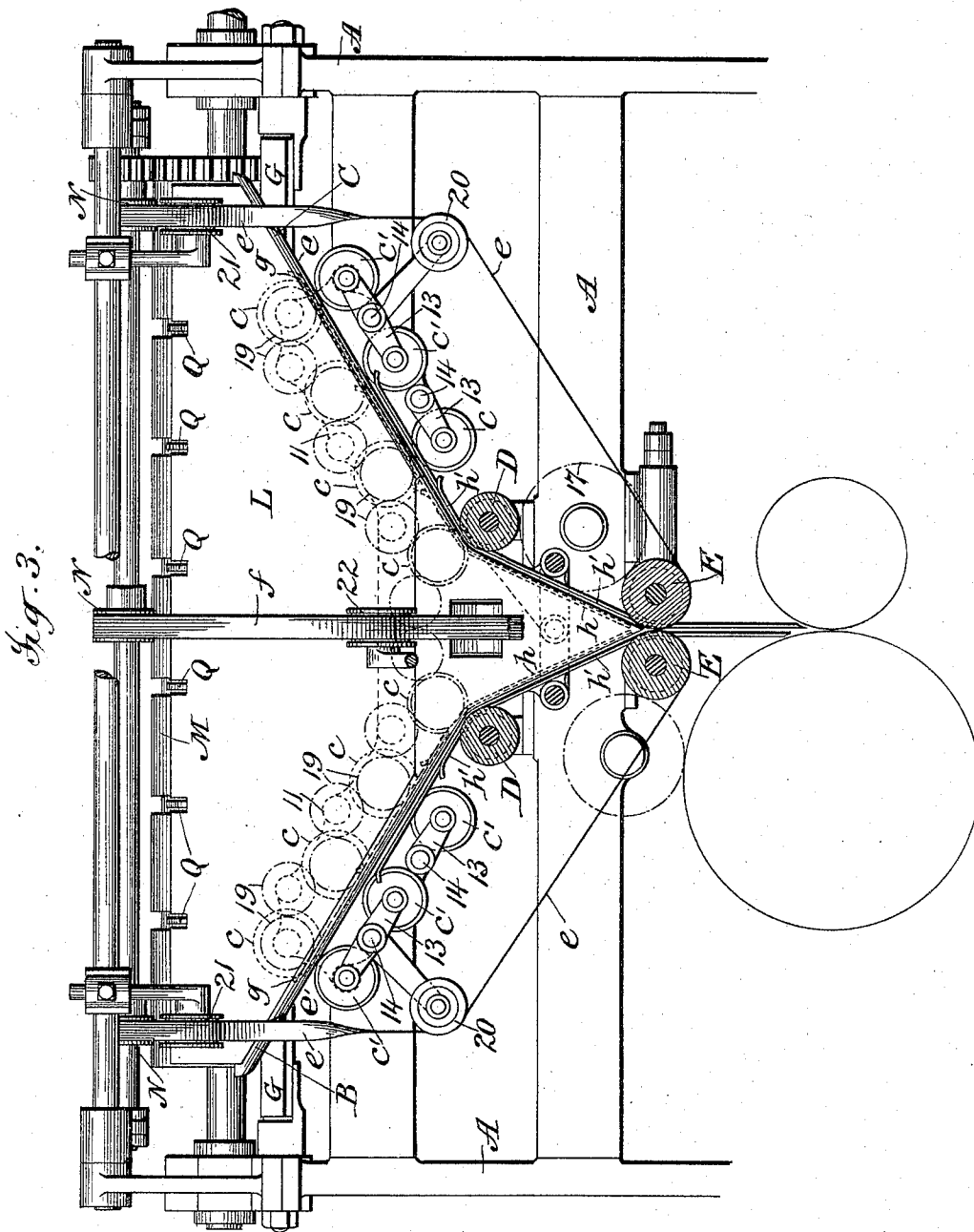
(No Model.)

3 Sheets—Sheet 3.

L. C. CROWELL.
FOLDING APPARATUS.

No. 582,009

Patented May 4, 1897.



Attest:
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J. C. Kahoe.

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UNITED STATES PATENT OFFICE.

LUTHER C. CROWELL, OF BROOKLYN, NEW YORK, ASSIGNOR TO ROBERT HOE, THEODORE H. MEAD, AND CHARLES W. CARPENTER, OF NEW YORK, N. Y.

FOLDING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 582,009, dated May 4, 1897.

Application filed November 16, 1895. Serial No. 569,162. (No model.)

To all whom it may concern:

Be it known that I, LUTHER C. CROWELL, a citizen of the United States, residing at Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Folding Apparatus, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to paper-folding mechanisms, and especially to that class of folding mechanisms which operate to impart a longitudinal fold to material passing over or through them on the run, and more particularly to such as are provided with a pair of converging internal guides or formers in passing over which the material has its sides carried toward each other, so as to be doubled or folded longitudinally. In such longitudinal folders adapted to fold sheets tapes were formerly employed for advancing the sheets over the folder, two series of tapes being used, or a series of external tapes coacting with internal plates. Such tape-folders are shown in Patents Nos. 276,672, 281,619, and 331,280. Such constructions were not entirely satisfactory in operation, as it is difficult to secure and maintain by tapes the proper tension at all points of the sheet to assure its proper feed and accurate folding. The construction requires careful attention to secure the best results, and there is some danger of offsetting, as it is found in practice that several series of tapes engaging different parts of the sheet are required for efficient action, the tapes necessarily having but a slight hold upon the paper, as otherwise they would offset too much for practical use. Various feeding means engaging the margin of the paper have been used therefore to avoid these objections to the tape-folders, such as feeding-rollers on the opposite sides of the folder converging from the internal guides, as shown in Patent No. 492,760, tapes engaging the margin of the paper and pressed together by supports, so as to secure a positive grip upon the paper, as shown in Patent No. 505,817, grippers seizing the margin of the paper, as shown in Patent No. 505,855, and other feed-

ing devices having a positive hold upon the paper, as distinguished from tapes running upon the printed portion of the paper and necessarily having but a slight hold upon the paper to avoid offsetting.

The especial object of the present invention is to provide an improved construction of longitudinal folder employing positive feeding devices, and while the invention is applicable in connection with such feeding devices of other forms than rollers, and the invention, broadly considered, includes such other positive feeding devices, results of especial value are secured by a construction employing rollers, as in Letters Patent No. 492,760; and the invention consists in part of special combinations including such feeding-rollers and will be described and illustrated in connection therewith.

In using such roller folders in connection with printed paper it is important that the rollers should engage only the unprinted margin of the paper, as these rollers, which are preferably made of rubber or similar gripping material, are liable to offset and smut if run upon the printed portion of the paper. If the sheets are perfect and fed accurately, such a construction with rollers running upon the margin of the paper is efficient, but it sometimes happens, especially in running from a high-speed press, that the margin of the paper may be turned under or torn or fractured, either being torn away for a short distance, or, as is liable to happen, perforated and partially detached at the inner edge of the margin by the edge of the printing form or plate. It may sometimes happen also that the leading edge of the paper will catch upon the edge of one of the rollers, so as to be turned under and not fed properly by the latter. I avoid this difficulty by adding to the marginal rollers one or more tapes on the opposite sides of the folder converging from the internal guides, a single tape on each side preferably being used in combination with plates serving as abutments for the tapes, although it will be understood that inside and outside tapes may be used, if preferred, as is common in the old and well-known tape

folders of this class. Both inside and outside rollers may be used or only inside or outside rollers coacting with a plate or other abutment. As the tapes may have such a slight hold upon the paper that they do not offset and smut and still assure the proper feeding of the sheets in conjunction with the rollers, I thus provide a construction of roller folder which secures the desired positive feed without smutting, as the rollers run only on the margins, while at the same time the tapes assure the feeding of sheets having defective margins or those not properly fed by the rollers for any other reason.

For a full understanding of the invention a detailed description of a construction embodying all the features of the same in their preferred form will now be given in connection with the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a sectional side elevation of the folder. Fig. 2 is a plan view with the top plate broken away at the upper end. Fig. 3 is a front elevation on line 3 of Fig. 1.

Referring to said drawings, it will be understood that the frame A may be of any suitable construction, such as is common in web-printing or other machines employing longitudinal folders of this class.

B C are the internal guides, over which the sides of the sheet are bent to form the fold, these internal guides being shown as consisting of bars converging between the external guides or rolls D, from which point the nose of the folder provides converging surfaces on opposite sides continuing the guides B C to the rolls E, which form the fold-laying device and from which the folded sheet may be delivered directly or pass to a delivery mechanism of any suitable form.

The internal guides B C are supported at their upper ends by a bar G, extending across the top of the folder, and at their lower ends by a cross-bar H, pivotally mounted so as to be vertically adjustable on a bar I, extending rearward under the folder and mounted in a bracket on the frame A in any suitable manner, preferably so as to be adjustable longitudinally as usual in such constructions, the proper position of the guides being thus secured.

The folder may be left open at the top, only the internal guides B C being used, but a top plate L, extending between the internal guides B C, will preferably be used to aid in supporting the middle of the sheet and to coact with the tapes, hereinafter described, in feeding the sheet, and this top plate L is shown as extended beyond and rearward of the upper ends of the guides B C to a feeding-roll M, coacting with a series of pulleys N and tapes in advancing the sheets to the folder. This roll M is preferably formed of a series of disks or grooved, as shown, so as to receive a series of fingers Q, which act as guides to direct the sheets from the roll M onto the

plate L, these fingers entering slots in the plate L and the grooves in the roll M.

The construction thus far described is common in this class of folders and may be varied widely, the invention being applicable generally to the various forms of folders of this class.

On each side of the folder are provided sets of feeding-rollers converging on opposite sides of the folder to the rolls D, interior and exterior rollers *c c'* being shown, these interior and exterior rollers being placed opposite each other, so as to grip the printed sheet on the margin and positively carry it onward. The interior rollers *c* are carried by short shafts 10, supported in bars 11, extending across the rear of the folder and mounted in standards on the frame A or in any other suitable manner. The exterior rollers *c'* are mounted in arms 13, sleeved on studs 14, carried by the bars 11, and held in adjustable position on the studs by any suitable means, so that by adjustment of the arms on the studs the position of the rollers *c'* of each pair relatively to the coacting rollers *c* may be varied independently of the other pairs to secure the proper pressure on the sheets at all points. The rollers *c c'* are preferably rubber-faced or provided with surfaces roughened in any suitable manner to give a better grip upon the paper.

While interior and exterior rollers have been shown, it will be understood that either exterior or interior rollers may be used in combination with a plate or other suitable abutment coacting with the rollers to form a positive feeding device for the sheets, as fully pointed out in Patent No. 492,760, above referred to.

The rollers *c c'* may be driven in any suitable manner, and either one or both of the sets of the rollers may be driven positively; but one set is preferably driven positively and the other by friction with the same, and I have shown the interior set of rollers *c* driven from the feeding-rolls E as follows: One of the rolls D is driven from the fold-laying rolls E through intermediate 17, which engages the gear 18 on the roll-shaft, and from this gear 18, through suitable gearing 19, consisting of gears on the shafts of the rollers *c* and intermediates connecting said gears, all the rollers *c* and the other roll D are driven.

The construction above described is substantially that of Patent No. 492,760 above referred to and is the preferred construction for embodiment of the present invention.

With these marginal feeding-rollers are used tapes *e* at each side of the folder lying inside the rollers, so as to engage the sheets inside the margin. These tapes *e* converge from the internal guides B C and preferably are continuous from the pulleys N, running over the edges of the plate L and the guides B C downward on the sides of the folder around the rolls D to the fold-laying rolls E,

thence returning around guide-pulleys 20 and tightening-pulleys 21. It will be understood, however, that the upper ends of the tapes *e* may be at the internal guides B C, a second set of tapes or other suitable means being used to feed the sheet over the top of the folder to the guides. The usual central set of tapes *f* at the top of the folder are also shown, these tapes running from pulley N over the plate L to the nose of the folder, thence downward from the nose and over the pulley 24, returning around tightening-pulley 22, but in some constructions these may be omitted.

The tapes *e* coact with plates *g*, which act as abutments against which the required pressure of the tapes *e* is secured, and the feeding of any sheet which is not properly fed by the rollers *c c'* thus assured, as above described.

While only one series of tapes running at each side of the folder has been shown, it will be understood that two or more series of such tapes may be used, if desired.

It is not absolutely required that guides should be used on the side of the folder converging from the side guides B C to the rolls D, but such guides are preferably employed, and in combination with the rollers and tapes form a part of the invention. In the construction shown two sets of narrow guides *h* are used, these guides extending from the internal guides B C downward between the external rolls D to and between the fold-laying rolls E, so as to positively guide the sheet and keep it in proper position during its entire passage through the folder. The inner guides *h* terminate just above the fold-laying rolls E, but the outer guides *h'* preferably continue downward between the rolls E, as shown, these rolls being cut away opposite the guides to accommodate them.

While the construction has been described as applied to folding sheets, and a longitudinal folder embodying the invention is especially adapted for this use and the improvements of especial value as thus applied, as they secure the certain and accurate folding and feeding of separate sheets, it will be understood that longitudinal folders embodying the present invention are applicable also to folding webs or to associating two or more sheets or webs led from the opposite sides of the folder and that a slitter and other devices in use with present longitudinal folders are equally applicable to folders embodying the present invention.

The term "positive feeding devices" used in this specification and claims is intended to cover all feeding devices which are arranged to press upon the paper with such force as to give a positive grip upon and feed of the paper, and therefore to be liable to offset or smut if arranged to engage the printed portion of the paper, as distinguished from tapes or equivalent devices advancing the paper by a slight pressure thereon, so as to practically avoid the liability to offset or smut and per-

mit their practical use upon the printed portion of the paper.

What is claimed is—

1. In a longitudinal folder, the combination with converging internal guides, of positive feeding devices on the opposite sides of the folder converging from the internal guides and arranged to engage the margin of printed paper, and feeding-tapes converging from the internal guides and arranged alongside the feeding devices and engaging the paper inside the margin, substantially as described.

2. In a longitudinal folder, the combination with converging internal guides, of feeding-rollers on the opposite sides of the folder converging from the internal guides and arranged to engage the margin of printed paper, and feeding-tapes converging from the internal guides and arranged alongside the feeding-rollers and engaging the paper inside the margin, substantially as described.

3. In a longitudinal folder, the combination with the converging internal guides, of positive feeding devices on the opposite sides of the folder converging from the internal guides and arranged to engage the margin of printed paper, internal and external guides on the opposite sides of the folder converging from the internal guides, and feeding-tapes converging from the internal guides and arranged inside the margin, substantially as described.

4. In a longitudinal folder, the combination with converging internal guides, of feeding-rollers on the opposite sides of the folder converging from the internal guides and arranged to engage the margin of printed paper, internal and external guides on the opposite sides of the folder converging from the internal guides, and feeding-tapes converging from the internal guides and arranged inside the margin, substantially as described.

5. In a longitudinal folder, the combination with converging internal guides, of positive feeding devices on the opposite sides of the folder converging from the internal guides and arranged to engage the margin of printed paper, a fold-laying device, and feeding-tapes converging from the internal guides to the fold-laying device and arranged inside the margin, substantially as described.

6. The combination with converging internal guides B, C, of external guides D, fold-laying rolls E, positive feeding devices on the opposite sides of the folder converging from the internal guides to the external guides D and arranged to engage the margin of printed paper, and feeding-tapes converging from the internal guides to the fold-laying rolls E and arranged inside the margin, substantially as described.

7. The combination with converging internal guides B, C, of external guides D, fold-laying rolls E, positive feeding devices on the opposite sides of the folder converging from the internal guides to the external guides D and arranged to engage the margin of printed

paper, feeding-tapes converging from the internal guides to the fold-laying rolls E and arranged inside the margin, and internal and external guides *h*, *h'* converging from the internal guides to the fold-laying rolls E, substantially as described.

In testimony whereof I have hereunto set

my hand in the presence of two subscribing witnesses.

LUTHER C. CROWELL.

Witnesses:

C. J. SAWYER,

A. L. KENT.