2 Sheets—Sheet 1.

G. LAUDER.
Paper-Folding Machine.

No. 210,544. Patented Dec. 3, 1878.

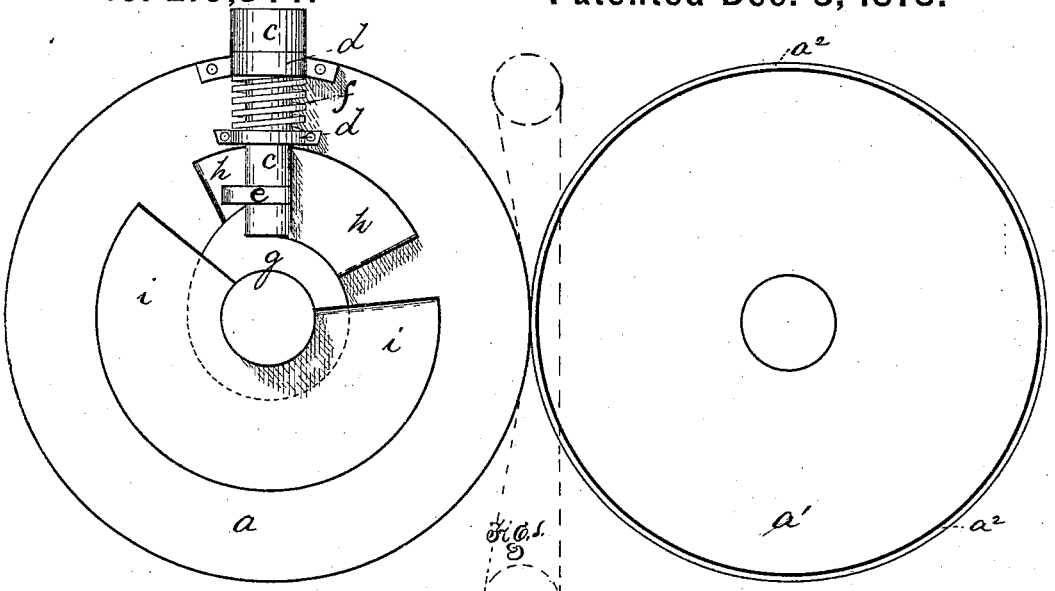

Fig. 1.

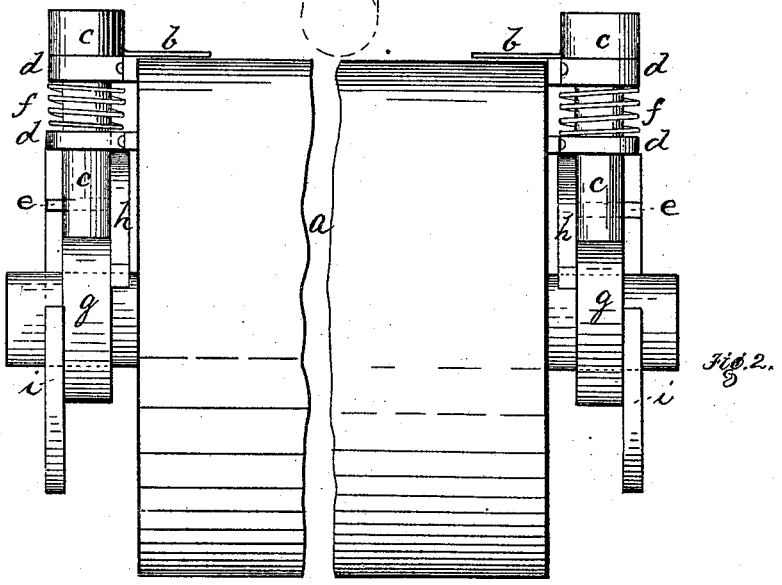

Fig. 2.

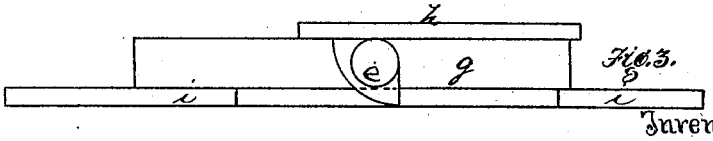

Fig. 3.

Witnesses.
John W. Smith
L. C. Fidler.

Inventor
George Lauder
by Bakewell & Kerr
Atty's

2 Sheets—Sheet 2.

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Paper-Folding Machine.

No. 210,544. **Patented Dec. 3, 1878.**

Fig. 4.

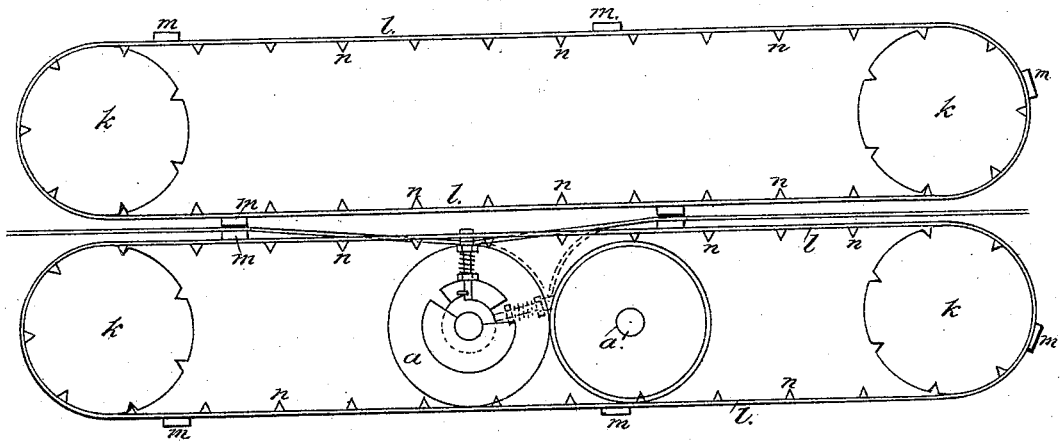
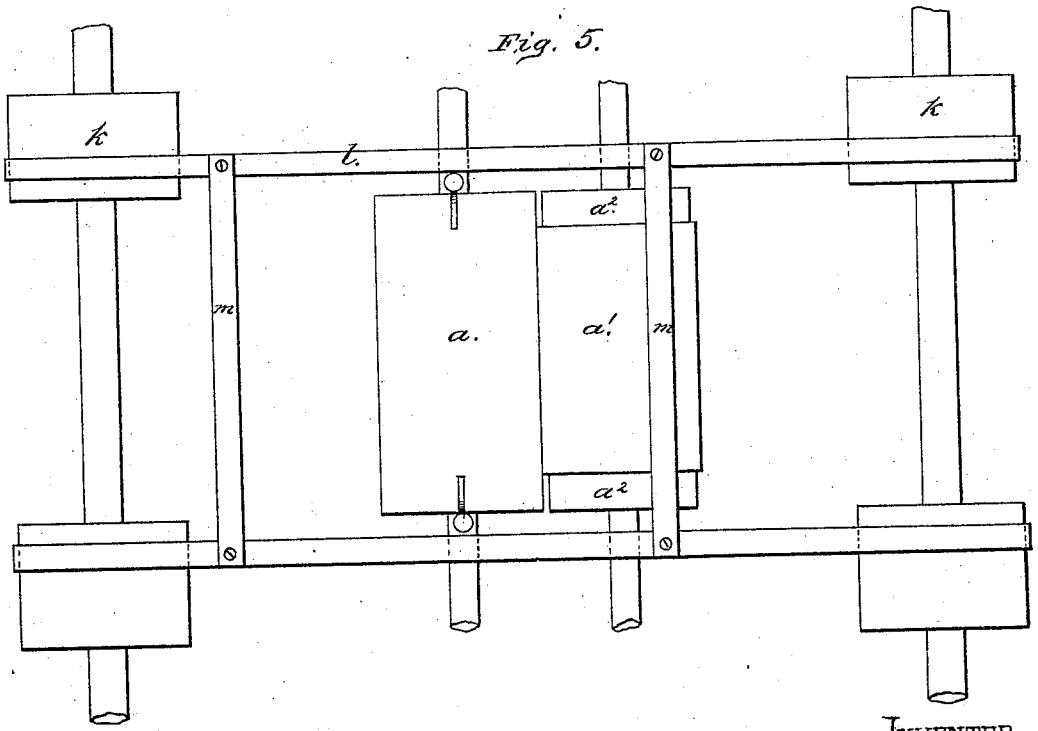


Fig. 5.



WITNESSES:

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L. C. Fitler.

INVENTER:

George Lauder

by Bakewell & Kerr

attys

UNITED STATES PATENT OFFICE.

GEORGE LAUDER, OF PITTSBURG, PENNSYLVANIA.

IMPROVEMENT IN PAPER-FOLDING MACHINES.

Specification forming part of Letters Patent No. **210,544**, dated December 3, 1878; application filed October 14, 1878.

To all whom it may concern:

Be it known that I, GEORGE LAUDER, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Paper-Folding Machinery; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawing, forming part of this specification, in which—

Figure 1 is an end view of folding-rolls, illustrating my invention. Fig. 2 is a side elevation of one of said rolls, parts being broken out. Fig. 3 is an extended view of cams for operating the folding-fingers. Fig. 4 is an end view of the folding-rolls, together with side elevation of devices for controlling the web or sheet. Fig. 5 is a top view of the folding-rolls and one of the belts of the devices for controlling the web or sheet.

Like letters refer to like parts wherever they occur.

My invention relates to the construction and operation of devices for folding paper, and is especially adapted and directed to the folding of sheets from a continuous web—such, for instance, as comes from the rotary press.

In folding paper from a web, as from a rotary press, while accuracy is desirable, rapidity of folding is essential; but the nature of the material operated upon is such that little strain or force is permissible, even with the heavier and more expensive paper; consequently folders as in general constructed are not capable of folding as fast as a web can be printed, because when run at the necessary speed the strain will rupture or distort the paper and prevent a proper registering of the sheet.

The object, therefore, of the present invention is to obtain a construction which will, first, register the sheet with comparative, if not positive, accuracy; secondly, avoid undue strain on the paper while making the fold; and, thirdly, be simple in character and capable of being run at the required rate of speed.

I will now proceed to describe my invention, so that others skilled in the art to which it appertains may apply the same.

In the drawings, a a^1 indicate folding-rolls, one of said rolls being provided with swiveling folding-fingers b. These fingers b are secured to shafts, rods, or bolts c, movable in keepers d on the ends of the roll, whereby they are enabled to turn or swivel. On bolts c are segmental tappets e, by means of which the rods are turned one-quarter rotation, more or less, at intervals, springs f or equivalent devices being employed to keep the bolts c in contact with the actuating-cams.

g, h, and i indicate fixed cams for actuating the bolts, (or fingers,) said cams being preferably mounted on or attached to the frame in which the roll a is journaled. The cams g, which form or may form the bottoms of the grooves, are so shaped as to lift the fingers b at stated intervals by forcing up the bolts c, to which said fingers are attached. The cams h, which are usually set at one side of cams g, should each be equal to one-fourth of a circle less the tappet e, and are arranged to turn the rods or bolts c, so as to bring the fingers b over the roll or parallel to the axis thereof, retaining them in said position until the roll has made one quarter-revolution. The cams i, which are set at the opposite sides of cams g, each approximate three-fourths of a circle less the tappet, and are arranged to turn the rod or bolt c in reverse direction, or so as to bring the fingers b at an angle to the axis of the roll, (or tangential to the circumference), in which position the fingers b are held during about three-fourths of the revolution of the roll, or until the tappets e are again struck by cams h. The roll a^1 is preferably cut away on its circumference, as at a^2, sufficiently to prevent any possibility of said roll interfering with or injuring the folding-fingers b.

k k represent pulleys, placed just outside the rolls a a^1, to permit free rotation of the rolls and the attached devices. Said pulleys are provided with belts or bands l, carrying cross-bars m, placed equidistant the length of the sheet to be folded, and each belt has gear-teeth n, and is otherwise constructed and geared with relation to the pulleys and the other belts, that the cross-bars of the two sets of belts shall register. The function of these belts and cross-bars is to control the sheet and present it properly to the folding devices.

Power may be applied to the devices in any desired manner, the parts being properly

geared, so as to cause the same to move in unison, whereupon their operation will be as follows: The leading end of the sheet or web, having been caught by the bars *m*, (or springs on the belts, the equivalents thereof,) will be carried by the belts *l* over the folding-rolls until the center of the sheet is opposite the axis of roll *a*, or the roll carrying the folding-fingers *b*. At the same instant the rotation of roll *a* will have brought the bolt *c* into the position shown in the drawings, the bolt having been lifted by cam *g*, so as to elevate the fingers *b*, and rotated one-quarter turn by cam *h*, so as to stand parallel to the axis of the roll and over the paper carried by belts *l*. The continued rotation of the roll *a* carries the bolt off the highest point of cam *g*, when the bolt is drawn down by the spring *f*, causing the fingers *b* to clamp the paper to the roll along the line of fold, and the leading end of the sheet is then drawn from the gripe of cross-bars *m* and its tail separated from the web, the doubled sheet being carried forward between rolls *a* a^1, as shown by dotted line, Fig. 4. About the time the roll *a* has made one-quarter rotation, or is in the position indicated by dotted line, Fig. 4, the cams *i* strike tappets *e*, giving rods or bolts *c* one-quarter reverse rotation, and withdrawing the folding-fingers to free the sheet. By this last action the fingers *b* are brought at an angle to the axis of the roll, (or tangential to its circumference,) in which position they are maintained by cams *i* until again operated by cams *h*, when the operation before specified is repeated.

The first and most important fold having thus been made, any of the well-known devices, or a duplication of those shown, may be employed to give any number of subsequent folds desired.

In case it is desired to fold single sheets with the devices described, it will usually be necessary to duplicate the cross-bars *m* on both belts—that is to say, put two bars, *m m*, side by side or close together, one to control the leading end of the sheet and the other the tail.

In some instances it may be desirable to dispense with the roll a^1, in which case tapes or an apron, as indicated in dotted line, Fig. 1, may be employed.

The advantages of my invention are accuracy and rapidity of folding, without putting undue strain on the paper, and the cheapness and simplicity of the mechanism.

Having thus described the nature and advantages of my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination, with a folding-roll, of swiveled spring-fingers moving therewith, and mechanism, substantially as specified, for operating the same, whereby the fingers are caused to rise and fall to clamp a sheet along the line of fold, and are partially rotated to engage and disengage the paper, substantially as specified.

2. The combination, in a paper-folder, of a folding-roll, clamping-fingers moving with the roll, and fixed cam mechanism adapted to lift, drop, and partially rotate the fingers, substantially as and for the purpose specified.

3. The combination, in a paper-folder, of the belts provided with cross-bars or springs for controlling the sheet, a folding-roll provided with automatically-acting swiveling fingers for clamping the sheet to the roll, and mechanism coacting with the folding-roll to double the sheet, substantially as and for the purpose specified.

In testimony whereof I, the said GEORGE LAUDER, have hereunto set my hand.

GEORGE LAUDER.

Witnesses:
A. C. JOHNSTON,
JOHN K. SMITH.