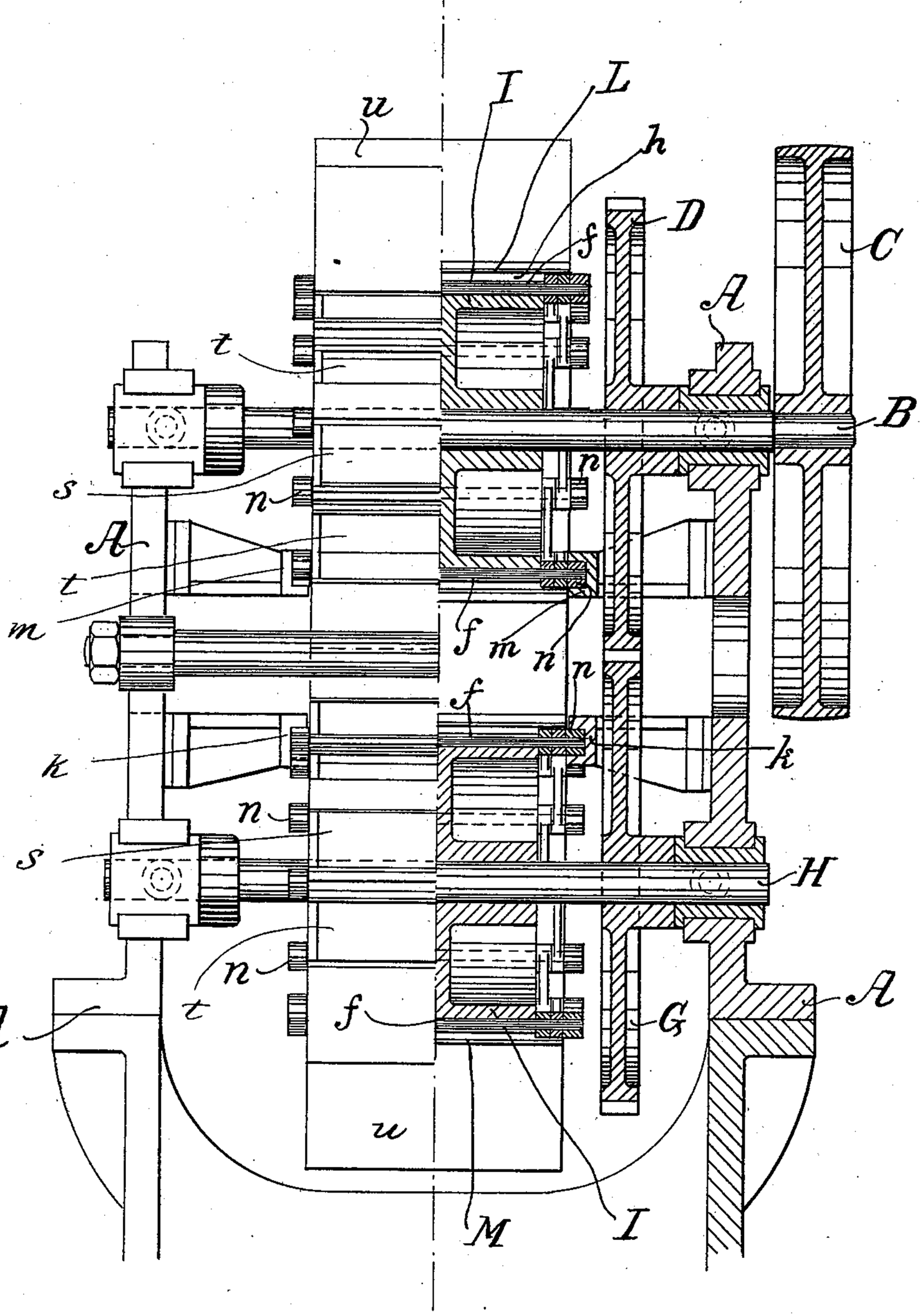
(No Model.) 4 Sheets—Sheet 1.

# F. MEISEL.

## MACHINE FOR FOLDING PAPER.

No. 568,307. Patented Sept. 22, 1896.

*Fig. 1.*




WITNESSES:

S. v. Mertschinsky.

P. L. Marden.

INVENTOR

Francis Meisel

BY F. O. Tieschenmacher

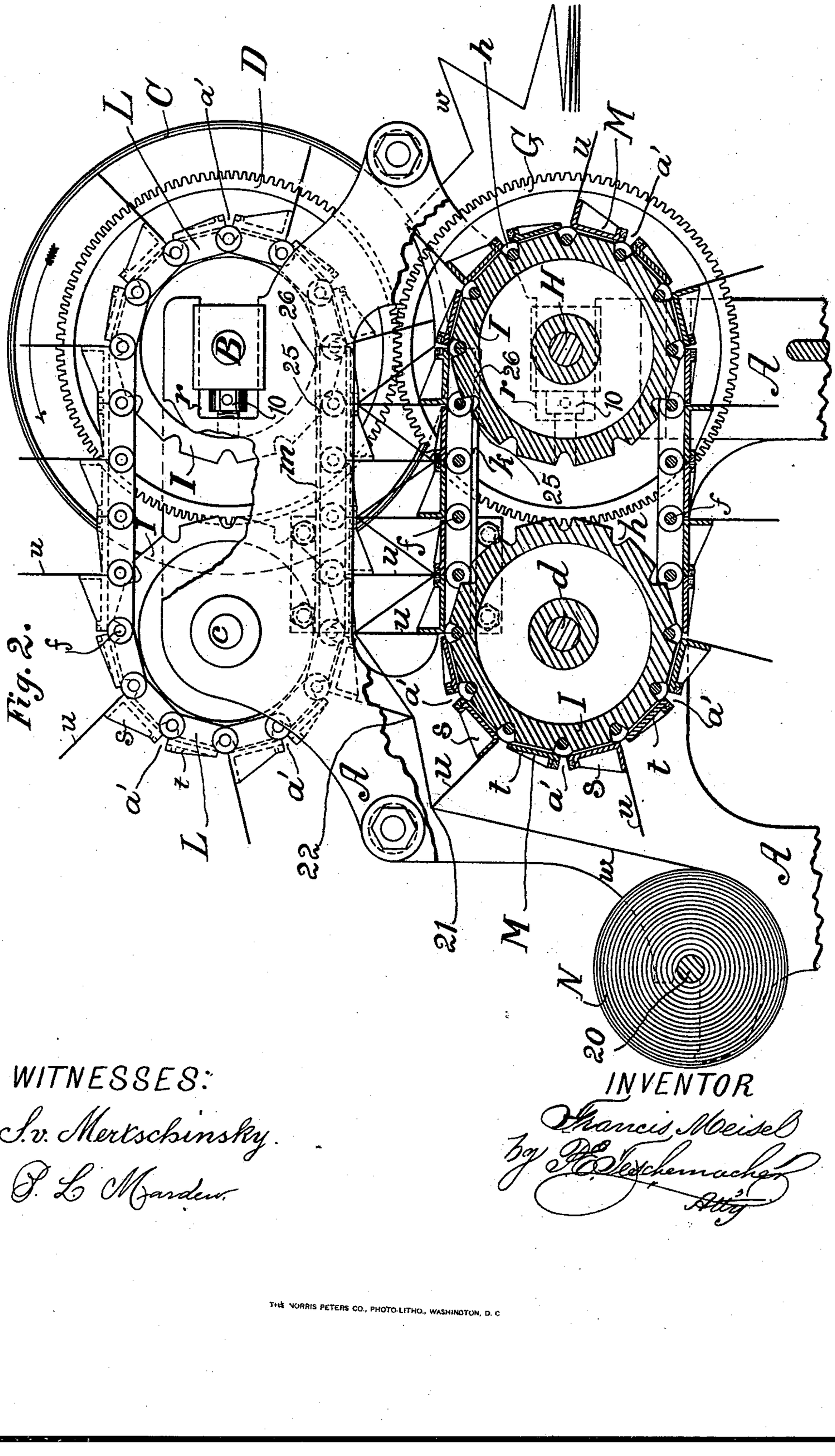
ATTORNEY.

(No Model.) 4 Sheets—Sheet 2.

# F. MEISEL.

## MACHINE FOR FOLDING PAPER.

No. 568,307. Patented Sept. 22, 1896.




WITNESSES:

S. v. Mertschinsky.

P. L. Marden.

INVENTOR

Francis Meisel

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Atty

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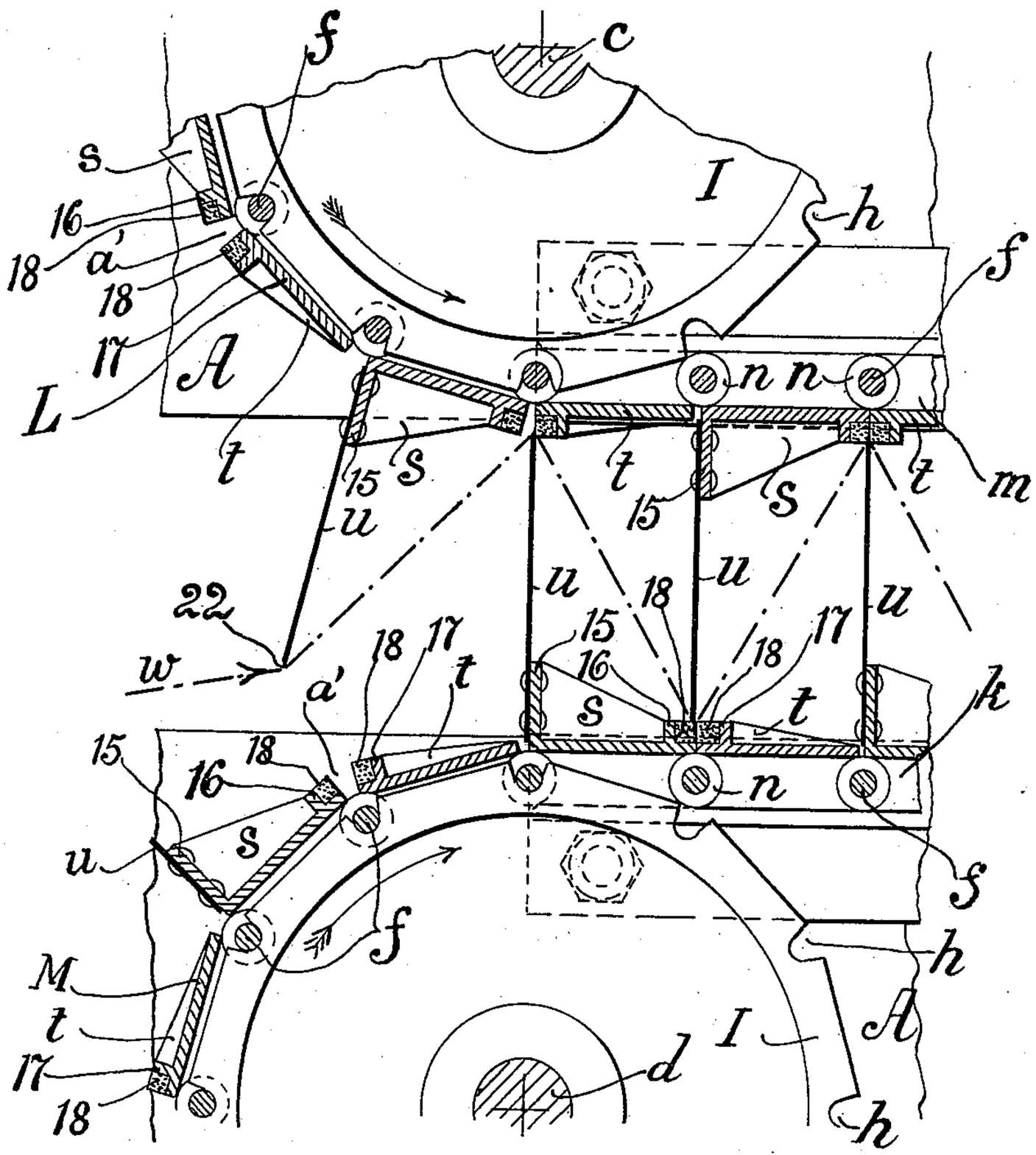
# F. MEISEL.

## MACHINE FOR FOLDING PAPER.

No. 568,307. Patented Sept. 22, 1896.

*Fig. 3.*




WITNESSES:

S. v. Mertschinsky.

P. L. Marden.

INVENTOR

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ATTORNEY.

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# F. MEISEL.

## MACHINE FOR FOLDING PAPER.

No. 568,307. Patented Sept. 22, 1896.

Fig. 4.

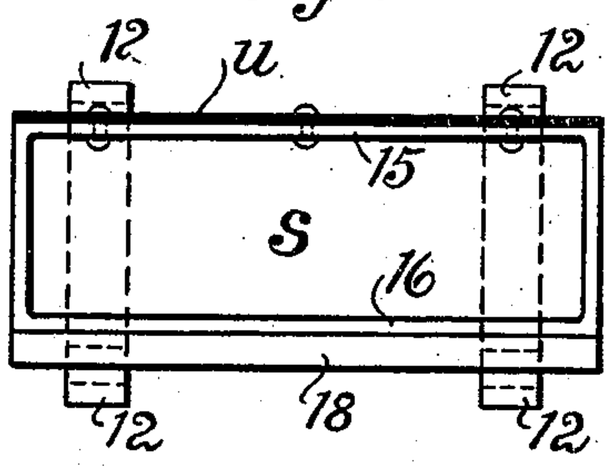



Fig. 6.

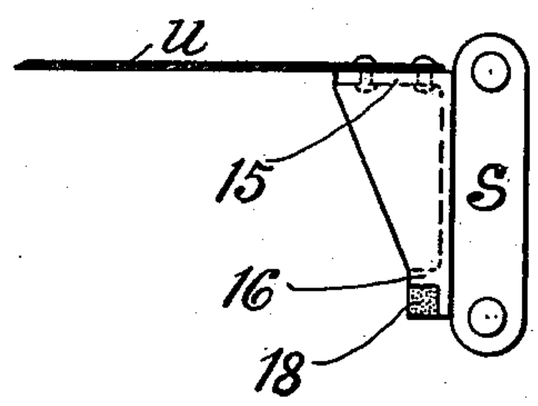



Fig. 5.

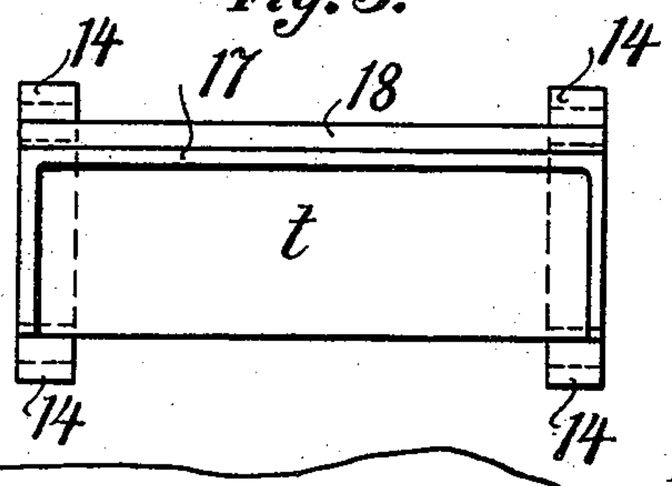



Fig. 7.

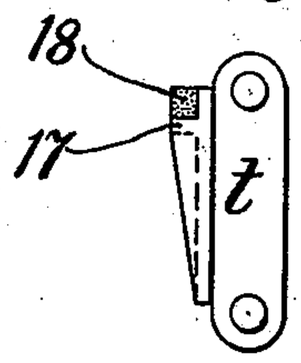
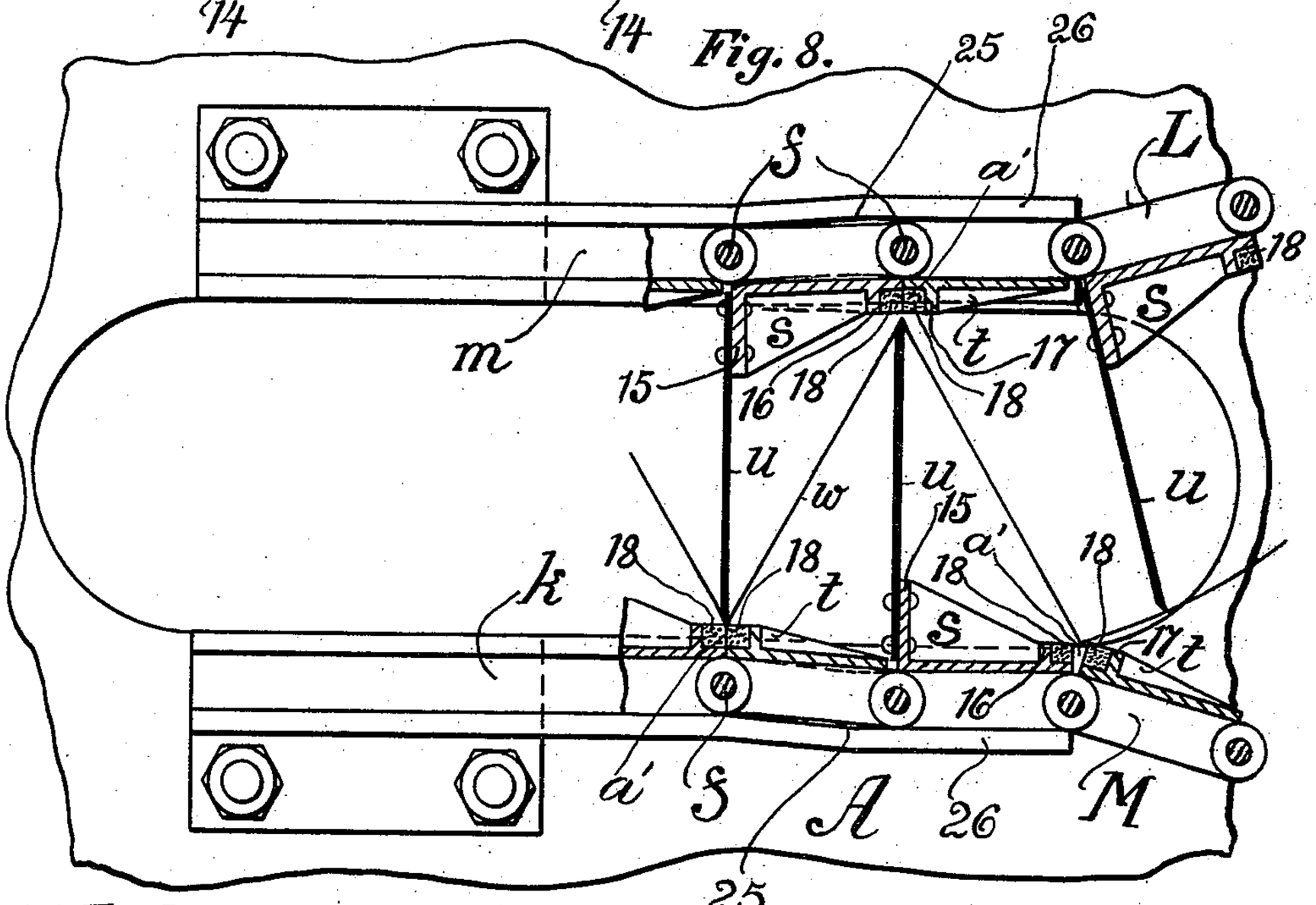



Fig. 8.




WITNESSES:

S. v. Mertschinsky.

P. L. Marden.

INVENTOR

Francis Meisel

by D. E. Teschemacher Atty

# UNITED STATES PATENT OFFICE.

FRANCIS MEISEL, OF BOSTON, MASSACHUSETTS.

## MACHINE FOR FOLDING PAPER.

SPECIFICATION forming part of Letters Patent No. 568,307, dated September 22, 1896.

Application filed August 31, 1895. Serial No. 561,128. (No model.)

*To all whom it may concern:*

Be it known that I, FRANCIS MEISEL, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain Improvements in Rotary Machines for Folding Paper, Cloth, and other Materials, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a sectional end elevation of a rotary paper-folding machine constructed in accordance with my invention. Fig. 2 is a sectional side elevation of the same. Fig. 3 is an enlarged detail showing one of the upper pair and one of the lower pair of the sprocket or chain-carrying wheels. Figs. 4 and 5 are views of two adjoining links of one of the chains to which the folding-blades are secured. Fig. 6 is an end elevation of the link shown in Fig. 4. Fig. 7 is an end elevation of the link shown in Fig. 5. Fig. 8 is an enlarged detail showing the upper and lower chain-guideways on one side of the machine and a portion of the chains and folding-blades which operate in connection therewith.

The object of this invention is to provide a rotary machine which will fold a web or sheet of paper or other material in reverse or zigzag form in a rapid and uniform manner, so that the folds will all be of equal length and so that the folded edges will be tightly compressed in order to cause the folds to lie closely or compactly together; and to this end my invention consists in a machine having two series of coöperating folding-blades traveling at the same speed and attached to endless carrier-chains supported by sprocket wheels or cylinders, the blades of the two series operating alternately in such manner that those of the upper chain will force the material downward into jaws formed between the links of the lower chain, and those of the lower chain will force the material upward into jaws formed between the links of the upper chain, said jaws closing firmly upon the material, which is thus carried through the machine and simultaneously folded in reverse or zigzag folds, as hereinafter fully set forth.

My invention also consists in certain novel combinations of parts and details of construction, as hereinafter set forth and specifically claimed.

In the said drawings, A represents the framework of the machine, in suitable bearings in which runs the driving-shaft B, carrying at one end the driving-pulley C, to which the power is applied by a belt. (Not shown.) To the shaft B is secured a large gear D, which meshes with and drives a similar gear G, secured to a shaft H, placed beneath the shaft B, and likewise having its bearings in the framework A, the two shafts being rotated at the same speed.

*c d* are two parallel shafts also having their bearings in the framework and placed the former opposite to and on the same level as the shaft B and the latter opposite to and on the same level as the shaft H.

The shafts B H *c d* each carry a wide sprocket wheel or cylinder I, the sprocket-wheels of the shafts B *c* supporting an endless chain L and the sprocket-wheels of the shafts H *d* supporting an endless chain M, the rods *f*, which connect the links of the said chains, engaging the longitudinal grooves *h* of the cylinders I, as shown in Figs. 1, 2, and 3, whereby the two chains are caused to travel with a positive motion and with a uniform speed. The upper portion of the chain M and the lower portion of the chain L, which travel in the same direction, are supported by horizontal parallel guideways *k m* on opposite sides of the machine, secured to suitable brackets projecting from the framework A, and in these guideways run antifriction-rolls *n*, mounted on the ends of the rods *f*, by which the links of the chains are pivoted together. These guideways hold the portions of the chains which they support firmly in position parallel with each other and prevent them from sagging in case they should become slack from wear or other cause.

The journal-boxes of the shafts B H are fitted to slide in horizontal guideways *r* in the framework, as shown in Fig. 2, and are made adjustable therein by screws 10, so that the carrying-cylinders can be adjusted to take up any slack of the chains which may be produced by wear or other cause, and thus keep them tightly stretched, as desired.

The chains L M are each composed of a

series of pairs of links *s t*, the links *s* being each provided on each of its longer sides with two lugs or projections 12, each located at a short distance from the end of the link, as shown in Fig. 4, while each link *t* is provided on each of its longer sides at the extreme ends with two lugs or projections 14, as shown in Fig. 5, between which fit the lugs or projections 12 of the links *s*, and through all four of these lugs passes the rod *f*, by which the said two links are hinged or pivoted together, said rod *f* projecting at its opposite ends beyond the links, as shown in Fig. 1, to receive the antifriction-rolls *n*, previously referred to, and that portion of the rod between the two lugs 12 engaging the grooves *h* of the sprocket-cylinders over which the chain runs, as shown in Figs. 1 and 2. Each alternate link of each chain is provided on one of its longer sides with a rectangular flange 15, to which is secured by rivets or in any other suitable manner a folding-blade *u*, preferably composed of sheet-steel, the outer edge of which is made thin, like a dull knife-edge, to insure a sharp and well-defined crease in the material being folded. The links which carry the folding-blades are also each provided a little inside of the opposite parallel edge with a narrow rib or flange 16, Figs. 4 and 6, and the opposite abutting edge of the adjoining link is provided with a similar rib or flange 17, Figs. 5 and 7, and against the shoulders formed by these flanges are placed and secured by suitable means rectangular facing-strips 18, preferably composed of rubber or other suitable elastic substance, forming jaws *a'*, which when separated are adapted to receive the edge of a folding-blade of the opposite chain, as shown in Figs. 2 and 3, the said edge entering the jaws on the left-hand side of the machine as the chains are brought into parallelism and leaving the same as they open when the chains approach the delivery end of the machine and before they commence to pass around the cylinders I.

The web *w*, of paper or other material to be folded, is drawn from a roll N, which is mounted on a shaft 20, the journals of which rest in suitable bearings in the framework.

The guideways *k m* are each provided near the rear or delivery end of the machine with an incline 25, Fig. 8, the inclines of the two upper guideways *m* extending upward and the inclines of the two lower guideways *k* extending downward, and the short portions 26 of the ways beyond the inclines again extending in a horizontal direction, but on different levels, as shown. As the rolls *n* enter these inclines 25 the jaws *a'* of each chain are successively opened to release the folding-blades confined therein, which are at the same time withdrawn from the jaws by the action of the inclines 25 of the opposite pair of guideways, each folding-blade being released from its jaws a short time before it is moved from its horizontal position as it begins to start on its curved course around its sprocket-cylinder, whereby the bending of the folding-edges of the blades is avoided, as would be liable to occur if the blades were not released until after they started on their curved courses around the sprocket-cylinders.

In the operation of folding, the web is first drawn by hand over the edge of one of the folding-blades at the left-hand side of the machine. The chains are then rotated in the proper direction until the edge of said blade, with the material drawn thereover, is caught and held by the pair of jaws *a'* opposite thereto. The web is then engaged and taken up by one of the folding-blades of the lower chain M on the left-hand side of the machine, as shown at 21, Fig. 2. The edge of the next folding-blade of the upper chain L is then brought down into contact with the web, as shown at 22, and carries the fold between a pair of jaws *a'* of the lower chain M, which are at that moment brought into position to receive it, the said jaws, as the chain at that point assumes a horizontal position and enters the lower guideways *k*, closing upon the edge of the folding-blade and tightly compressing the folded material upon the same. The edge of the folding-blade of the lower chain M which was first brought into contact with the web now carries it between a pair of jaws *a'* of the upper chain L, the jaws, as the chain at that point assumes a horizontal position and enters the upper guideways *m*, closing upon the edge of the folding-blade and tightly compressing the folded material in the same manner as previously described. The next fold in the web is made by the following blade of the upper chain L, which enters the next pair of jaws *a'* of the lower chain M, and so on continuously, the upper and lower folding-blades being alternately brought into contact with the web of paper and carrying the folded edges of the same into the jaws *a'* of the two chains, whereby the material is unwound from the roll N, stretched tightly over the edges of the blades to make the creases, and rapidly and uniformly folded in zigzag or reverse folds, which are tightly compressed at the edges by the jaws *a'*, so that they will lie compactly together, as required, when discharged from the machine.

The jaws *a'* of both the upper and lower chains remain closed and continue to compress the folds while said chains are passing horizontally along the guideways *k m*, but as soon as the jaws are brought up to the inclines 25 of the guideways, as shown in Fig. 8, they are successively opened to release the folding-blades, as previously described, and as soon as the jaws pass beyond the guideways at the right-hand end of the machine, as shown in Fig. 2, and start on their curved courses around their respective sprocket-cylinders the folded material will be discharged from the machine and deposited upon a suitable support or permitted to fall into a box or receptacle placed to receive it.

The folding-blades are made sufficiently stiff and rigid to insure their edges remaining perfectly straight, so that they will accurately enter and fit between the jaws of the chains as the latter are brought around into position to receive them.

The above-described machine can be constructed to fold the material in folds of any desired length or width, and will perform its work with great accuracy and rapidity, thus adapting it for folding paper and other material for a great variety of different purposes.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. A rotary folding-machine comprising a pair of endless traveling chains arranged in parallelism, each chain being mounted upon a pair of sprocket wheels or cylinders and being provided with a series of folding-blades adapted to be brought into contact with the material to be folded, the blades of the two chains coöperating and acting alternately on the material to produce reverse or zigzag folds, and said chains being provided with jaws adapted to compress the folded edges of the material as it is carried through the machine, substantially as set forth.

2. In a rotary folding-machine, a pair of endless traveling chains arranged in parallelism upon sprocket wheels or cylinders and provided with folding-blades adapted to act upon and fold the material in reverse or zigzag folds; said chains having jaws between their links adapted to compress the folded edges of the material as it is carried through the machine, substantially as set forth.

3. In a rotary folding-machine, the combination of a pair of endless traveling chains arranged in parallelism, each chain being mounted upon a pair of sprocket wheels or cylinders and being provided with jaws between the alternate abutting edges of its links, a series of folding-blades secured to the alternate links of said chains and adapted to act alternately upon the material to be folded, the folding edges of the blades of one chain entering the jaws of the opposite chain as the latter are brought around into position to receive them, substantially as set forth.

4. In a rotary folding-machine, the combination of a pair of endless traveling chains arranged in parallelism, each chain being mounted upon a pair of sprocket wheels or cylinders and being provided with jaws between the alternate abutting edges of its links and on its opposite sides with antifriction-rolls, a series of folding-blades secured to the alternate links of said chains and adapted to act alternately upon the material to be folded, the folding edges of the blades of one chain entering the jaws of the opposite chain as the latter are brought around into position to receive them, and parallel guideways for the reception of the antifriction-rolls of the said chains, all operating substantially in the manner and for the purpose set forth.

5. In a rotary folding-machine, a pair of endless parallel traveling chains mounted upon a pair of sprocket wheels or cylinders, the alternate links of each chain being provided at one edge with a folding-blade projecting therefrom at a right angle, and the opposite edge of said link in connection with the abutting edge of the adjoining link forming a pair of jaws for the reception of the folding edge of a folding-blade of the opposite chain, whereby the folded edge of the material is compressed as it is carried through the machine by the said chains and folding-blades, substantially as described.

6. In a rotary folding-machine, the combination of a pair of endless parallel traveling chains mounted upon and supported by sprocket wheels or cylinders, each chain carrying a series of folding-blades secured to its alternate links and projecting therefrom at right angles, antifriction-rolls mounted upon the opposite edges of said chains, parallel guideways arranged to receive said antifriction-rolls and support the chains in their proper positions at the points where the paper is being carried through the machine, and jaws formed between the alternate abutting edges of said links, said jaws being provided with elastic or yielding gripping-surfaces for compressing the folds of the paper or other material, substantially as described.

7. In a rotary folding-machine, the combination of a pair of endless traveling chains arranged in parallelism, each chain being mounted upon a pair of sprocket wheels or cylinders and being provided with jaws between the alternate abutting edges of its links and on its opposite sides with antifriction-rolls, a series of folding-blades secured to the alternate links of said chains and adapted to act alternately upon the material to be folded, the folding edges of one chain entering the jaws of the opposite chain as the latter are brought around into position to receive them, and parallel guideways *k*, *m*, for the reception of the antifriction-rolls of the said chains, said guideways being each provided with an incline near the rear or delivery end of the machine, whereby the jaws of the chains are successively opened to release the folding-blades before the latter change the direction of their motion from a straight to a curved course as they commence to be carried around the sprocket-cylinders, substantially as described.

8. In a rotary folding-machine, the combination of the two pairs of sprocket wheels or cylinders mounted upon shafts B, H, *c*, *d*, the shafts B, H, being connected by gears D, G, and rotated at the same speed, the endless parallel traveling chains L, M, mounted upon said sprocket wheels or cylinders and provided at their opposite edges with antifriction-rolls *n*, mounted upon the opposite ends of the pivot-rods *f*, parallel guideways *k*, *m*, for the reception of the antifriction-rolls *n*,

jaws $a'$, formed between abutting links of the chains, folding-blades $u$, secured to the alternate links of each chain and adapted to fold the material in zigzag or reverse folds and carry the folded edges between said jaws $a'$, of the chains, the several parts being constructed to operate substantially as described.

Witness my hand this 26th day of August, A. D. 1895.

FRANCIS MEISEL.

In presence of—
P. E. TESCHEMACHER,
A. R. ELLINGWOOD.