(No Model.) 2 Sheets—Sheet 1.

F. C. HELLMUTH.

PAPER FOLDING MACHINE.

No. 300,606. Patented June 17, 1884.

fig: 1.

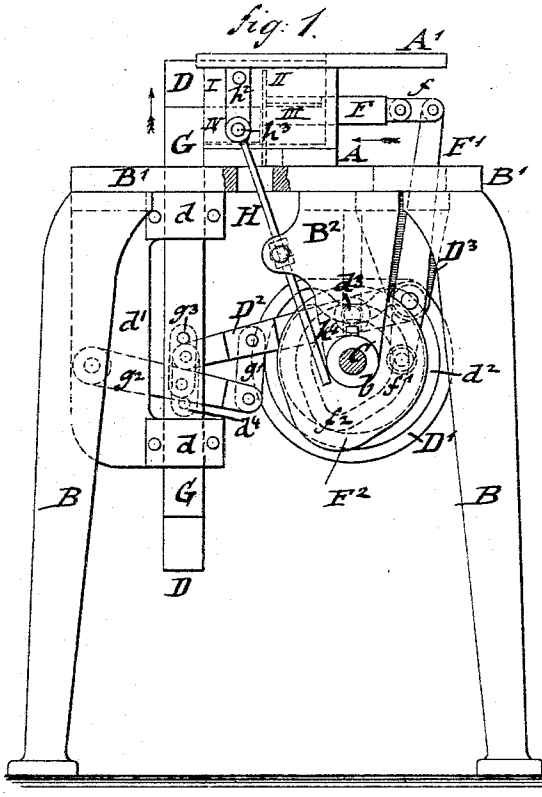


fig: 2.

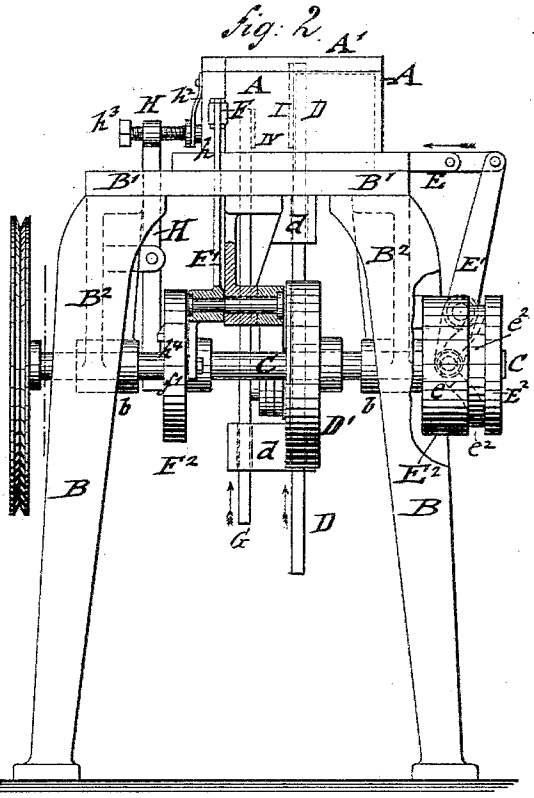
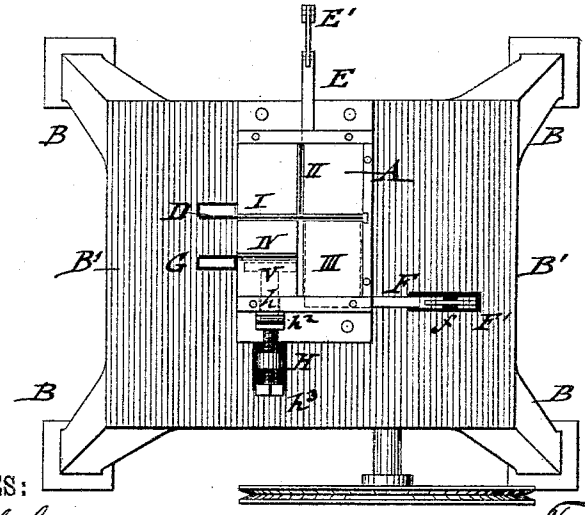


fig: 3.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 4.

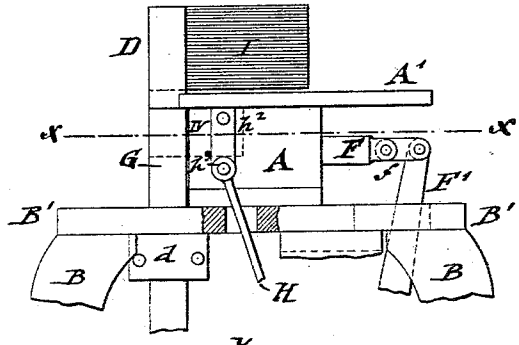


Fig. 5.

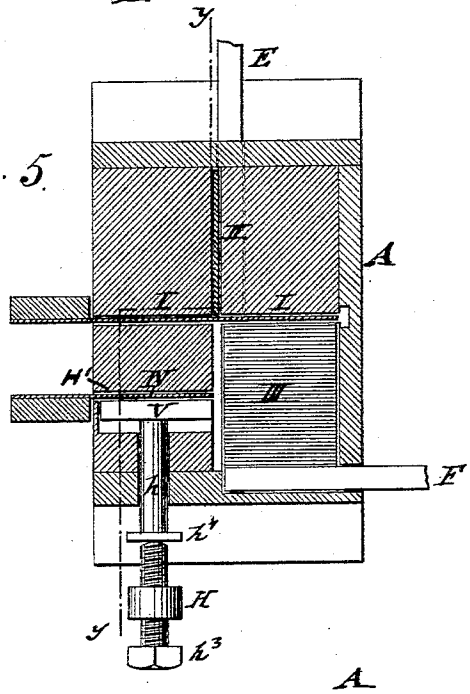


Fig. 6.

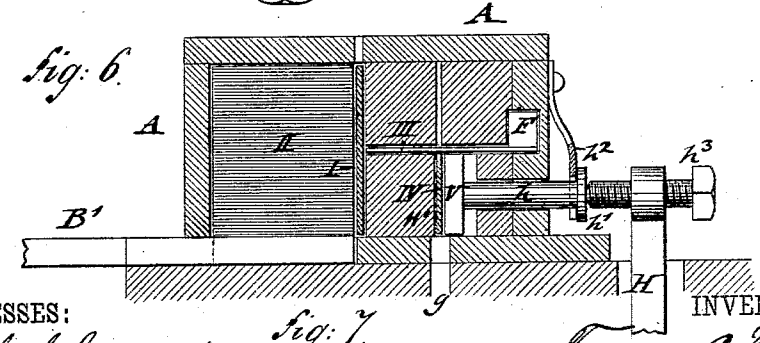
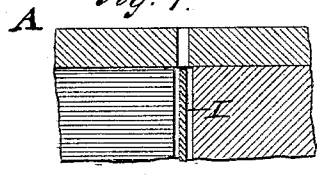


Fig. 7.



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UNITED STATES PATENT OFFICE.

FREDERICK C. HELLMUTH, OF BROOKLYN, NEW YORK.

PAPER-FOLDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 300,606, dated June 17, 1884.

Application filed October 27, 1883. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK C. HELLMUTH, of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Paper-Folding Machines, of which the following is a specification.

This invention relates to a compact and effective machine for folding papers, by which circulars, &c., may be successively folded a definite number of times, and finally tightly pressed together, and then delivered from the machine, the different folding operations and the final pressing of each sheet being accomplished by one rotation of the driving-shaft, so that large numbers of sheets can be folded, according to the speed of the machine.

The invention consists of a solid block supported on a suitable frame, and provided at its upper part with a table to feed the paper. This block is slitted transversely through its entire width for a vertically-reciprocating folder, and also in longitudinal direction through the entire length of the block for a second vertical laterally-reciprocating folder. A third horizontal slit midway of the height of the block guides a third horizontally-reciprocating folder that takes up the paper from the second folder and imparts a third fold thereto. A fourth vertically-reciprocating folder of smaller size is arranged parallel to the first folder in a vertical slit of the machine, and takes up the paper and imparts the final folding operation thereto, whereupon a laterally-reciprocating plunger presses the paper thus folded against a fixed wall or cheek, so as to press home the creases, after which the circulars are dropped through a bottom opening of the block to the outside and conducted off. The different folding-blades and the plunger for pressing the folded sheets receive motion from suitable cams on the rotating driving-shaft in such a manner that for each revolution of the shaft one circular is folded entirely.

The actuating mechanisms by which the different mechanisms are operated will be fully described hereinafter, and the points of novelty finally pointed out in the claims.

In the accompanying drawings, Figure 1 represents a side elevation of my improved paper-folding machine. Fig. 2 is a side elevation at right angles to that shown in Fig. 1, partly in section. Fig. 3 is a plan with top plate removed from the guide-box. Fig. 4 is a detail side view of the guide-box. Fig. 5 is a horizontal section of the same on line *x x*, Fig. 4; Fig. 6, a vertical transverse section on line *y y*, Fig. 5; and Fig. 7 is a detail section of one of the guide-slits of the box.

Similar letters of reference indicate corresponding parts.

Referring to the drawings, A represents a solid guide-block of rectangular shape, which is securely attached to the horizontal top plate, B′, of a supporting-frame, B, of suitable strength. To the under side of the top plate, B′, are applied hangers B^2, which carry at their lower ends sleeve-shaped bearings *b b*, for a horizontal shaft, C, that receives motion by a belt-and-pulley transmission from a suitable power-shaft. The shaft C carries a number of cams, by which motion is imparted to the different actuating mechanisms of the machine.

The guide-block A is made of oblong shape and of solid blocks of iron, so as not to be liable to shrinkage or wear. From one of the longer sides of the top of the block A extends a horizontal shelf, A′, of equal or somewhat greater width than the width of the box. The sheets of paper to be folded are placed on the shelf and fed from the same successively to the top of the guide-block.

The guide-block A is provided at a point centrally to its length with a vertical transverse slit that extends throughout its height, said slit serving for guiding a vertically-reciprocating steel blade or folder, I, which is applied to a vertical bar, D, that is extended through the table and moved in guideways *d*, one immediately below the top plate, B′, and the other at the lower end of a hanger, *d′*, attached to the under side of the top plate, B′, as shown clearly in Fig. 1. The vertically-reciprocating folder I is actuated by a cam, D′, the cam-groove d^2 of which engages an anti-friction roller, d^3, of an oscillating lever, D^2, that is pivoted at its outermost end to a hanger, D^3, of the supporting-frame B, while its opposite end is connected by a pivot-link, d^4, to the vertical folder-bar D. The cam-groove d^2 of the cam D′ is heart-shaped, so that the folder I is held throughout the greater part of the rotation of the cam D′ in a position of rest above the guide-block, as shown in

Fig. 4, but quickly dropped and raised again when the roller d^3 arrives in the depression of the cam-groove. By this motion of the folder I the sheet of paper fed to the top of the guide-block A is drawn down with the folder into the transverse slit of the block, and thereby the first fold imparted thereto.

At both sides of the vertically-reciprocating folder I the guide-block A is provided with a second vertical central slit that extends longitudinally through the entire length of the block and intersects the transverse slit, and which serves to guide a second vertical and laterally-reciprocating folder, II, which is attached to a horizontal guide-rod, E, to which laterally-reciprocating motion is imparted by a fulcrumed lever, E′, that is connected at its upper end by an intermediate link to the guide-rod E, and at its lower end by an anti-friction roller, e', with a cam-groove, e^2, of a cam, E^2, on the driving-shaft C, as shown clearly in Fig. 2. A laterally-curved indentation of the cam-groove e^2 imparts to the folder I I a quick forward motion from its position at one side of the transverse slit and through the entire length of the longitudinal slit, as will appear clearly from Fig. 5.

A third folder, III, equal in size to one-fourth of the horizontal area of the guide-block A, is guided in a horizontal slit of the block A in front of the laterally-reciprocating folder I. The horizontal guide-slit of folder III is located midway between the top and bottom of the block A, the folder III being moved laterally forward through said slit by a horizontal guide-rod, F, which is connected by a pivot-link, f, to a fulcrumed lever, F′, the lower end of which carries an anti-friction roller, f', that is engaged by a cam-groove, f^2, of a cam, F^2, the cam-groove being so shaped that at the proper time a quick reciprocating motion is imparted to the folder III.

A folder, IV, that is equal in size to one-fourth of the folder I, is arranged parallel thereto, and guided in a vertical slit of the block A, located at a point midway between the transverse guide-slit of folder I and one of the lateral end walls of the block, as shown in Fig. 5. The slit of folder IV communicates with an opening, g, in the table of the frame B, as shown in Fig. 6. The folder IV is applied to a vertical guide-rod, G, which is arranged parallel to the guide-rod D of folder I, and reciprocated from the lever-arm D^2 by means of an intermediate link-connection, g' g^2 g^3, which is shown in Fig. 1, and by which link-transmission the proper degree of vertically-reciprocating motion is imparted to folder IV simultaneously with folder I.

Parallel to folder IV is arranged a vertical plunger, V, the shank h of which reciprocates in a recess of the block, arranged at one side of the folder IV. The shank of the plunger extends through a hole in the end wall of the block to the outside, where it is arranged with an enlarged head, h'. A forked band-spring, h^2, that engages the shank h of the plunger V back of the head h', tends to draw the plunger in an outward direction away from the folder IV. The head of a set-screw, h^3, at the upper end of a fulcrumed lever, H, presses upon the head h' of the plunger whenever its lower end is engaged by a lateral projection, h^4, on the cam F^2, whereby a forward motion is imparted to the plunger, so that the same is tightly pressed against the cheek H′, which forms one side of the guide-slit of folder IV, of which slit the plunger V forms the other side, as shown in Figs. 3 and 5. The set-screw h^3 serves for the purpose of adjusting the exact position of the plunger V, and of regulating exactly its relative position to the cheek H′, so that it exerts a greater or less pressure thereon. The end of the set-screw h^3 is preferably rounded off, so as to act upon the head h' of the plunger-shank throughout the oscillating motion of the fulcrumed lever H.

The operation of my improved paper-folding machine is as follows: The paper to be folded is placed on the top plate or shelf, A′, of the guide-block, and fed forward by hand or by a suitable mechanism. Suitable gages (not shown in the drawings) are arranged on the top of the block, whereby the paper is stopped when arriving at its proper position. It is then taken hold of by the folder I and drawn down into the transverse guide-slit of the same, until it arrives with the same at the bottom of the block A. The upper edges of the paper thus folded spread apart, and are retained in the guide-slit by small abutments at the upper edges of the guide-slit, (shown in detail in Fig. 7,) so that the paper cannot follow the quick upward motion of the folder I when the same returns into its normal position above the guide-block A. At the moment when the folder I has resumed its uppermost position, the folder II is moved forward and folds the sheet a second time by drawing it into the longitudinal guide-slit of folder II. The edges are retained by abutments near the center of the longitudinal guide-slit, which are similar to those at the edges of the transverse slit of folder I. The sheet is next taken up by the horizontal folder III, folded by the same in the same manner as by the folders I and II, then folded by the vertical folder IV, which places it in position between the plunger V and cheek H′, so that the plunger by its forward motion presses the sheet which has been folded four times by the folders tightly against the cheek, so as to press the folds home and leave the paper in a smoothly and evenly folded shape. On the withdrawal of the plunger the folded sheet is pushed down by the downward motion of the following folded paper and dropped through the opening g at the bottom of the table, to be conducted off along inclined guides to a suitable receptacle. In this manner one sheet is folded and pressed at each revolution of the driving-shaft, so that a large number of sheets can be quickly and uniformly folded. The machine is therefore specially adapted whenever large quantities

of circulars of different sizes have to be folded, as it dispenses with the large number of hands heretofore employed in such cases.

It is obvious that the machine may be built in different sizes, and that also a greater or smaller number of folders may be used, according to the size of the paper to be folded.

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

1. The combination of a guide-block having central vertical transverse and longitudinal guide-slits, and a horizontal and a vertical guide-slit at one side of the central vertical transverse guide-slit, a vertically-reciprocating folder, a laterally-reciprocating folder, a horizontally-reciprocating folder, a second smaller reciprocating folder, a reciprocating plunger adapted to press the folded sheet together, and mechanism, substantially as described, operated from a driving-shaft, whereby the folders and plunger are successively actuated, so as to fold one sheet at each rotation of the driving-shaft, substantially as set forth.

2. The combination of a guide-block, A, having a vertical guide-slit extending through its entire height and one-half of its width, a vertical folder, IV, a vertically-guided arm, G, a pivoted lever, D^2, having an anti-friction roller, d^3, a rotating cam, D′, having a groove, d^2, and links g' g^2 g^3, whereby the lever D^2 is connected to the vertical arm G, substantially as set forth.

3. The combination of a guide-block, A, having a cheek, H′, a horizontally-movable and spring-actuated plunger, V, having a headed shank, h, a fulcrumed lever, H, having a set-screw, h^3, at its upper end, and a rotating cam, F^2, having a projection, h^4, engaging the lower end of the lever H, substantially as set forth.

4. The combination of a guide-block having vertical and longitudinal guide-slits provided with abutments at one end, vertically and horizontally reciprocating folders, a reciprocating plunger to press the folded sheet together, means, substantially as described, whereby said folders and plunger are actuated, and a supporting-table having a slit below the last vertically-reciprocating folder to admit the dropping of the folded sheet out of the guide-block, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

FREDK. C. HELLMUTH.

Witnesses:
PAUL GOEPEL,
SIDNEY MANN.