H. L. GLAZE.

PAPER FOLDING MACHINE.

APPLICATION FILED JULY 25, 1919.

1,411,779.

Patented Apr. 4, 1922.

3 SHEETS—SHEET 1.

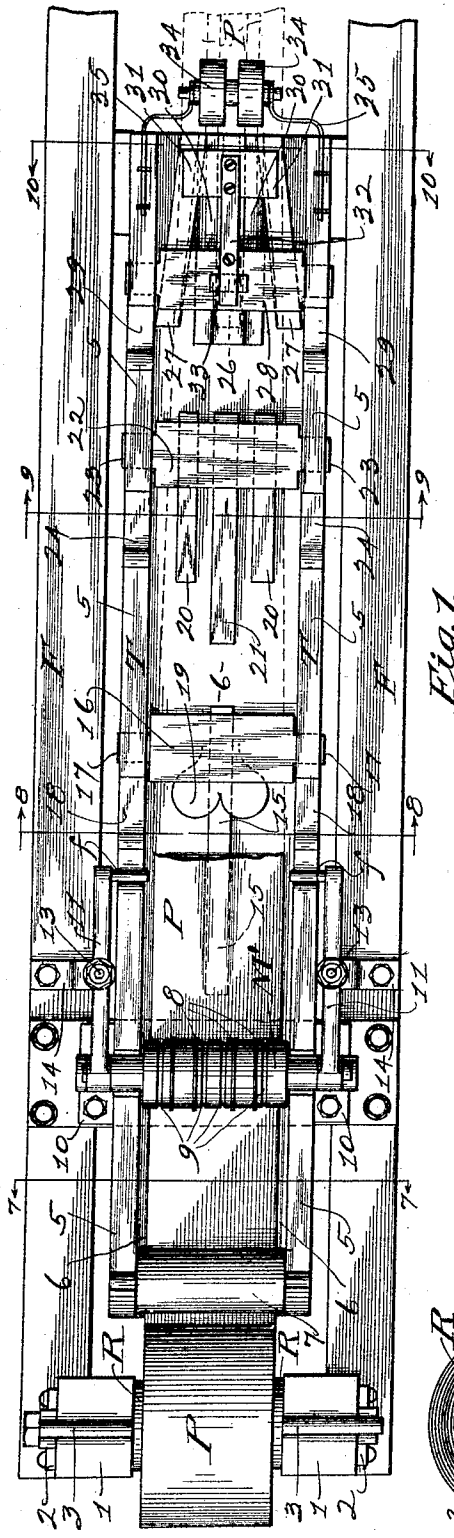


Fig. 1

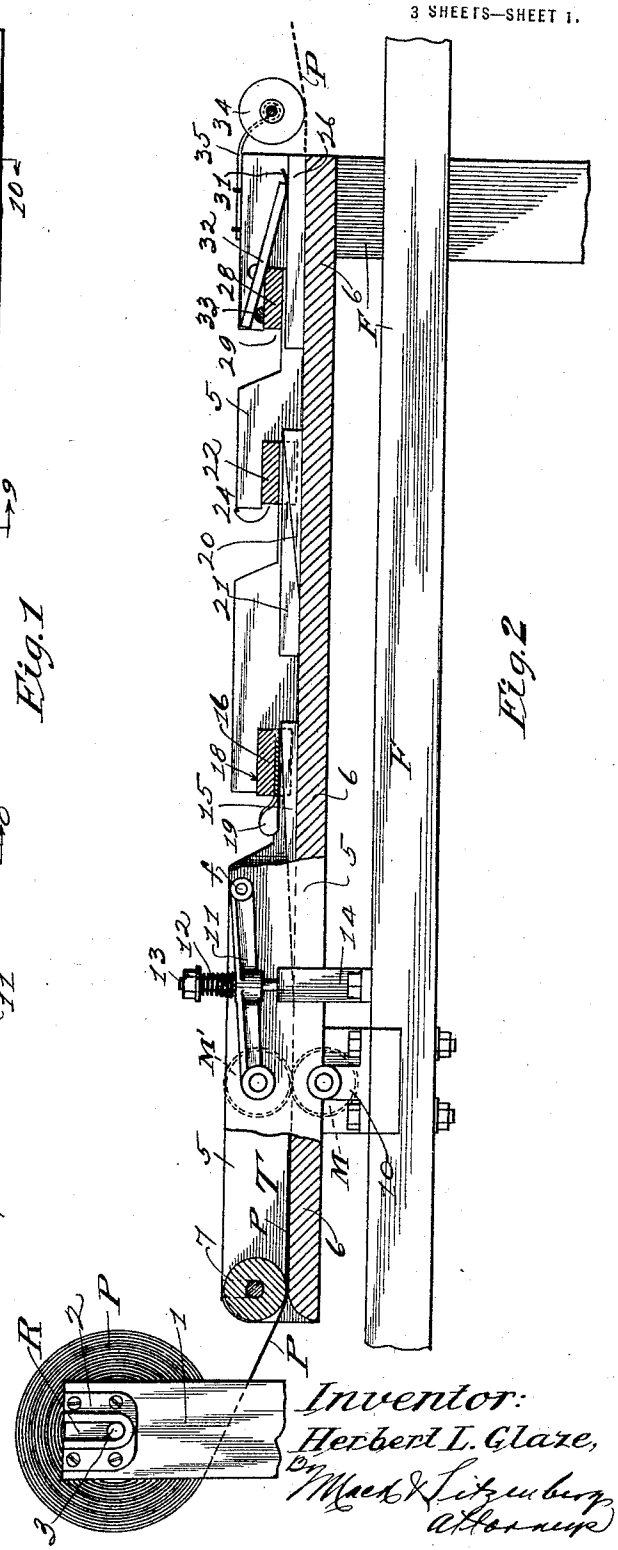


Fig. 2

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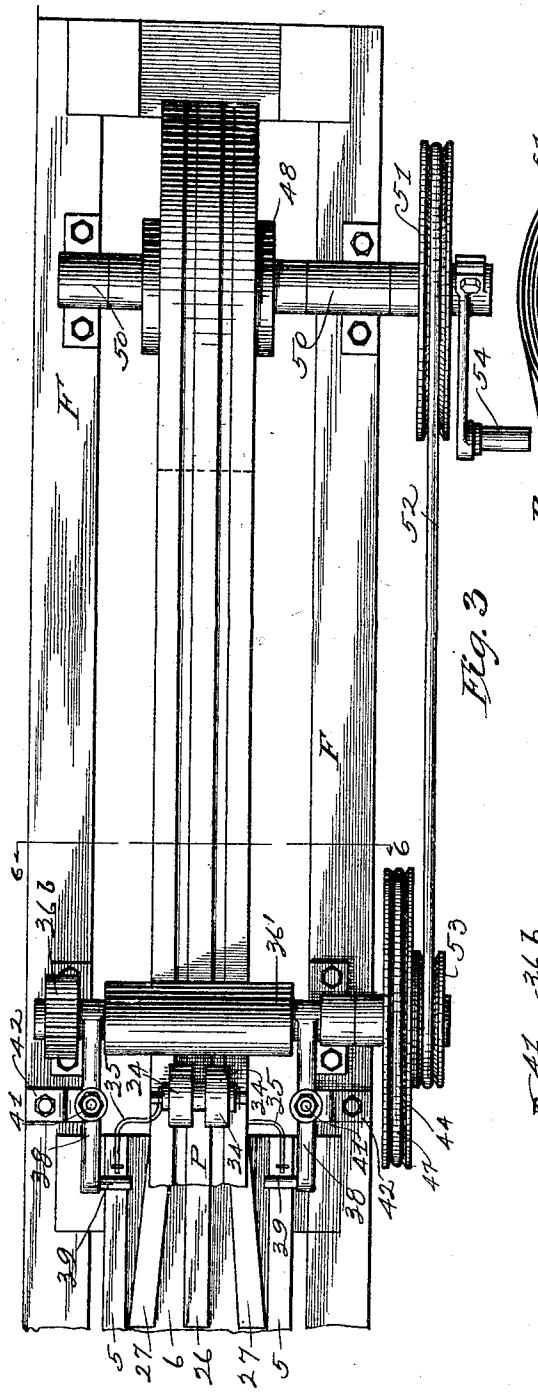


Fig. 3

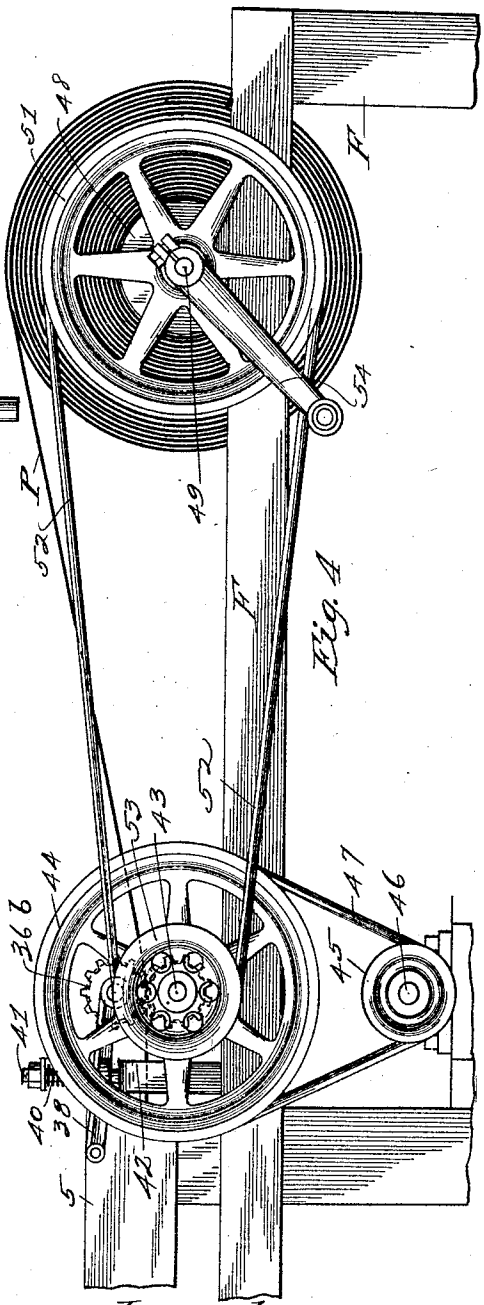


Fig. 4

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3 SHEETS—SHEET 3.

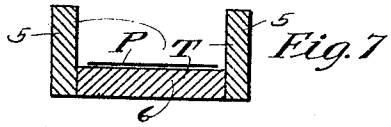


Fig. 7

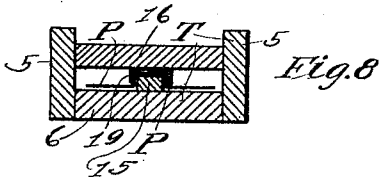


Fig. 8

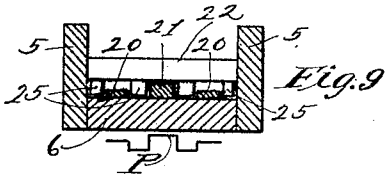


Fig. 9

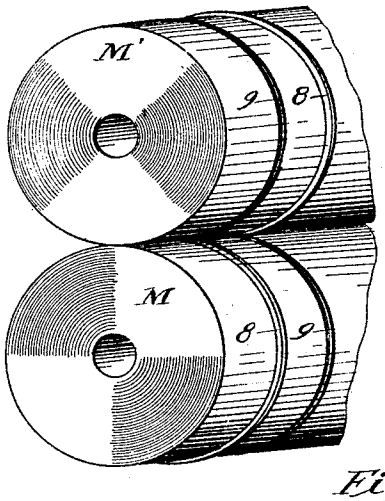


Fig. 12

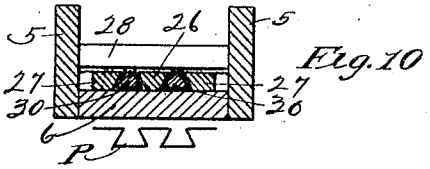


Fig. 10

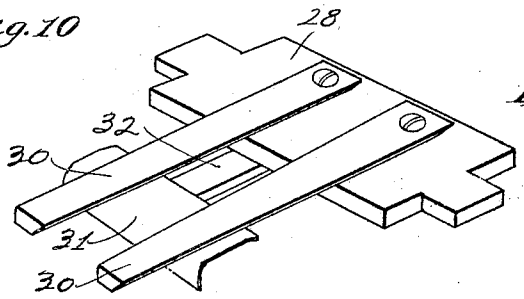


Fig. 13

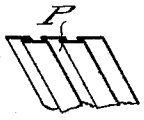
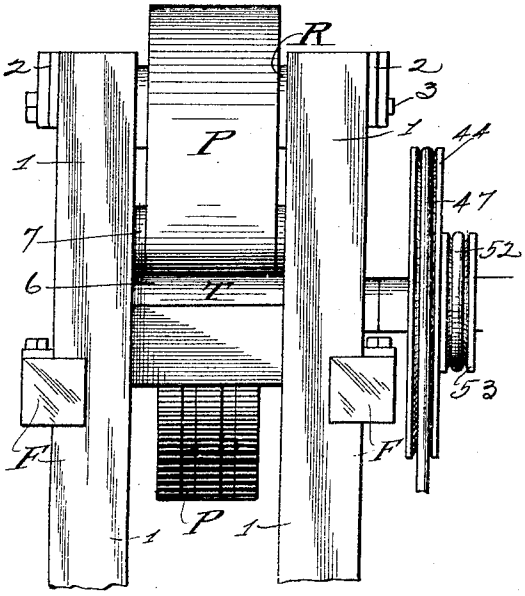
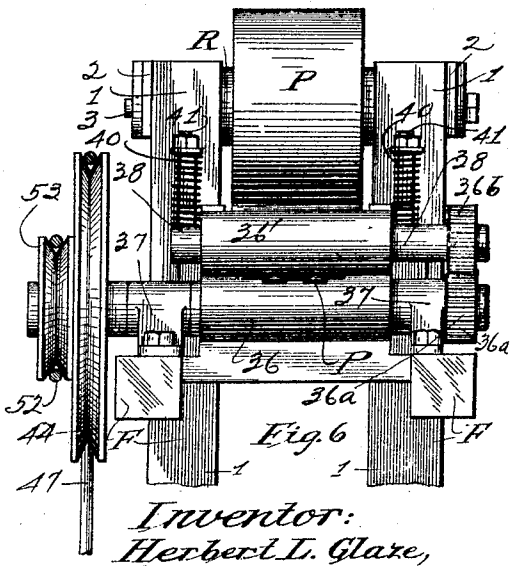


Fig. 11

Fig. 5





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UNITED STATES PATENT OFFICE.

HERBERT L. GLAZE, OF LOS ANGELES, CALIFORNIA, ASSIGNOR TO PLASTOID PRODUCTS, INCORPORATED, OF LOS ANGELES, CALIFORNIA, A CORPORATION OF CALIFORNIA.

PAPER-FOLDING MACHINE.

1,411,779. Specification of Letters Patent. **Patented Apr. 4, 1922.**

Application filed July 25, 1919. Serial No. 314,346.

To all whom it may concern:

Be it known that I, HERBERT L. GLAZE, a citizen of the United States, and a resident of Los Angeles, in the county of Los Angeles and State of California, have invented new and useful Improvements in Paper-Folding Machines, of which the following is a specification.

This invention relates to and has for its main object the provision of a machine by means of which paper may be folded as it is unwound and delivered from a reel or spool to the machine in a continuous operation, and means co-operating therewith for rewinding the paper on a suitable spool or reel after the folding operation.

For the purposes of this invention, the paper is prepared in ribbon like strips of a convenient length and arranged in reels, preliminary to the folding operation, in order that one reel at a time may be placed in position in the machine for use and other reels substituted therefor during the operation of the machine, the paper being wound again after having been properly folded.

Another object is to provide means for supporting the paper to be folded in position for the folding operation, together with a plurality of successive folding elements arranged in the path of movement of the paper for gradually molding or bending the paper into the desired shape and thereafter rewinding the folded paper for use.

A further object is to provide a preliminary marking means whereby the paper to be folded may be marked and indented continuously and in a straight line as the paper is advanced thereby, in order that the succeeding folding elements may engage the paper roll at the indentations and thus more readily form the paper into the desired shape than would otherwise be possible.

A particular object of my invention is to provide a machine whereby rolls of building paper, usually or sometimes waterproof in character, may be formed and folded in reverse directions longitudinally of the paper so that reentrant folds possessing the characteristics of what is more commonly known as "dovetail" grooves or folds may be provided continuously in a sheet of paper for use with a plastic body or core for forming what is commercially known as plaster board or plaster lath.

In the provision of a lath of the character referred to it is necessary that some sort of lock be provided therein for holding the plaster thereon. I have provided and will describe a form of lath in which dove-tail or reentrant grooves are provided longitudinally of the lath for affording a clinch for the plaster, and an object of this invention is to provide a satisfactory means for forming the reentrant folds in the paper in a continuous operation preliminary to the manufacture of the plaster board. Other objects may appear as the description progresses.

Referring to the drawings in which I have illustrated one practical embodiment of my invention,

Fig. 1 is a plan of the front portion of my machine;

Fig. 2 is an elevation, partly in section, of the same;

Fig. 3 is a plan forming a continuation of Fig. 1;

Fig. 4 is an elevation forming a continuation of Fig. 2;

Fig. 5 is a front end elevation;

Fig. 6 is a transverse sectional elevation on line 6—6 of Fig. 3;

Figs. 7, 8, 9 and 10, are respectively, transverse sections on lines 7—7, 8—8, 9—9, and 10—10, of Fig. 1;

Fig. 11 is a fragmentary perspective view of the folded paper as it is rewound for future use;

Fig. 12 is an enlarged perspective view of the marking rollers;

Fig. 13 is a perspective view of the forward folding element.

With reference particularly to Figs. 1, 2, 3 and 4, F, is a suitable frame having posts 1, 1, at the feeding end of the upper ends of which are provided slotted bearings 2, 2, for a transverse shaft 3. A reel of paper P of ribbon like character is rolled on a core or reel R, and such a reel is rotatably held on the shaft 3 so that the paper P may be advanced from the reel in the folding operation. A trough, or chute, T is supported longitudinally of the frame F and has sides 5, 5, and a floor 6, said sides being spaced so as to afford ample clearance at the edges of the paper P, which is adapted to be moved longitudinally over the floor 6 and between the sides 5, 5.

Paper P is first advanced under an idler

roller 7 at the front end of the machine and thence forwardly in the trough T between a pair of marking rollers M and M′, which have intermeshing ribs 8, 8, etc., and grooves 9, 9, etc., of annular formation extending therearound at regular intervals between which the paper P is moved. The lower roller M has a fixed axis in bearings 10, 10, at the sides of the trough T, suitably held on the frame F, while the upper roller M′ is yieldable relative to roller M and is supported on arms 11, 11, which have fulcrums *f*, *f*, on the sides 5, 5, of the trough and are held in resilient contact with roller M by means of springs 12, carried on bolts 13, 13, which are attached at their lower ends to brackets 14, 14, on frame F. For forming reentrant folds in the paper P, the paper must of necessity be reversely marked on the opposite sides, so that the ribs 8 on one of the rollers M or M′ will engage the corresponding groove 9 on the other roller, the paper being firmly held therebetween, and the paper will thus be indented in a straight line from end to end as it is moved between the rollers, one side of the paper being so marked by one of the rolls and the opposite side thereof being similarly but reversely marked by the other roller.

Adjacent to the rollers M and M′, I provide a single cleat 15 on the floor 6 of the trough T and midway between the sides 5, 5, thereof, said cleat being suitably spaced from the pair of rollers M and M′ and the end nearest said rollers being substantially flush with the upper side of floor 6, while the remote end thereof is elevated substantially above the floor, or for a distance equal to that between the more closely spaced marks or indentations in the paper P. Thus, as the flat paper P from the feeding reel emerges from between the marking rollers the end of the ribbon or sheet of paper is drawn through the trough T until it overlies the end of the trough. A block 16 which has ends 17, 17, thereon adapted to engage horizontal slots 18, 18, in the sides 5, 5, of the trough is positioned, as shown in Fig. 1 for holding the paper in contact with the floor 6 and cleat 15. Block 16 has a metallic shoe 19 on the lower side thereof which overlaps the edges of the cleats slightly for bending the paper thereover at the indentations.

Forwardly of cleat 15, a triplet of somewhat similar cleats 20, 20 and 21 are attached to the floor 6 of the trough, the pair of cleats 20, 20, being oppositely positioned and of substantially equal length and spaced equally from the central cleat 21. All of said cleats are inclined forwardly, but the cleat 21 is preferably longer than the cleats 20, 20, so that the partial fold in the paper P produced by the cleat 15 may be engaged and preserved by means of cleats 21 prior to the further folding of the paper around the cleats 20, 20. A block 22 having ends 23, 23, which are removably held in horizontal slots 24, 24, in the sides 5, 5, as in the case of the block 16, and the lower side of this block has a plurality of cleats 25, 25, etc., depending therefrom and alternating with the cleats 20, 20 and 21 for forcing the sheet of paper P between said cleats and forming it as it is moved through the trough T, the paper being thus formed into a plurality of reversely formed rectangular grooves at this point.

Near the end of the trough T, I provide a central cleat 26 and a pair of like side cleats 27, 27, which are spaced at the front ends so as to afford free entrance of the partially folded paper therebetween, the adjacent edges of said cleats being vertical at the rear ends thereof and the said edges of the front ends being substantially inclined inwardly from the upper sides, the inclination of the edges being gradually increased from the rear to the front ends of the cleats.

A removable forming member is provided for holding the paper firmly over the cleats 26, 26 and 27, and consists of a block 28 which is held at the ends in slots 29 formed in the trough sides 5, 5, and is provided with a pair of tapered fingers 30, 30, on the lower side which are adapted to press the paper into and hold the same in position between the central cleat 27 and the side cleats 26, 26. A shoe 31 is provided for holding the paper in contact with the upper sides of the cleats and said shoe is held on an adjustable arm 32 pivotally attached to the upper side of the block, a wedge 33 being provided thereon for increasing the friction between the shoe and the paper.

It will be observed that the blocks 16, 22 and 28 are removably held in position on the trough and are slidable in the direction of the marking rollers M—M′ for removal from the trough.

At the rear or discharge end of the trough T, I provide a pair of rollers 34, 34, which are resiliently held on springs 35, 35, attached to the sides 5, 5, of the trough, said rollers being adapted to engage the uppermost folds of paper as the same is moved thereby for forming the paper in the manner shown in Fig. 11.

Adjacent to the rollers 34, 34, I provide a pair of friction rollers 36 and 36′, between which the formed paper is advanced for flattening the same out as shown, the roller 36 being rotatably held in fixed bearings 37, 37, and the rollers 36′ being yieldably held relative thereto in movable arms 38, 38, having fulcrums 39, 39, on the sides 5, 5, of the trough. Springs 40, 40, on bolts 41, 41, attached to brackets 42, 42, serve to hold the rollers in resilient engagement. Gears 36^a and 36^b operably connect rollers 36 and 36′.

Shaft 43 on roller 36 has a pulley 44 thereon which is driven from a motor driven pulley 45 on a drive shaft 46 by means of a belt 47. Thus when the paper P has been initially advanced to a point between the rollers 36 and 36′, the friction exerted thereon by said rollers will continue to move the paper therebetween until a reel of the paper has been exhausted, whereupon another reel of paper may be substituted and the operation repeated.

Subsequent to the marking, forming and folding operation hereinbefore described, the paper P is rewound upon a reel 48 which is carried by a shaft 49 having bearings 50, 50, attached to frames F. Shaft 49 carries a pulley 51 which is rotated by means of a belt 52 extended over a relatively small pulley 53 on shaft 43; also a hand crank 54 is provided on shaft 49, whereby the reel 48 may be manually turned for taking up slack in the paper P or for equalizing the winding of the paper relative to the folding thereof. It will be obvious that shaft 49 being rotated at a constant speed as the paper is wound around the axis thereof, and the hand crank is provided so that the rotation of shaft 49 may be either retarded or advanced, as the case may be, according to the relative sizes of the reel and the driving pulley 52.

What I claim is:

1. A paper folding machine having an elongated receptacle, capable of supporting a reel of paper alined therewith and so that a strip of paper may be moved flatwise through said receptacle, means for reversely marking the opposite sides of said paper in longitudinal lines, relatively fixed and detachable means for preliminarily folding said paper in a single line in like directions centrally of the strip, similar means for thereafter folding said paper reversely at the sides, and similar means for finally folding said paper in reentrant folds and winding the same flatwise upon a reel, as set forth.

2. A paper folding machine having means for reversely creasing the paper in spaced longitudinal lines, relatively fixed and detachable means for thereafter forming a central rectangular groove therein having its corners at the crease in the paper, similar means for subsequently forming reverse grooves of similar character laterally of said central groove, and similar means for finally folding said paper at the corners of said grooves, said grooves when so formed being reentrant in character.

3. A paper folding machine including a flat bottom having sides thereon forming a trough in which the paper may be moved, openings in said sides, and forming blocks held in said openings for engagement with the paper.

4. A paper folding machine comprising a frame, a stationary horizontal trough supported thereon adapted to guide paper passing therethrough, relatively adjustable and rotatable creasing rollers for reversely indenting the paper when moved therebetween, a preliminary forming member having a single rib thereon for engaging the paper, and successive members having a plurality of detachable folding elements for engaging the paper to different extents whereby the paper may be folded from a normally ribbon like condition into a series of alternating reentrant folds for the purpose described.

Signed at Los Angeles, Los Angeles County, State of California, this 25th day of June, 1919.

HERBERT L. GLAZE.

Witnesses:

LUTHER L. MACK,

H. M. BRUNDAGE.