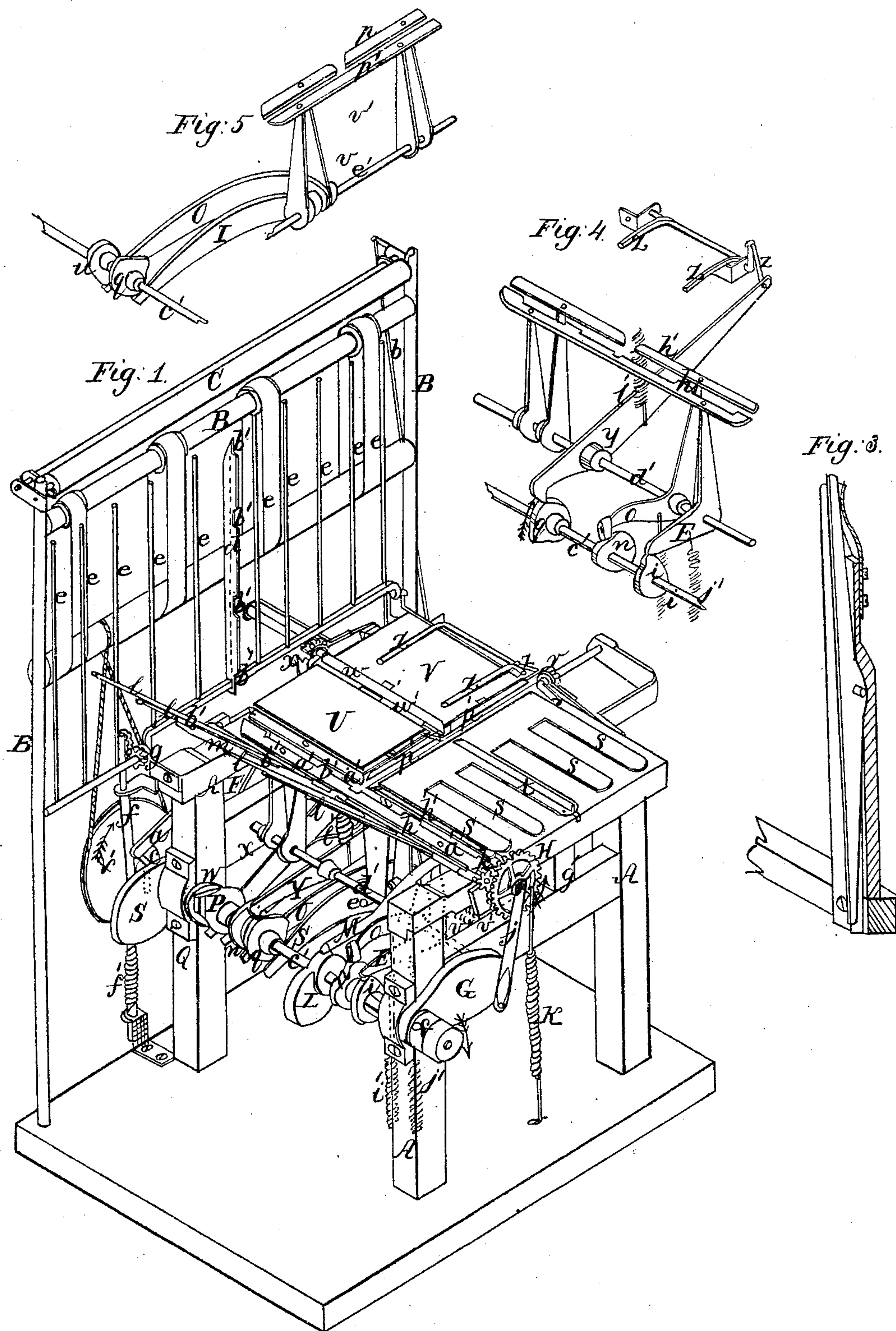
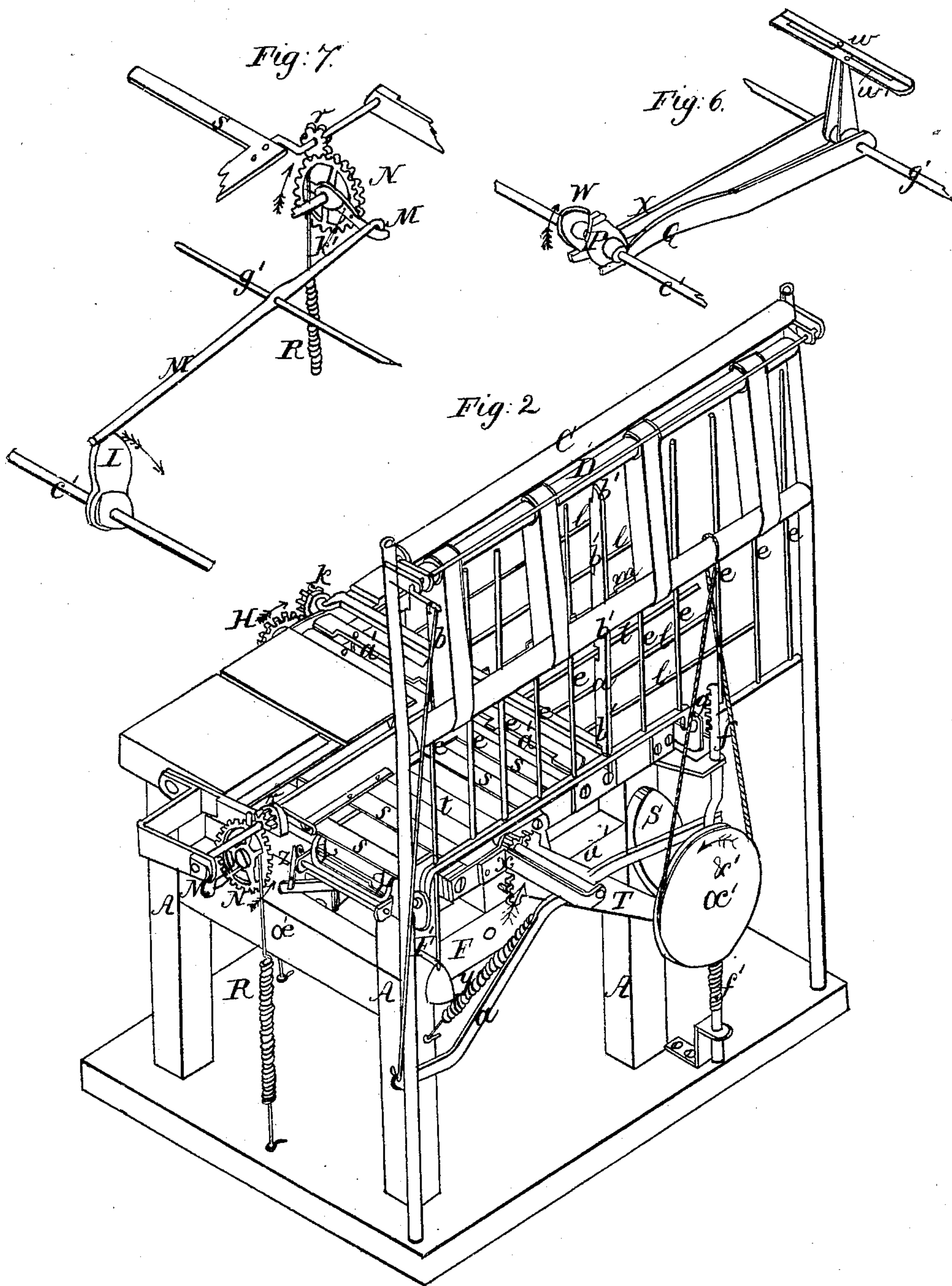


Sheet 1. 2. Sheets.

C. O. Crosby.
Paper Folding Mach.
No 16,266. *Patented Dec. 23, 1856.*



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Paper Folding Mach.
No. 16,266. *Patented Dec. 23, 1856.*



UNITED STATES PATENT OFFICE.

C. O. CROSBY, OF NEW HAVEN, CONNECTICUT.

MACHINERY FOR FOLDING PAPER.

Specification forming part of Letters Patent No. 16,266, dated December 23, 1856; Reissued October 26, 1869, No. 3,687.

To all whom it may concern:

Be it known that I, CHAUNCEY O. CROSBY, of the city and county of New Haven, in the State of Connecticut, have invented a new and useful Improvement in Machinery for Folding Paper; and I do hereby declare that the following is a full, clear, and exact description of the construction, character, and operation of the same, reference being had to the accompanying drawings, which make a part of this specification, in which—

Figure 1, is a perspective view of the machine, taken from the front left-hand corner, showing all the cams, levers, fingers, &c. Fig. 2, is a perspective view of the same, taken from the opposite corner, showing all the gearing, &c. which is not shown in Fig. 1. Fig. 3, is a perspective view of one of the blades fitted to have a parallel motion in forcing the bight of the paper between the gripping bars, so that the action may be equal. Fig. 4, is a perspective view of a part of the cam-shaft, the first pair of grippers, &c. Fig. 5, is a perspective view of a part of the cam-shaft, second pair of grippers, &c. Fig. 6, is a perspective view of a part of the cam-shaft, third pair of grippers, &c. Fig. 7, is a perspective view of a part of the cam-shaft, lever, &c. for working the fingers, *s, s*, &c. Figs. 1, and 2.

My improvement consists in so constructing the machine that, by the action of a series of cams on a shaft, through the agency of levers and springs, and racks and pinions, the paper will be placed, appropriately, on the platforms, by suitable fingers, rods, or plates, while a blade will force the bight of the paper between two movable gripping bars which will grip and hold it firmly until the rods, or fingers, which place it there have been removed, and another set, acting at right angles, shall come over and fold it in the other direction, (at which time the first gripping bars will release it,) when another blade will force the bight of the, (now double,) paper between two other movable gripping bars, which will hold it, as before, until another set of fingers, acting at right angles to the last, shall fold it again, (when the second gripping bars will release it as before,) and so on to any number of folds desired. And so that one of the gripping bars, in each case, will slide back to flatten the bend which had previously been caused, near the bight, by fold-

ing it over when the bight was held between the gripping bars. And in cutting away a portion of the face of one of each pair of gripping bars, and also, of the edge of each blade, to allow a portion of the gripping bars to firmly hold the bight of the paper without binding the blade, which will be necessary when the paper is dry, as the bight would otherwise spring out of the gripping bars when the blade was withdrawn. And so that it will be susceptible of being directly attached to the printing press, and receiving the papers directly from it, or of being fed by hand. And of folding paper, whether dry or damp, with equal placidity.

I make the frame of posts and bars, as seen at *A, A*, &c. Or in any other suitable manner. I place all the cams on the shaft, *C'*, as fully shown in Fig. 1, and shown in part in Figs. 2, 4, 5, 6, and 7. And I make them, substantially, in the shape thus shown. (Though each may be varied to suit any difference of proportion in the arms of the lever it cuts upon, as will be readily suggested to the mind of any mechanic acquainted with the operation of cams and levers.) And I revolve this shaft, *c'*, in the direction indicated by the darts on the pulleys, *V*, and *V'*, by any suitable power. I make each of the several levers, substantially, in the form shown, generally, in Fig. 1, but more particularly, in Figs. 4, 5, 6, and 7. (Though each may be made of a different shape, or of different proportions to suit the shape of the frame, or shape of the cam, or position of the fulcrum, at the builders discretion. (And I support each lever by a suitable fulcrum, as shown at *d'*, Figs. 1, 2, and 4, *e'*, Figs. 1, 2, and 5, and *g'*, Figs. 1, 2, 6, and 7. (Or made of any other suitable form, and placed in any other suitable position, which the builders mind may suggest in each case, so that they may effect the mechanical result intended, in any of the well known ways.) I use spiral springs, as shown at *K, v, f', R, y*, &c. to restore the levers &c. to the position from which they had been forced by the revolving of the cams. (Though flat springs, or any other well known mechanical device may be used to effect the same purpose.) I use pinions on the turning parts, or bars, of the sets of fingers, which I revolve by means of wheels, as shown at *H, h* and *N* or racks, 110

as shown at *f*, *g*, and at X, which are so connected with lever arms, or projections, (as shown at *j* and *f*, Fig. 1, at *w*, M and *z*, Fig. 2, and M, Fig. 7,) the action of the cam on the lever will turn the wheel, or move the rack, in the direction indicated by the dart, which will revolve the pinion and bring over the fingers to fold the paper, while the paper is held by the grippers. These wheels and racks may be used interchangeably, or the same may be used in all places, should it be found more convenient by the builder.

To the back part of the frame, A, A, &c. I attach two posts, B, B, in which I use three, (or any other suitable number of,) rollers, for the purpose of feeding the sheet of paper to the folder. The top roller, C, is raised, (by the lever, *a*, worked by the cam, *c*, and connected by the connecting rod, *b*,) to allow the sheet to be inserted between it and the next below it, D, so that by revolving the rollers, the sheet may be passed down over the fingers, *e*, *e*, &c. and blade, *d*, ready to be laid on the form.

Having constructed the several parts of the machine, and put them together, as represented in Figs. 1 and 2, and fed a sheet between the rollers, C and D, (as described in the preceding paragraph,) I revolve the cam shaft, *c'*, (in the direction indicated by the darts on the pulleys,) when the cam, *c*, Fig. 1, (coming in contact with the projection on the rack bar, *f*, seen near *c*,) will raise the rack bar, *f*, so as to turn the pinion, *g*, and bring the rods, or fingers, *e*, *e*, and *e*, and blade, *d*, down in front to lay the sheet upon the platform, when the blade, *d*, will force the bight of the paper between the gripping bars, *h*, and *h'*, at this time the cam, *i*, Figs. 1 and 4, will raise the front end of the elbow-shaped lever, E, Figs 1 and 4, (which will carry back the upright end, or arm, of the lever E, and force the gripping bar, *h*, against the gripping bar, *h'*, so as to hold the bight firmly, while the fingers, *e*, *e*, and *e*, and blade, *d*, will, by the ordinary operation of the spiral spring, *f'*, be returned to their original position, as shown in Figs. 1 and 2. At this time the cam, G, Fig. 1, acting on the lever, *j*, will turn the wheel, H, Figs. 1 and 2, (in the direction indicated by the dart,) which motion will revolve the pinion, *k*, and bring over the set of fingers, *l*, *l*, &c. and blade, *m*, to fold the paper at right angles to the gripping bars, *h*, and *h'*. And, (at the same moment,) the cam, *i*, will release the lever, E, so as to allow a spiral spring, (indicated by dots, at *j'*, Fig. 1, and shown, in section, at *j'*, Fig. 4,) to force down the outer end of the lever E, and draw back the gripping bar, *h*, and release the bight of the first fold; and to take out the bend, made by folding the paper over the gripping bar, *h'*,

the spiral spring, indicated at *i'*, Fig. 1, (by dots,) and shown, in section, at *i'*, Fig. 4, will force down the outer end, or arm, of the lever, *o*, into the lowest, or least prominent, part of the cam, *n*, as shown in Figs. 1 and 4, and thereby move the gripping bar, *h'*, outward; (which will soon be returned to its original position by the more prominent part of the cam, *n*, or the outer end of the lever, *o*, may be placed below the cam, *n*, and the position of the spring, *i'*, changed, when the prominent part of the cam, *n*, will move the gripping bar, *h'*, to take out the bend, and the spring, *i'*, will return it, as may be found most convenient, in any case. Suffice it to say that in working the gripping bars, in each case, I design the cams to act as guides to regulate the motion of the levers, and the springs to hold the levers firmly, or constantly, against the peripheries of the cams, without reference to the relative position of the cam and the part of the lever which comes in contact with it; that is, whether that part of the lever is above, or below, the cam, I therefore leave it to the discretion of each builder of the machine, as he will readily understand the most convenient location, and arrangement, of these well known mechanical devices, to effect the desired result.

When the paper is folded, and the bight released and straightened, (as before described) the blade, *m*, will force the bight of the (already double) paper between the gripping bars, *p*, and *p'*, Figs. 1, and 5, when the cam, *g*, will depress the outer end of the elbow shaped lever, I, and force up the gripping bar, *p'*, to grip and firmly hold the bight of the paper, (as before described,) when the fingers *l*, *l*, &c. will be returned to their original position, by the ordinary action of the spiral spring, R, on the wheel, H, and pinion, *k*.

The cam, L, (shown in Fig. 1, where its most prominent part is approaching the outer, or left hand, end of the lever, M, and in Fig. 7, where it is receding from, or releasing it,) will elevate the left hand end of the lever, M, and consequently depress the right hand end, which right hand end acting on the arm, or lever, *h'*, will turn the wheel, N, Figs. 2 and 7, in the direction indicated by the dart, and thereby revolve the pinion, *r*, Figs. 1, 2, and 7, and carry over the fingers, *s*, *s*, &c. and blade, *t*, to the position shown in Fig. 2, to fold the (already double) paper a second time; at this time the cam, *g*, will release the lever, I, and a spiral spring, *v*, Figs. 1, and 5, attached to the upright part, or arm, of the lever, I, will throw back the gripping bar, *p'*, to release the bight of the paper; and the cam, *u*, coming into a position to allow the outer end of the elbow-shaped lever, O, to be elevated, a spiral spring, *v'*, Figs. 1, and 5, will

move the gripping bar, *p*, to smooth out the bend, as in the former case, and the cam, *n*, will return the gripping bar, *p*, to its original position, (or vice versa.) The blade, *t*, will then force the (already four fold) paper between the gripping bars, *w*, and *w'*, and the cams, *P*, and *W*, Figs. 1 and 6, with the levers *Q*, and *X*, with spiral springs attached in the manner shown at *l'*, Figs. 1 and 4, (operating on the lever, *Y*,) or, in the manner shown at *v* and *v'*, in Figs. 1, and 5, (operating on the levers, *I*, and *O*,) will operate the gripping bars, *w*, and *w'*, as described in the two former cases, and the spring, *R*, will throw back the fingers, *s*, *s*, &c. to the position shown in Fig. 1, as before. The cam, *S*, Figs. 1, and 2, will then depress the lower end of the lever, *T*, (which works on the fulcrum, *d'*, Fig. 2,) which, by means of the rack and pinion, shown at *x*, Figs. 1 and 2, will throw over the plate, *U*, to fold the paper again, by pressing it onto the platform, *V*, when the gripping bars, *w*, and *w'*, will release it, and smooth out the bend, as in the former cases; and the spring, *y*, Fig. 2, will throw back the plate, *U*, to its former position, as shown in Fig. 1. The cam, *g*, will then elevate the left hand end of the lever, *Y*, Figs. 1, and 4, (which works on the fulcrum, *d'*,) which, by means of the connecting rod, *z*, Figs. 1, 2, and 4, will raise the bent bars, *Z*, *Z*, to a perpendicular position, and thus throw off the folded paper onto any proper receptacle; and the spring, *l'*, Figs. 1, and 4, will then elevate the right hand end of the lever, *Y*, and return the bent bars, *Z*, *Z*, to the position shown in Fig. 1, when another sheet may be received, and so on.

One of each pair of gripping bars, must have exposition of its face removed, as shown at *a'*, &c. Figs. 1, and 2. And each

of the blades must have a portion of its edge removed, as shown at *b'*, &c. Figs. 1, and 2, to allow the gripping bars to grip the bight of the paper firmly without binding the blade. For if not gripped firmly, when the paper is dry its elasticity would cause the bight to spring out of the gripping bars as soon as the pressure of the blade was removed, and therefore could not be depended on, though in damp paper, it might work well without it. All the blades may have a movable blade, attached by a fulcrum pin in the center, as seen in Fig. 3, so that the blades may always act parallel with the gripping bars; in which case the movable blade only will act on the paper. These machines may be constructed so as to make any number of folds desired, as from folio to the highest number ever used.

The power may be applied by a band on the pulley, *V*, or by a crank on the cam-shaft, or by any other convenient means.

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

1. The combination of the blades with the gripping bars, when constructed, arranged, and made to operate, substantially as herein described.

2. I also claim the blades in combination with the fingers, when combined and made to operate, substantially as herein described.

3. I also claim the cutting away a portion of the face of one of each pair of the gripping bars; and, also, of the edge of each of the blades, (as shown in the drawings,) so that I may grip the paper without binding the blades, when constructed, and used, substantially, as herein described.

C. O. CROSBY.

Witnesses:

SAMUEL THOMPSON,
R. FITZGERALD.