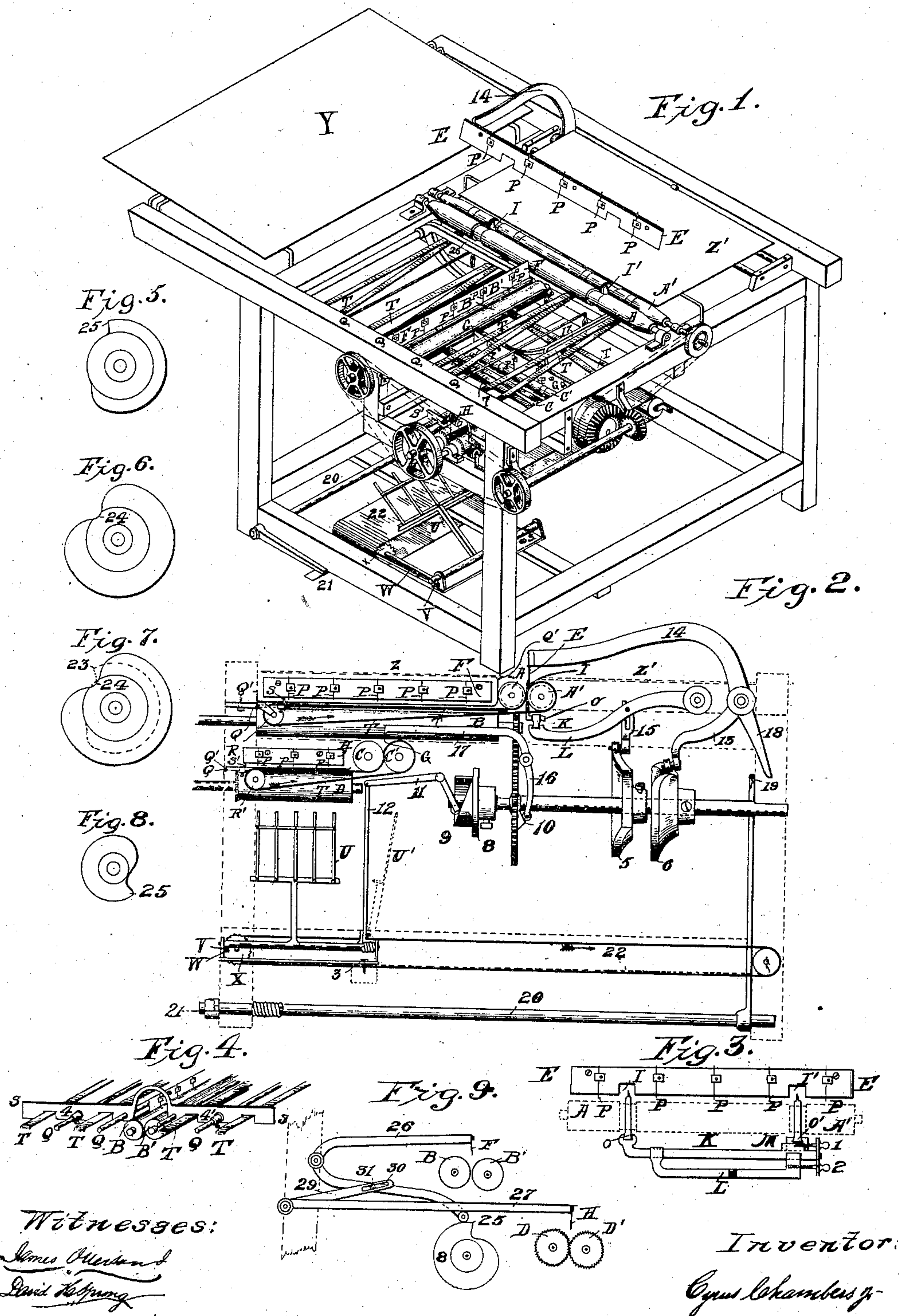


C. CHAMBERS, Jr.
PAPER FOLDING MACHINE.

No. 15,842.

Patented Oct. 7, 1856.



UNITED STATES PATENT OFFICE.

CYRUS CHAMBERS, JR., OF KENNETT SQUARE, PENNSYLVANIA.

MACHINE FOR FOLDING PAPER.

Specification forming part of Letters Patent No. 15,842, dated October 7, 1856; Reissued July 26, 1870, No. 4,079.

To all whom it may concern:

Be it known that I, CYRUS CHAMBERS, JR., of Kennett Square, in the county of Chester and State of Pennsylvania, have invented a new and useful Improvement in Machines for Folding Paper for Books and other Purposes; and I do hereby declare that the following is a full and exact description, as will fully appear by reference to the accompanying drawings and the letters of reference marked thereon.

The nature of my invention consists in the construction of a machine which will fold paper for books and other purposes the desired number of times, so that the pages will come in their regular order and proper position with respect to each other and irrespective of the edge, and deliver it unbroken and in a convenient manner for the further manipulations of forwarding.

Figure I represents the machine in perspective with half of the cover or feeding table removed. Fig. (II) 2, is a sectional view showing the general arrangement of the machine. Fig. 3, represents the register pins or points, the manner of adjusting them, and how they hold the sheet until it is seized by the fine points on the blade E. Fig. 4, represents the mechanism which stops and retain the paper, ready for the operation of the next folding machinery. Fig. 5, shows the shape of the cam for operating the register pins I, I'. Fig. 6 shows the shape of the cam for operating the blade E. Fig. 7, shows their position on the shaft with respect to each other; and Fig. 8, shows the cam which operates the blades F and H, and Fig. 9 shows the manner of operating the blades F and H by the cam 8.

The first and most important of these is the attachment of the register pins I, I', Figs. 1 2 and 3, on which the sheets are placed either by using the holes made for registering on the press, or holes or marks made for that or any other purpose. The said holes or marks bearing the same position in regard to the printing of the different sheets and thereby causing the folds to be made with respect to the printing and irrespective of the edge of the sheet. The said register pins may be attached to a table and the sheet drawn from it by the aid of nippers, as in printing presses; but I have arranged them in my operating machine so as to allow the paper to be registered in the proper position to be folded without

such aid as represented in Figs. 1 and 2. There are two grooves turned in the rollers A, A', to permit the pins I, I' to come up between them.

The pins I, I', are secured to the bar K, as represented at O, O', so that they can be moved backward or forward at pleasure. The said bar K, sliding in the end of the lever L, and operated by the screw 2, thereby allowing them to be moved from side to side. The distance of the pins from each other is regulated by the screw 1, which slides the block M, which supports the pin I' on the bar K, as represented in Fig. 3.

The second part of my invention consists in furnishing the blades or plates or their equivalents around the edge of which the paper is folded with fine points or their equivalents, as represented by P, Figs. 1 2, and 3. These points may be needles secured to the blade or plate, by the small plates and screws as represented; or part of the edge may be dressed away and leave the points projecting or the edge may be composed entirely of points. The object of these points is to prevent the paper from slipping around the edge before it is seized by the rollers or sides of the recess into which it is forced; thereby causing the crease or fold to be made precisely where the blade or plate strikes it.

The third part of my invention consists of a mechanism which conducts the paper from one folding apparatus, thence presents and retains it in the proper position to be acted on by the next. It consists of a single series of tapes or endless belts T, T, T, T, Figs. 1 2 and 4 (instead of two as heretofore used.) The bars Q, Q, Q, Q, and Q' and the stop S, or their equivalents. The tapes are arranged so as to run up around the roller A', down between A, A', along on a level to the movable pulley R, around it and back to A' as represented by the red lines. The bars Q, Q, Q, Q are arranged between the tapes T, T, T, T, their upper surface being on a line or nearly so with that of the tapes. The stop on bar S, is made movable on the bars Q, Q, so that it can be adjusted at any desired place and be secured by the set screws 4 and 4'. The tapes conduct the paper as it passes from between the rollers and slides it on the bars Q, Q, Q, Q until the folded edge strikes the stop S, which prevents it from moving farther and holds it in that position until acted on by

the next blade. The bars Q, Q, Q, Q are arranged so that the paper rests on them and the tapes bear against the under side of it so that the friction is just sufficient to slide it on the bars and bring it against the stop S. If the paper rested entirely on the tapes it would if thin and soft, be wrinkled or doubled up when it came against the stop S, by the movement of the tapes. The object of the bars Q, Q, Q, Q is to obviate this and to support the stop S. There are also bars Q' Fig. 2 placed above the tapes and bars to prevent the air from raising the paper if the edge should be a little turned up. The bars may be round wire, or a plane surface may be used and made to raise or lower as represented. By moving the stops S, the succeeding folds may be made at any desired distance from the preceding; thus the machine can be altered to fold different sized sheets.

The fourth part consists in the peculiar arrangement of the rollers, blades and tapes. The rollers A A', which (in Fig. 2) make the first fold are arranged above the rest and immediately under the table Z, Z', on which the sheet is fed. The rollers B, B', are placed below A, A', and at right angles to them, so that the paper when carried out will clear them, C, C', below B, B' and so on as represented in Fig. 2. The blades E, F, G, H, are supported by arms extending from shafts supported at the side and end of the machine, whose centers should be on a level with the edge of the blade when down as represented. The great advantage of this arrangement is that it allows the paper to be registered or fed on the top of the machine, and in a position to be folded without being carried under the folding machinery by tapes or other means as heretofore. Also that one series of tapes or endless belts are dispensed with and less room occupied.

The fifth part of my invention consists in the application of the fly W, Figs. 1 and 2, and the endless belt Q Q, for the delivery of the folded paper. The shaft of the fly is supported by a frame, which turns on a screw 3, to allow the fly to be turned as represented by the dotted lines U' to receive the paper when discharged from the rollers C, C'. The roller X which has a ratch wheel on the end, is also supported by the frame which turns on the screw 3, when the fly U raises up, the cam V operates on the lever W, and turns the roller X one notch; thus moving the endless belt Q Q, a short distance in the direction indicated by the arrows. The fly is operated by the cam 9, the lever 11, and connecting rod 12. By the movement of the belt Q Q, the folded paper is prevented from piling too high, and is carried away any desired distance, or the belt may remain stationary until the pile

gets to a convenient height, and then move the required distance for the commencement of a new one.

The sixth part consists in covering the rollers with cloth or any soft flexible substance in order to insure their seizing the paper when forced between them by the blades: Also decreasing the speed of the rollers as the extended surface of the sheet decreases in passing through the machine. The advantage of this is, it presents the sheet ready for the action of the third blade G, at the time the first (E) acts. Also presents it for the fourth (H) at the same time as the second (F) thereby allowing the first and third, and the second and fourth to be attached together and operated by one and the same cam. Thus in a machine making any number of folds, the blades may all be operated by two cams or their equivalents, instead of one to each blade as heretofore. But in a machine where the sheet is fed or registered under the first blade, plate or straight edge, it is necessary to have control of it so that if the feeder should not get the sheet placed on the pins at the proper time, the said blade can be prevented from descending by the treadle 21, which turns the shaft 20, and throws out the top of 19, until the arm 18 will strike it, thereby preventing the blade E from descending and save the sheet or the hands of the operator. Therefore the blades E and G are operated by different cams. The blade E is operated by the cam shown at 6 and Fig. 6. It is so shaped that it allows the blade to descend with the same velocity or nearly so as that with which the peripheries of the rollers A, A' move.

The cam 5 and Fig 5 operates the register pins I, I', it is so shaped to allow the pins to descend faster than the blade E, and to remain down until the paper shall have passed from between the rollers A, A'. It is arranged with the cam 6, on the shaft which is turned by a cog wheel, which gears into a pinion, one sixth its size, on the roller B, so that the pins I, I', drop just as the fine points P on the blade E touch the paper. The blades F and H are operated by the cam 8, shown in Figs. 8 and 9 and the blade G, by the cam 10. The rollers should run in adjustable bearings so that the distance from each other could be altered at pleasure. The blade E is supported by one cam 14 shaped as represented so that the machine can be fed from either side or both.

The rollers may be geared from each other as represented and the power applied at any convenient place. The whole being supported in a frame as represented.

Having thus described the different parts of my invention I will proceed to describe their operation as combined.

The paper when ready to be folded is

placed on the table Y and when the blade E, and pins I, I', are up as in Fig. 1 a single sheet is placed or registered on the pins I I', which remains stationary until the blade E, 5 descends when the fine points P, on the blade E touch the paper the pins I, I', drop below the rollers A, A', and the paper is seized by them and drawn through doubled. The tapes T, T, T, T, turn and 10 slide it on the bars Q, Q, Q, Q, until it strikes the stop S, which holds it in that position until acted on again by the second blade F which forces it through the rollers B, B', in like manner making the second 15 fold when by the second series of tapes bars and stops it is presented for the action of the third blade G which forces it through the rollers C, C', thus making the third fold when it is presented by aid of the third 20 series of tapes bars and stops for the fourth blade H, which forces it through the rollers D, D', in like manner: and thus folded the fourth time it drops on the fly U which lays it down on the belt Q. Q. By repeating 25 this process any desired number of folds may be made.

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

1. Causing a folding machine to make the 30 crease for the fold in paper or other substances so that any number of sheets fed successively to the said machine, may be folded, to correspond to the printing, or other impressions, made thereon; by means 35 of the points or register pins I I', or their equivalents, and the holes by which the sheet was registered upon the press; or the holes or marks as made in the sheet for any other purpose: The said pins being adapted to 40 the said holes, or marks, and the sheet or substance to be folded, placed upon the said pins, by using the said holes or marks for that purpose.

2. I claim the manner of adjusting the 45 register pins I, I', and their peculiar movement as described for the purposes specified.

3. I claim supplying the straight edge or blade or its equivalent (which forces the paper into recesses or between converging surfaces or their equivalents) with fine 50 points as and for the purpose specified.

4. I claim the bars Q, Q', and the stops S, independent of and in combination with each other as well as the bars Q Q' or the stops S separately, or combined as above, 55 in combination with the endless belts T T.

5. I claim arranging the rollers B, B', which make the second fold below the rollers A A' which make the first fold and the rollers C C' which make the third fold be- 60 low B B' and in like manner any number of rollers so that the substance to be folded may be forced downward between each pair, *m*, thereby enabling a single series of endless belts or their equivalents to conduct 65 it from one pair of rollers and present it for the action of the next.

6. I claim the fly U in combination with the endless belts Q Q and the mode of making the support of the said fly adjustable. 70 Also the manner of moving the said endless belt substantially as described.

7. I am well aware that endless belts have long been used for conducting paper in folding and other machines; therefore I do not 75 claim them as my invention, but I claim arranging a single series of endless belts substantially as described, so that paper or other substances may be conducted by them horizontally from a pair of rollers when 80 passing downward between them.

8. I claim gearing the rollers in such manner as to decrease the speed of the periphery of each successive pair in the proportion and 85 for the purpose specified.

9. I claim controlling the first blade or plate of folding machines by a treadle or other means for the purpose specified.

CYRUS CHAMBERS, JR.

Witnesses:

JAMES OTTERSON, Jr.,
DAVID H. SPRONG.