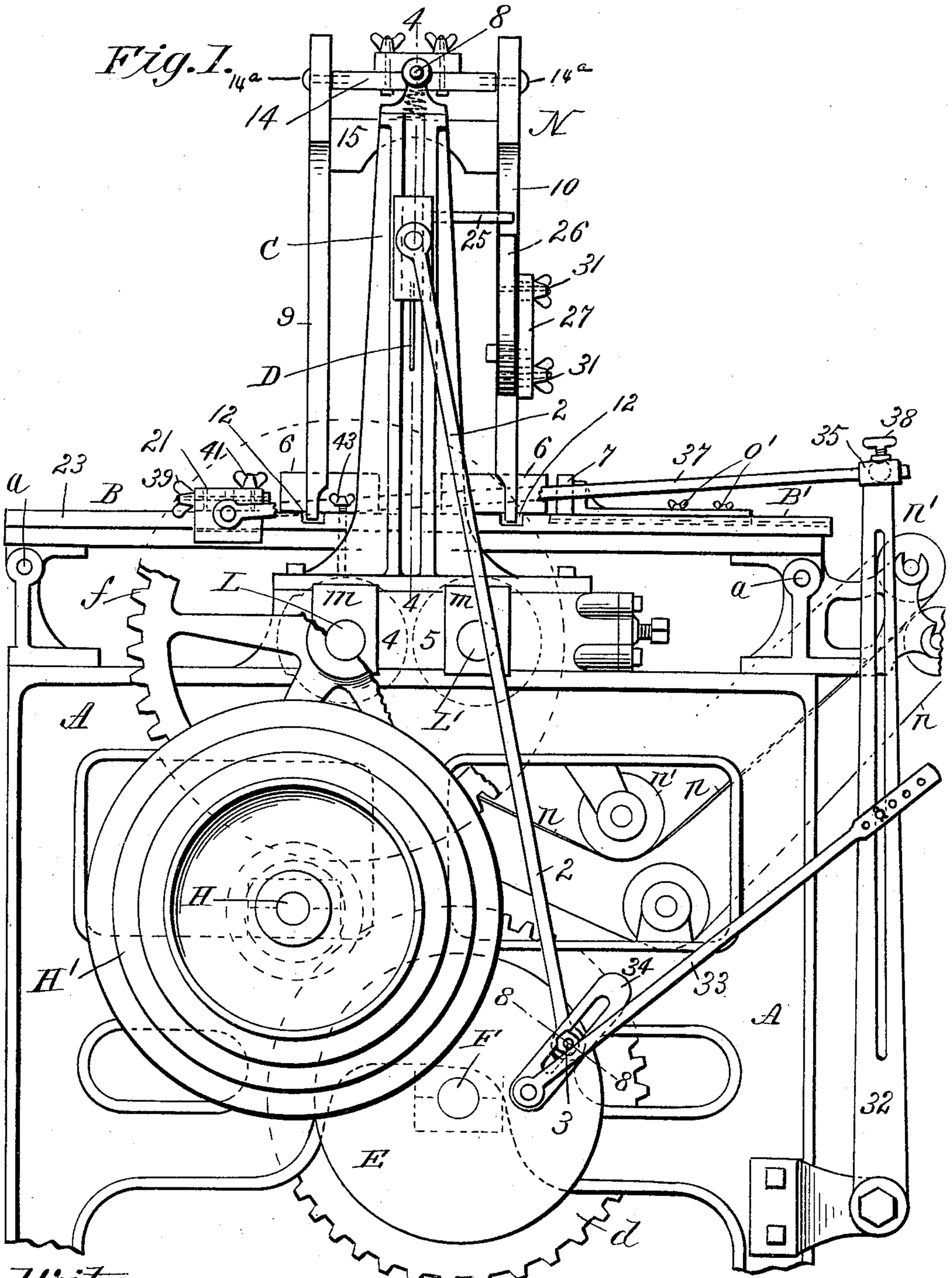
(No Model.) 3 Sheets—Sheet 1.

W. D. NICHOLS.

SHEET ADJUSTING DEVICE FOR FOLDING MACHINES.

No. 585,117. Patented June 22, 1897.

Fig. 1.



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(No Model.) 3 Sheets—Sheet 2.

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SHEET ADJUSTING DEVICE FOR FOLDING MACHINES.

No. 585,117. Patented June 22, 1897.

Fig. 2.

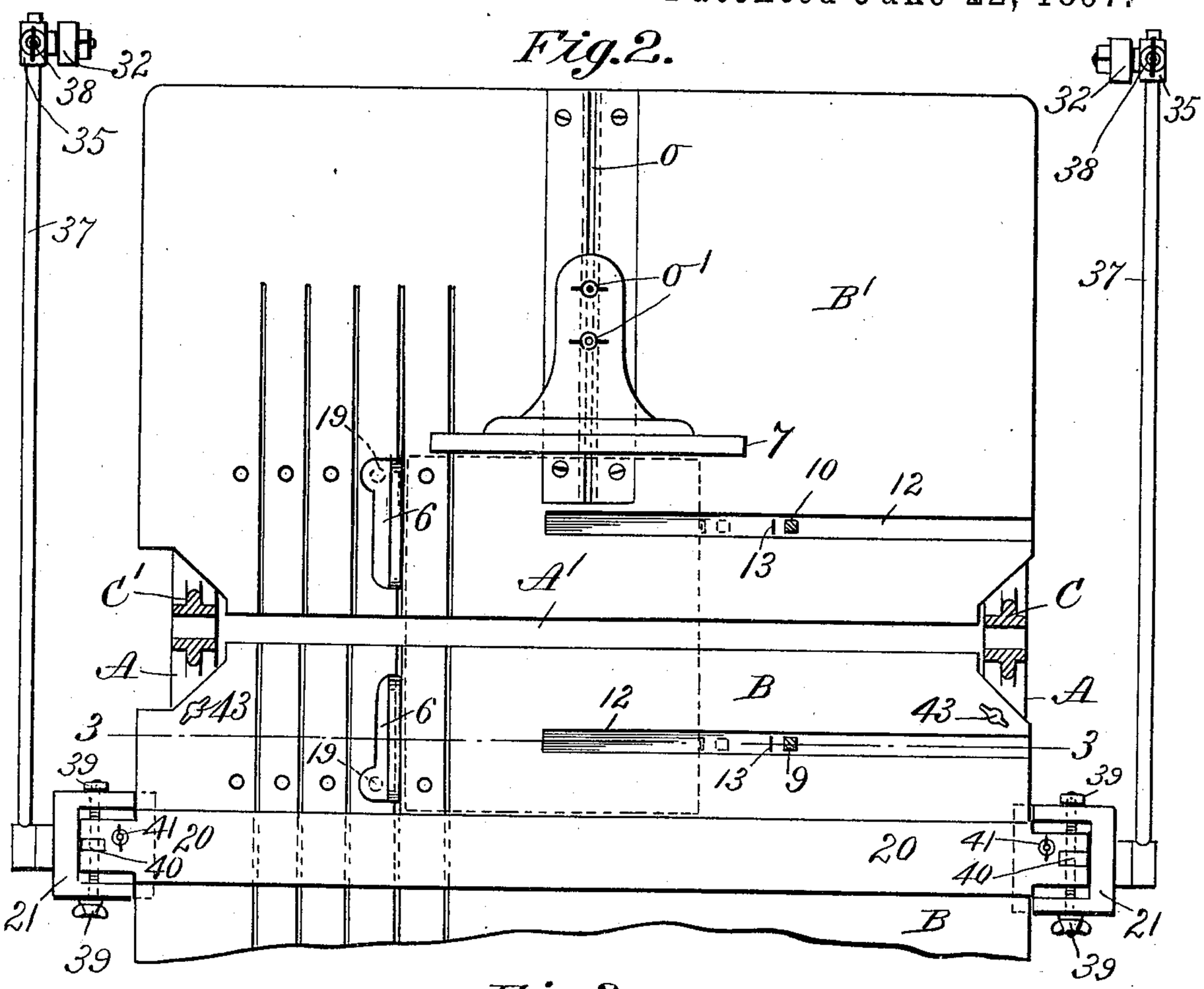
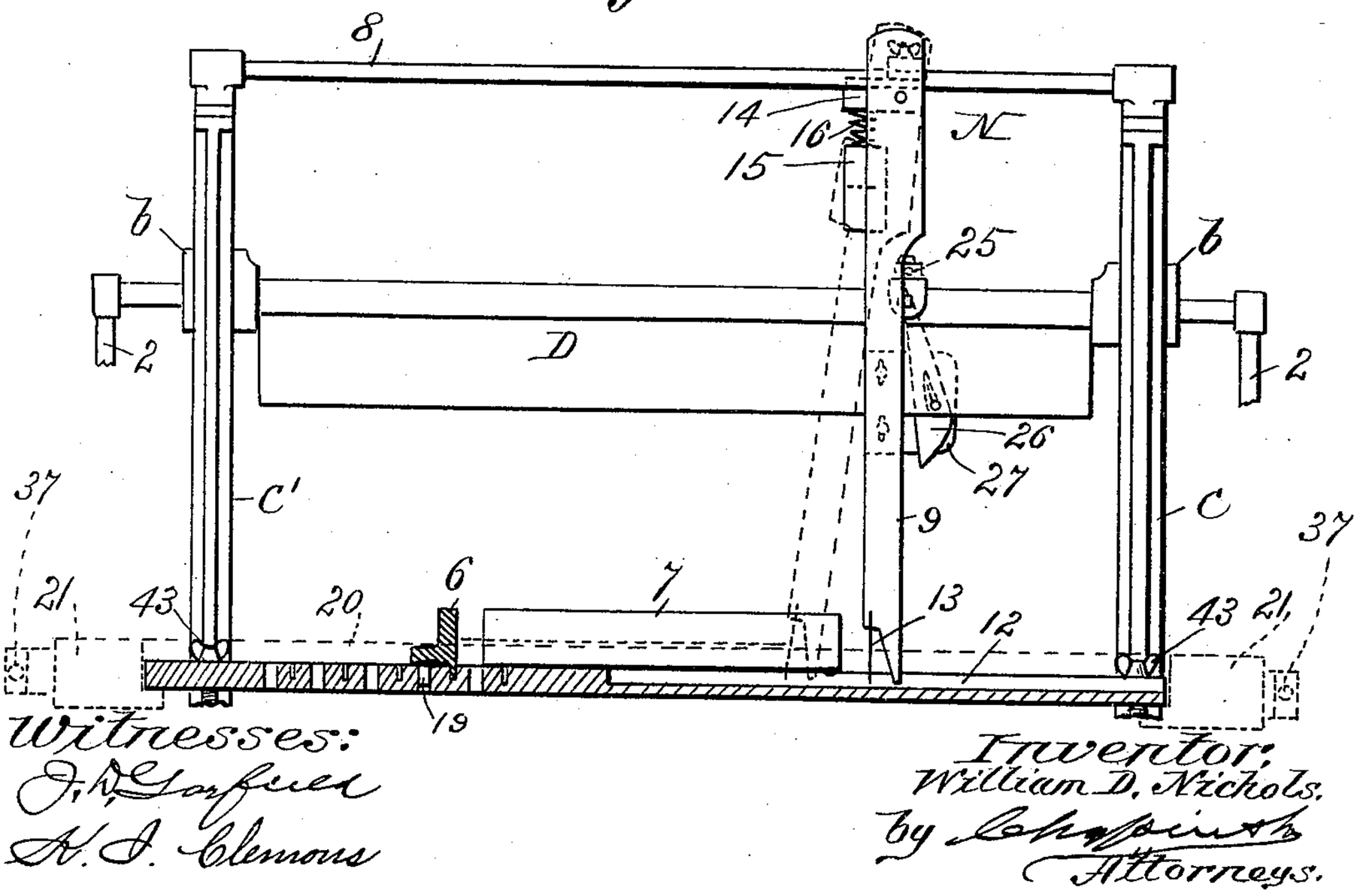


Fig. 3.



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(No Model.) 3 Sheets—Sheet 3.

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SHEET ADJUSTING DEVICE FOR FOLDING MACHINES.

No. 585,117. Patented June 22, 1897.

Fig. 4.

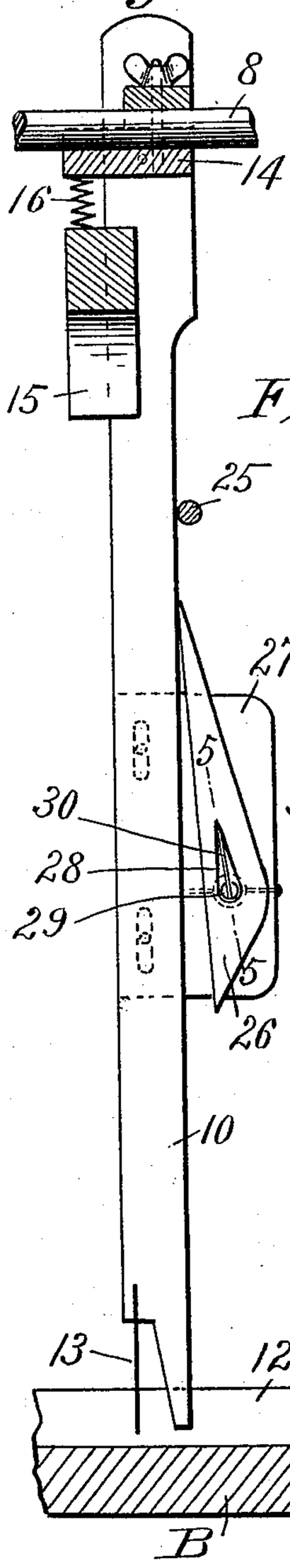


Fig. 5.

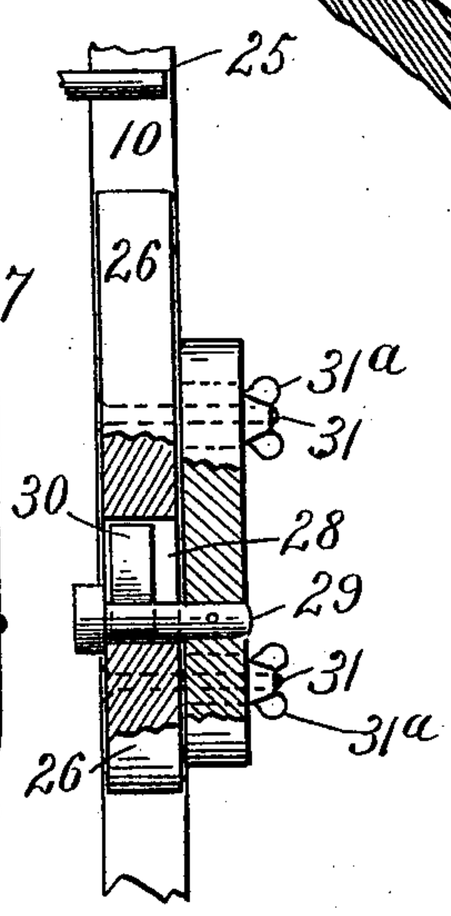


Fig. 6.

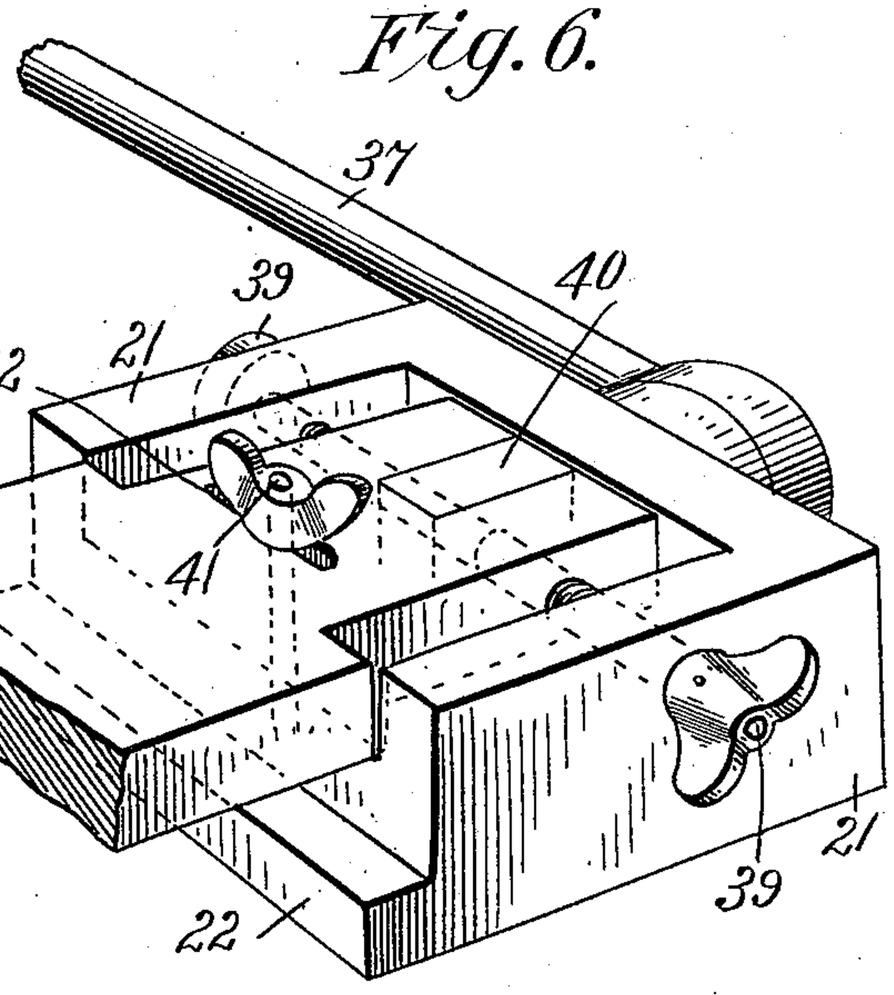


Fig. 7.

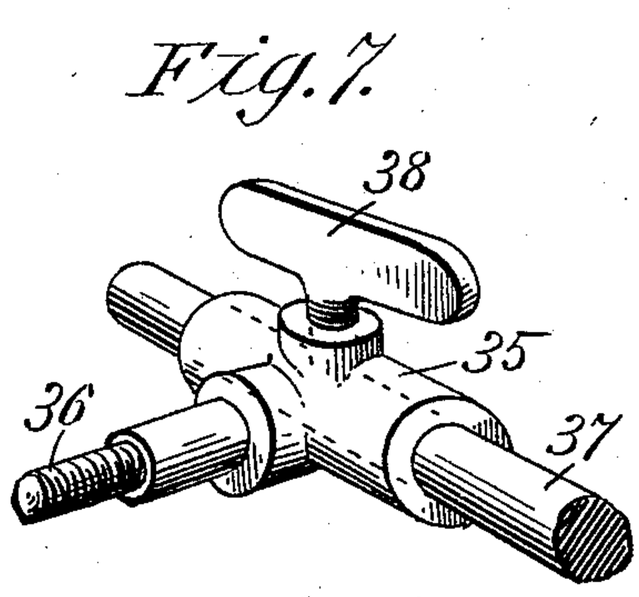


Fig. 8.

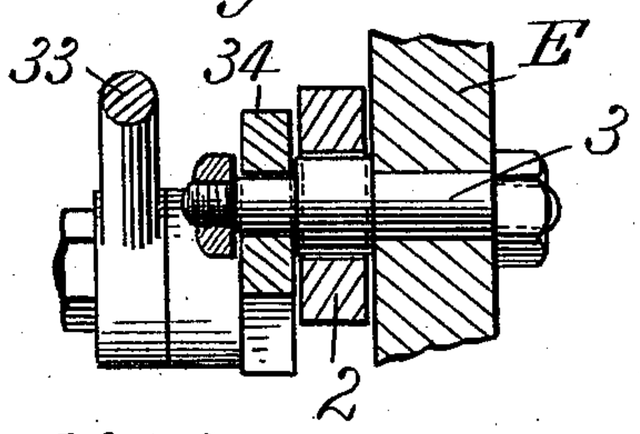


Fig. 9.

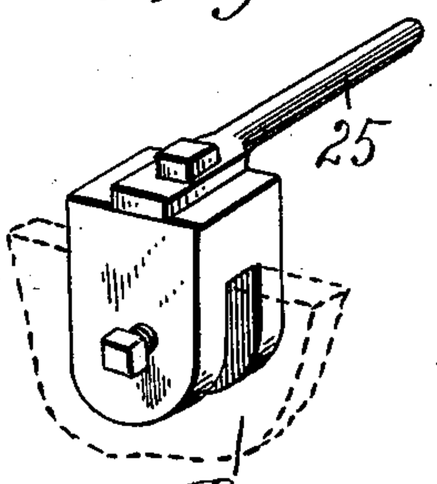
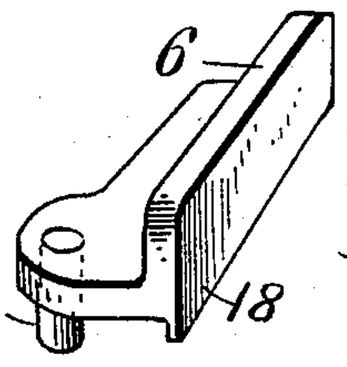


Fig. 10.



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UNITED STATES PATENT OFFICE.

WILLIAM D. NICHOLS, OF SOUTH HADLEY FALLS, MASSACHUSETTS.

SHEET-ADJUSTING DEVICE FOR FOLDING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 585,117, dated June 22, 1897.

Application filed October 26, 1896. Serial No. 610,079. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM D. NICHOLS, a citizen of the United States, residing at South Hadley Falls, in the county of Hampshire and State of Massachusetts, have invented new and useful Improvements in Sheet-Adjusting Devices for Paper-Folding Machines, of which the following is a specification.

This invention relates to improvements in paper-folding machines, and particularly to devices for adjusting the sheets of paper to be folded in their proper positions against the gages on the table of the machine; and the invention consists in the construction of said sheet-adjusting devices, as fully set forth and claimed in the following specification.

In the drawings the said adjusting devices are shown adapted to what is known as the "Kneeland" paper-folding machine, though with some modification it can equally well be applied to other machines having a folding-blade moving in a vertical plane.

Figure 1 of the drawings shows a folding-machine in side elevation having applied thereto my sheet-adjusting devices. Fig. 2 is a plan view of the table of said machine, certain parts being shown in section. Fig. 3 is a sectional view of the table on line 3 3, Fig. 2. Fig. 4 is an enlarged sectional view of a swinging frame hung above the table of the machine and also shows a portion of said table in section, said section being on line 4 4, Fig. 1. Fig. 5 is an edge view of a part of one of the arms of said frame, a part of which is in section on the line 5 5, Fig. 4. Fig. 6 is an enlarged perspective view of the adjusting devices on the end of a bar moving on the table of the machine. Fig. 7 is a perspective view of an adjusting device on one end of the connecting-rod on the end of the bar shown in Fig. 6. Fig. 8 is a sectional view on line 8 8, Fig. 1. Fig. 9 shows a finger attached to the top of the folding-blade of the machine. Fig. 10 shows one of the gages on the table of the machine.

Referring to the drawings, A is the frame of the paper-folding machine, having a table thereon divided into two parts B B′, thereby forming a slot A′ in said table, and each of said parts pivoted at its opposite parallel side, as at *a*, Fig. 1, and means, as described farther on, for vertically adjusting the contiguous edges of said parts or one of them.

Two oppositely-located standards C C′ are suitably slotted to receive the squared ends *b b* of the folding-blade D, which has a reciprocating vertical movement in said slotted standards, which movement is imparted by a crank-wheel E on a shaft F and a connecting-rod 2, engaging pivotally by one end the end of the folding-blade which projects through the slotted standard and a stud 3 on said crank-wheel by its opposite end. A main shaft H, having the cone-pulley H′ thereon, is geared to the aforesaid shaft F and to one of two shafts L L′, said gear connection being indicated by *d* for the one on shaft F and the other by *f* for the gear on shaft L, the gear on the main shaft H being shown only in dotted lines. A similar connecting-rod, crank-wheel, and gear corresponding to the connecting-rod 2, crank-wheel E, and the gear *d* are located on the opposite side of the machine to that shown in Fig. 1, and suitable gear connections between said shaft L and the shaft L′ are also provided, whereby the said two shafts L and L′ have rotary movements toward each other for feeding the folded sheets downward into engagement with the delivery-tapes *n*. Duplicates of connecting-rod 33, the oscillating arm 32, and connecting-rod 37, extending from the top of arm 32 to the sliding bar 20, are also provided on said opposite side of the machine. Said two shafts L L′ are supported in adjustable boxes *m* on the frame of the machine, whereby the two rolls 4 and 5 (indicated only in dotted lines on said shafts in Fig. 1) may be adjusted to and from each other. Said rolls are for the purpose of engaging the folded paper as it is pushed through the folding-slot A′ in the table of the machine and pass it onto the delivery-tapes *n*, running over the pulleys *n′ n′*. (See Fig. 1.)

Such, in brief, is the paper-folding machine to which my improved sheet-adjusting devices are applied, and heretofore sheets of paper to be folded have been fed to this machine by hand and the operator doing said feeding has been accustomed to place such sheets squarely against the two gages 6 and 7 on the table of the machine, while the fold-

ing-blade D of the machine has been ascending to its highest position and descending again to push the said paper through the slot between the contiguous edges of the divided table. Hence the speed of the machine has been limited, and frequently sheets improperly adjusted to the gages are folded which must be thrown out of the finished product of the machine.

The sheet-adjusting devices for paper-folders forming the subject of my invention permits of greatly-increased speed of folding and insures absolute accuracy in the placing of the sheets under the folding-blade, and the operator has only to place the number of sheets to be folded within the range of action of the adjusting devices and they are rapidly and accurately moved up against the gages on the table. Said sheet-adjusting devices consist, in part, of a frame N, hung to the bar 8, extending between the two standards C C′. Said frame has a swinging motion in the line of the slot A′ in the table. The lower extremities of the arms 9 and 10 of the frame are approximately equidistant from the said slot A′ and move in slots 12, cut in the face of the table parallel to said slot A′. The lower ends of said arms 9 and 10 are provided with springs 13, the ends of which are flush with the ends of the arms, and whose flat sides are so disposed as to encounter the edge of the sheets of paper to be moved into place on the table. That part of the arms 9 and 10 behind the springs 13 is cut away to afford room for the springing motion of the said springs when they encounter the sheets of paper to be moved into place. Said springs are of steel, preferably, and are of sufficient delicacy to afford a yielding abutment for the edges of the paper against which they impinge. Said frame N is pivotally secured to a cross-bar 14 by pins 14^a and has a swinging movement thereon, as described, and is clamped by thumb-screws or otherwise adjustably secured to said bar 8. A brace-bar 15 extends between the said arms 9 and 10 of the frame N, near the said bar 8, and rigidly unites said arms.

Between the under side of the cross-bar 14 and the upper side of the brace-bar 15 (see Fig. 4) is located a spiral spring 16, which is compressed when the frame N is swung in one direction and in turn moves said frame back again to its normal position.

Suitable gages 6 of ordinary construction are removably secured to the table on each side of the slot A′, said table being provided with suitably-spaced slots for the reception of a rib 18, projecting from the lower edge of the gage, and suitable holes for the reception of the dowel-pins 19 in said gages. One of said gages is shown in Fig. 10. A sliding bar 20, the ends of which are adjustably secured in two heads 21, has a reciprocating movement on the said table at right angles to the swinging movement of the frame N. The edges of the table are formed into suitable ways, with which the said heads engage. A lip 22 being formed on the lower inside edges thereof serves to hold said bar 20 in operative relation to the surface of the table, said lip projecting inwardly under the overhanging edge 23 of said table. Located parallel with the said sliding bar 20 and removably fixed to the surface of the table B′ is a gage 7. Said gage is similar to the gage 6 and at right angles thereto and is provided with a rib on its under side at right angles to the face of the gage and entering a slot *o* in the table. Suitable bolts *o′*, the heads of which have a sliding engagement with said slot, pass up through said gage, and by means of thumb-screws on said bolts said gage may be secured at any desired point on said table. Said two gages are the ones against which the sheets of paper are adjusted by the swinging frame N in one direction and the sliding bar 20 in another direction at right angles thereto, and one of which preferably moves slightly in advance of the other—that is to say, the swinging frame N begins its movement toward the gage 6 before the sliding bar 20 begins its movement toward the gage 7, and when the said frame reaches the limit of its movement it is practically stationary for a moment, while the bar 20 finishes its movement toward gage 7. While said bar 20 is thus moving to adjust the sheets of paper in one direction, the springs 13 on the lower extremities of the arms 9 and 10 of the frame N are bearing on the edges of the sheet to hold them against the gage 6. Thus the two movements of the frame N and sliding bar 20, acting at right angles to each other, serve to adjust the sheets to their respective gages accurately, and as rapidly as the said sheets can be placed on the table of the machine in front of said parts the movements of said frame and said bar are imparted thereto as follows: As the folding-blade D is moved vertically by its connecting-rod 2, in engagement with the crank-wheel E, a finger 25, adjustably secured by a set-screw or otherwise to the top of the folding-blade D (see Fig. 9) and at right angles thereto, engages with a cam 26, secured pivotally to a projection on one of the arms, as 10, of the swinging frame N. The position occupied by said finger 25 relative to the said cam on the arm 10 is clearly shown in Fig. 4. Said folding-blade, carrying said finger 25 downward, engages the outwardly-inclined surface of said cam and moves said frame N forward, compressing the spring 16 between the brace-bar 15 and the cross-bar 14, and as the finger 25 passes off of the lower end of the cam 26 said spring 16 operates to return the frame N to a vertical position in contact with said finger 25 below said cam 26. When the folding-blade rises, said finger 25 passes behind said cam 26, between it and the arm 10, to the position shown in Fig. 4. To permit said finger 25 to pass behind said cam on the upstroke of the folding-blade and to engage its inclined side on the downstroke thereof, the said cam is constructed with an

elongated slot 28, in the bottom of which slot is located a pivot-pin 29, on which said cam has an oscillatory motion. Said pin is fixed in the projection 27 on the arm 10, and secured to said pin by one end thereof is a spring 30, the upper end of which engages the upper end of the slot 28 in said cam. Said spring remaining fixed in said pin is so adjusted as to keep the upper extremity of the cam 26 normally in contact with the arm 10. Therefore as said pin 25 is carried upward by the folding-blade D it forces the upper end of the cam 26 away from the arm 10 against the tension of the spring 30, which returns the point of said cam to a proper position after the passage of said pin beyond said point. Said projection 27 on the side of the arm 10 is adjustably secured to said arm by means of suitable bolts 31, provided with the thumb-screw 31[a], as shown in Figs. 1 and 5.

The sliding bar 20 has, as stated, a movement at right angles to the slot A′ in the table of the machine, and to impart said movement thereto there is provided an upstanding swinging arm 32, pivoted at any convenient point to the frame of the machine by its lower extremity. Said bar is slotted for nearly its entire length. A stud movable in said slot engages with a connecting-rod 33 by one end, the opposite end of which is pivoted to the end of a slotted piece 34, the slot in said piece 34 receiving the end of the stud 3 on the cam-wheel E and being locked on said stud by a nut in any suitable position. By referring to Fig. 8 the relation of said parts on the stud 3 will be clearly seen. Thus by swinging the part 34 on the stud 3 the throw of the arm 32 can be regulated as desired, as above described, by the manipulation of said part 34 or by the shifting of the point of engagement between said connecting-rod 33 and said arm 32. The upper end of said arm 32 is provided with a swiveled connection 35. (Shown in Fig. 7.) Said connection being secured to the upper end of said arm by the threaded end 36, located at right angles to the connection 35 and passing freely through the arm, has a nut applied to the end thereof projecting through said arm.

A connecting-rod 37 has a pivotal engagement with the head 21 of the bar 20 by one end and its opposite end passes through the above-mentioned connection 35 and is secured therein by a thumb-screw 38 or other suitable means.

Through the operation of the above-described parts it is seen that any desired degree of movement of the bar 20 in a direction at right angles to the head 21 on the table may be obtained and approximate adjustments of said bar to any desired position may be obtained by regulating the throw of the arm 32, as described, and by the adjustment of the connecting-rod 37 within the swiveled head 35; but for a fine adjustment of said bar the ends thereof are made movable within the heads 21 by means of a bolt 39, passing through the end of said bar, said bolt having a suitable head on one end and a thumb-screw on the other, said bolt being suitably threaded and engaging a nut 40, which is let into the end of said bar and held therein in a fixed position. A locking-bolt 41, provided with a suitable thumb-screw, is secured to the head 21 and passes up through a slot 42 in the sliding bar 20, and after a proper adjustment of said bar relative to the head 21 has been obtained said locking-bolt is set to hold it in said position. The construction and arrangement of said adjusting devices for the ends of the bar 20 are clearly shown in Fig. 6.

As it sometimes happens that the table of the machine will get out of line, means for leveling it at the edges of the slot A′ on that part B thereof on which the said bar 20 operates are provided, and consist of screws 43, (shown in Figs. 1, 2, and 3,) passing through a suitably-threaded nut in said table and having their ends bearing on the frame of the machine.

If it is desired to adjust the machine to a sheet narrower than that to which it is adapted, as shown in the drawings, the adjustment of the swinging frame on the bar 8 and of the finger 25 on the folding-blade D must both be made in like degree, which, as shown in the drawings and as heretofore described, is easily and quickly accomplished.

By the use of this device on a folding-machine it is not necessary for the operator to accurately place the sheets of paper on the table of the machine so that they will square the gages. They may even be put onto the table quite carelessly, provided they are placed with their edges approximately parallel within the parallelogram formed by the gages 6 and 7, the sliding bar 20, and the ends of the arms 9 and 10 of the frame N.

By the use of this device the sheets are folded with far greater accuracy and rapidity than it is possible to fold them when they have to be laid on the table and squared with the gages by hand.

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

In a paper-folding machine having a vertically-moving folding-blade, a swinging frame for moving sheets of paper against a gage in one direction, and means for adjusting said frame relative to said gage, and a sliding bar on the table of the machine for moving said sheets in a direction at right angles to said first-named movement and against a suitable gage, and means for adjusting said bar relative to said last-named gage, and means for moving said frame and said bar, substantially as described.

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