(No Model.) 4 Sheets—Sheet 1

C. CHAMBERS, Jr. & W. MENDHAM.

MACHINE FOR FOLDING AND PASTING SHEETS OF PAPER.

No. 386,295. Patented July 17, 1888.

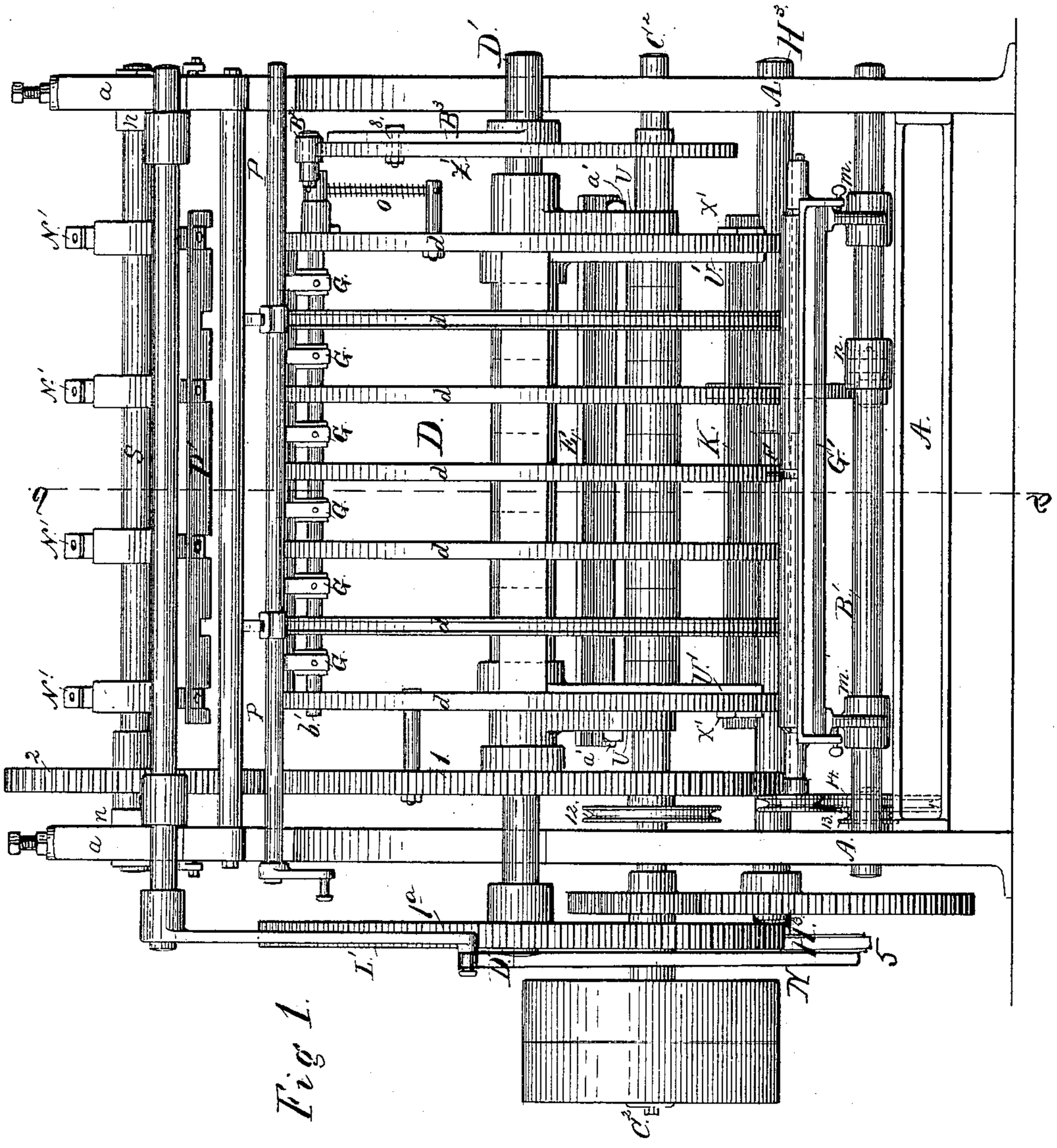

Fig 1.

WITNESSES:

John Burkhardt.
Wm. D. Carson.

INVENTORS:

Cyrus Chambers, Jr.
William Mendham,
per Joshua Pusey, atty.

(No Model.) 4 Sheets—Sheet 2.

C. CHAMBERS, Jr. & W. MENDHAM.

MACHINE FOR FOLDING AND PASTING SHEETS OF PAPER.

No. 386,295. Patented July 17, 1888.

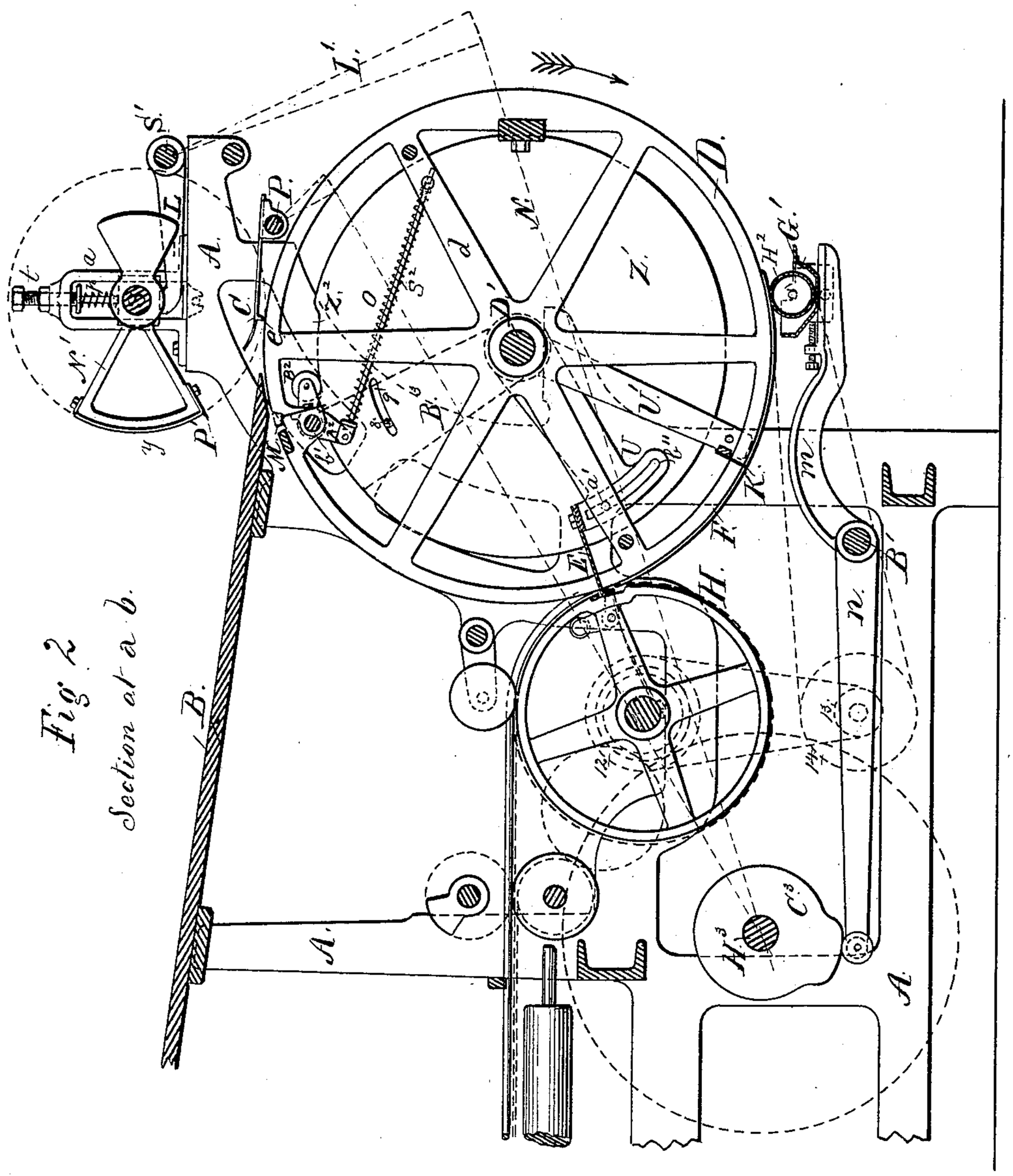

Fig. 2

Section at a b.

WITNESSES:

John Burkhardt.
Wm. D. Carson.

INVENTORS:

Cyrus Chambers, Jr.
William Mendham
per Joshua Pusey, atty.

(No Model.) 4 Sheets—Sheet 3.

C. CHAMBERS, Jr. & W. MENDHAM.

MACHINE FOR FOLDING AND PASTING SHEETS OF PAPER.

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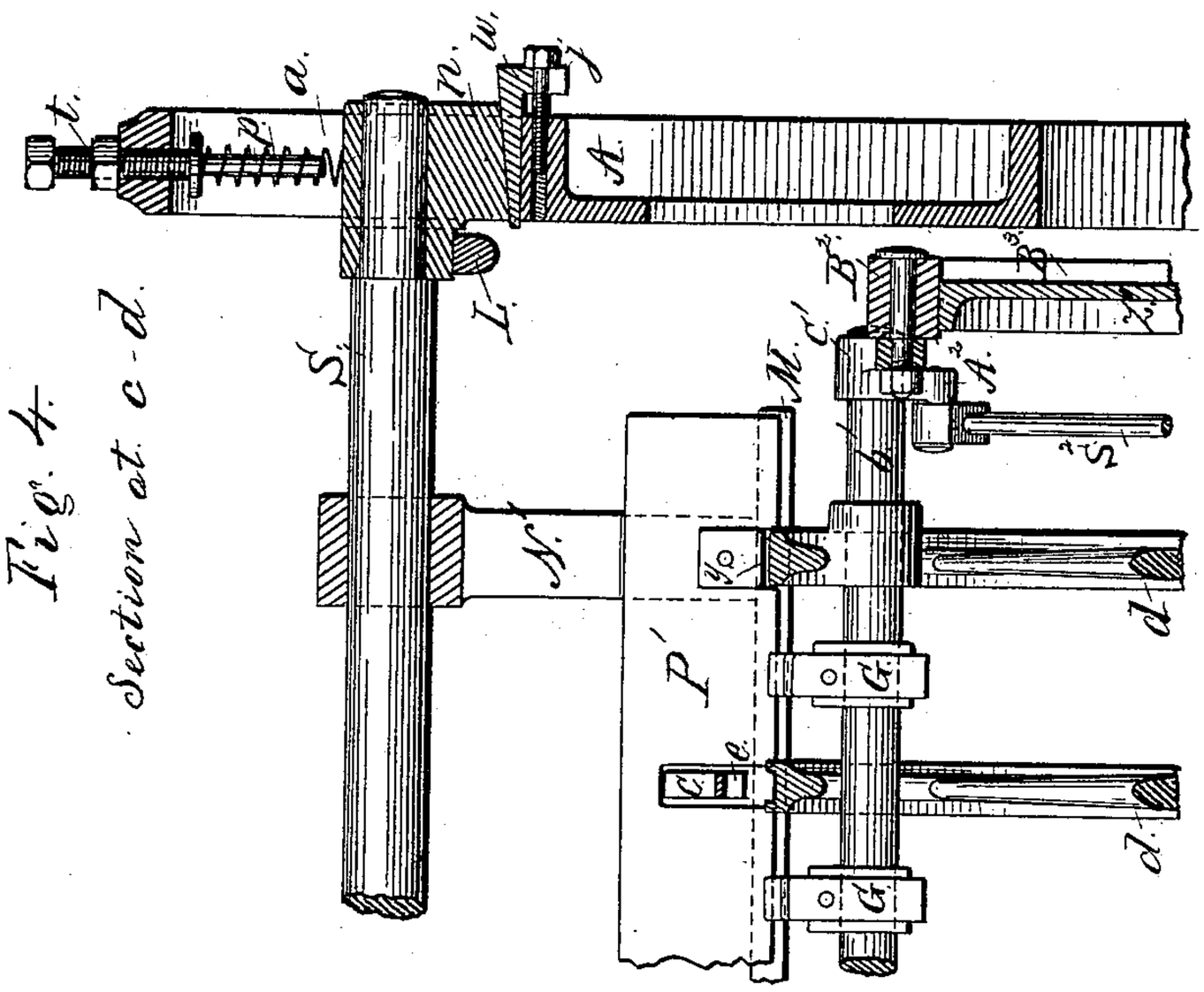

Fig. 4.
Section at c-d.

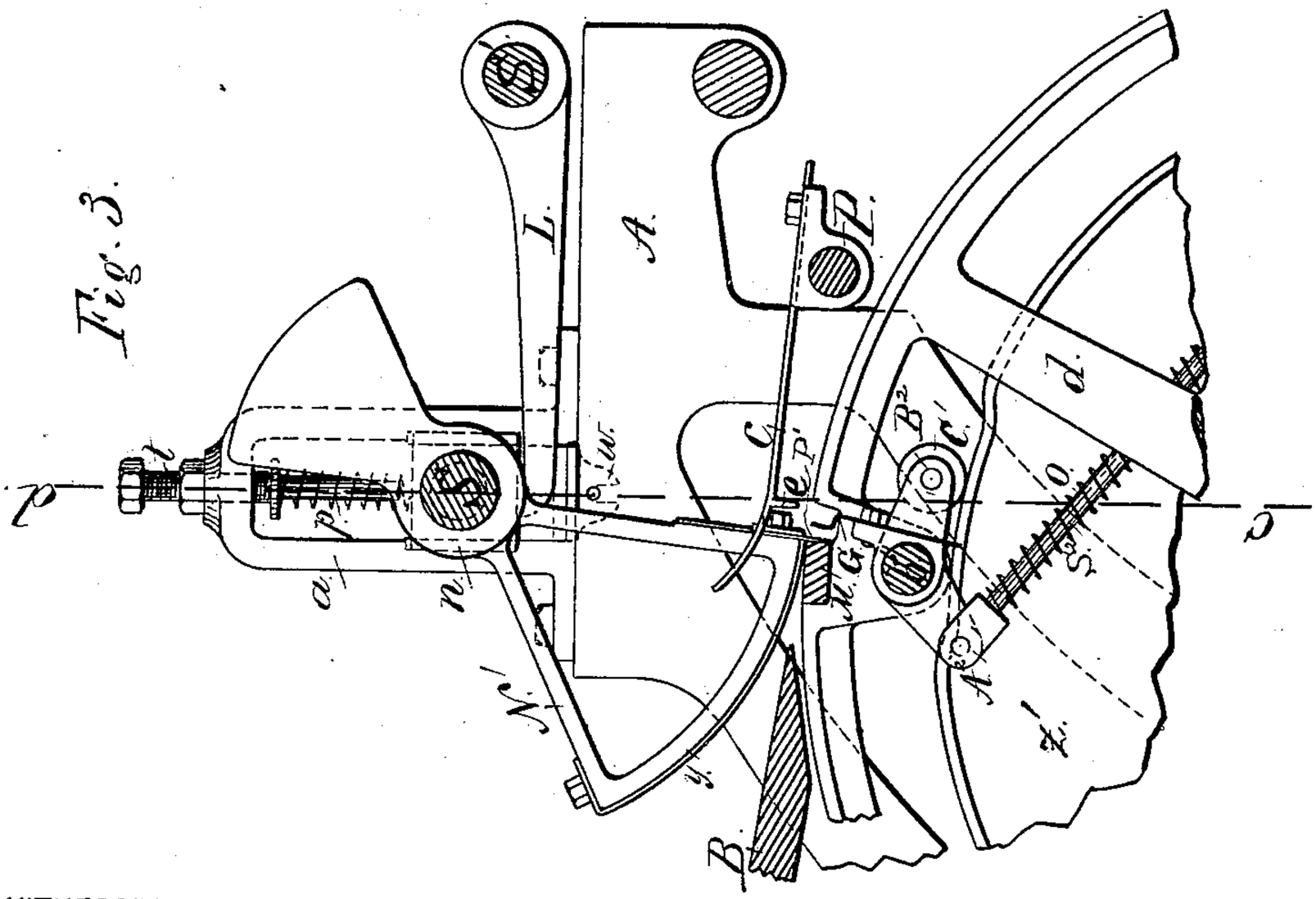

Fig. 3.

WITNESSES:

John Burkhardt
Chas. E. Carson.

INVENTORS:

Cyrus Chambers Jr.
William Mendham
per Joshua Pusey, Atty.

(No Model.) 4 Sheets—Sheet 4.

C. CHAMBERS, Jr. & W. MENDHAM.

MACHINE FOR FOLDING AND PASTING SHEETS OF PAPER.

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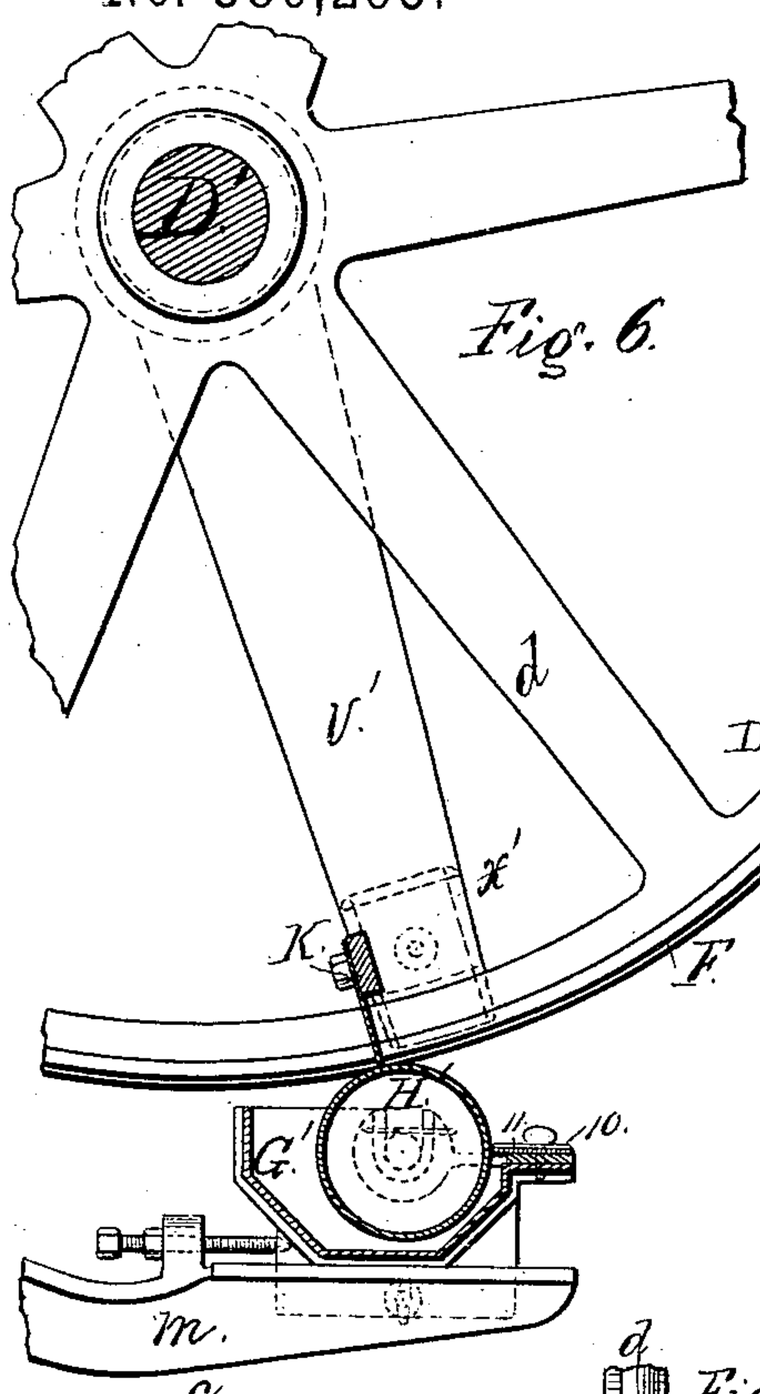


Fig. 6.

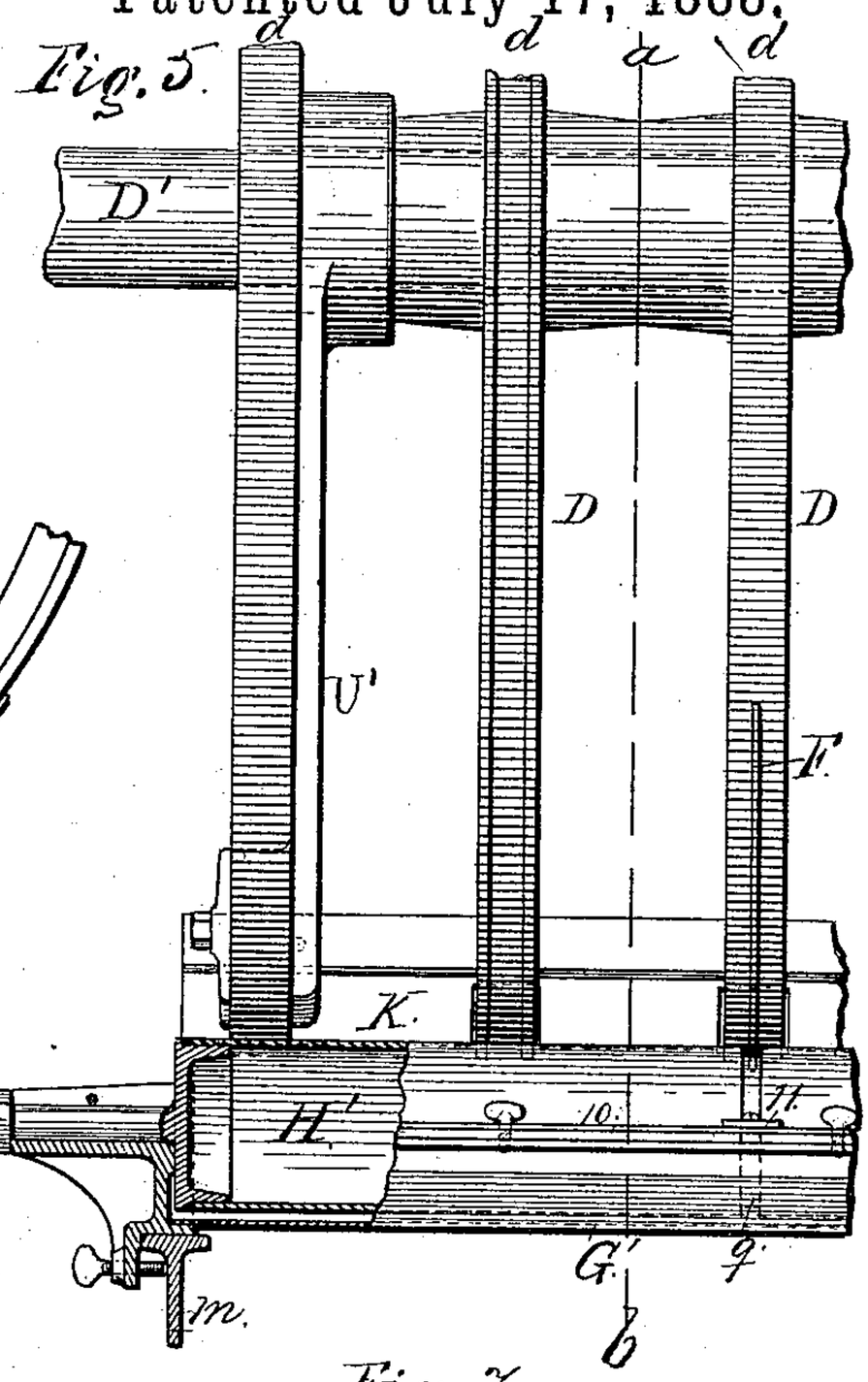


Fig. 5.

Fig. 7.

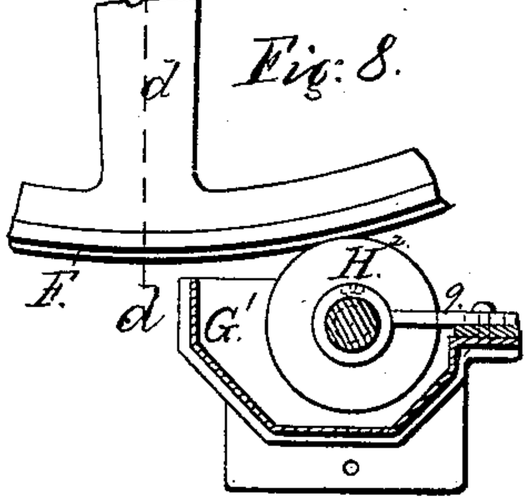
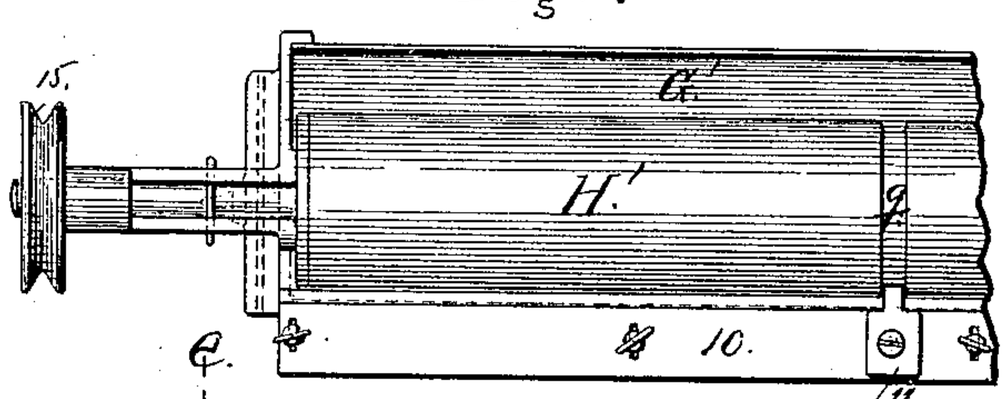


Fig. 8.

Fig. 9.



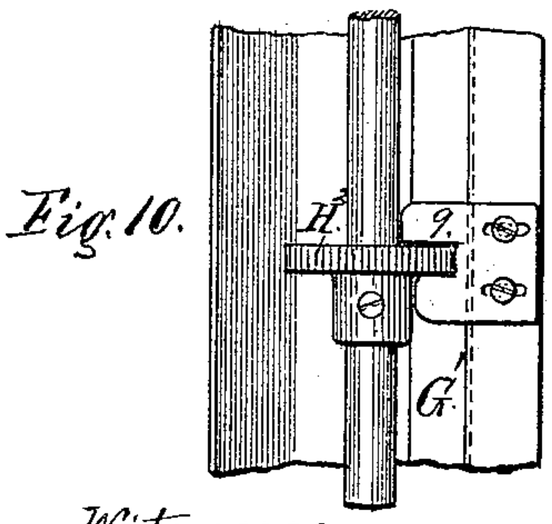


Fig. 10.

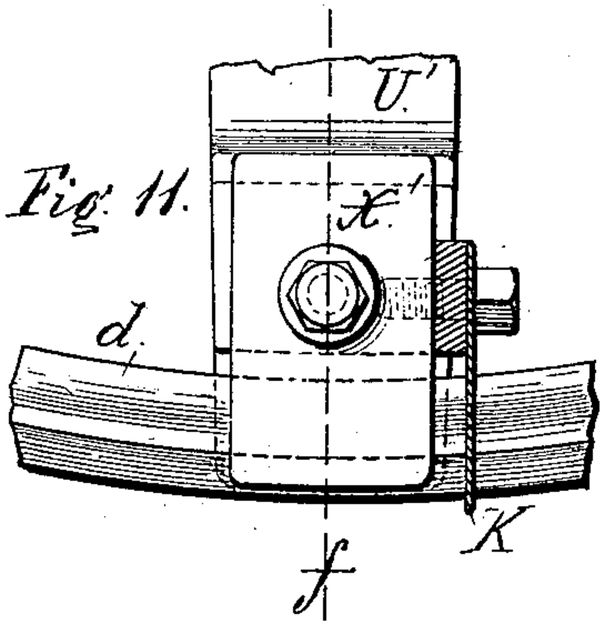


Fig. 11.

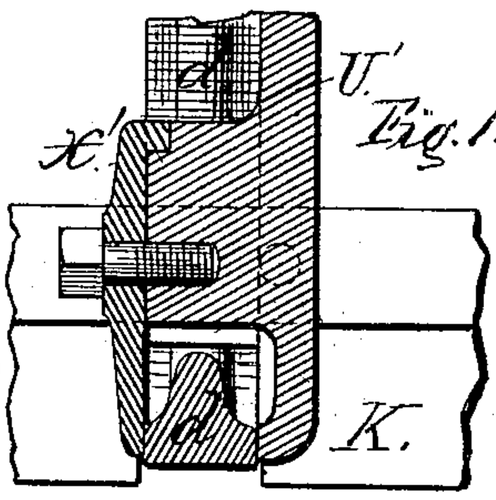


Fig. 12.

Witnesses.
John Burkhardt.
Wm. H. Carson.

Inventors:
Cyrus Chambers, Jr.
William Mendham,
per Joshua Pusey, atty.

UNITED STATES PATENT OFFICE.

CYRUS CHAMBERS, JR., AND WILLIAM MENDHAM, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNORS TO SAID CHAMBERS.

MACHINE FOR FOLDING AND PASTING SHEETS OF PAPER.

SPECIFICATION forming part of Letters Patent No. 336,295, dated July 17, 1888.

Application filed September 30, 1882. Serial No. 73,143. (No model.)

To all whom it may concern:

Be it known that we, CYRUS CHAMBERS, Jr., and WILLIAM MENDHAM, both citizens of the United States, and both residing at the city and county of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Machines for Folding and Pasting Sheets of Paper, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

Figure 1, Sheet 1, is a front elevation of part of a machine provided with our improvements. Fig. 2, Sheet 2, is a section on the line *a b* of Fig. 1. Fig. 3, Sheet 3, is a side view, enlarged, of that part of the main drum which carries the grippers, and of the feed-segments, showing the relative position of the latter at the moment when the forward end of the sheet is being seized by the grippers. Fig. 4 is a sectional view on line *c d* of Fig. 3. Fig. 5, Sheet 4, is a front elevation, enlarged, of a part of the main drum with the pasting devices for a sixteen-page sheet. Fig. 6 is a section on the line *a b*, Fig. 5. Fig. 7 is a plan view of the paste fountain and roller for sixteen-page sheets. Fig. 8 is an end view, partly in section, of the pasting devices for an eight-page sheet. Fig. 9 is a section on line *e d*, Fig. 8, of the rim of the drum-pulley which carries the paste-blade for an eight-page sheet. Fig. 10 is a plan view of the fountain and paste-wheel for an eight-page sheet. Fig. 11 is a side elevation showing the arrangement and mode of securing the paste-blade for a sixteen-page sheet to its carrying-arm and the mode of adjusting and securing the latter to the drum-pulley. Fig. 12 is a section on the line *e f*, Fig. 11.

Like letters of reference, where they occur in the several figures, always indicate the same parts.

This machine is of the class of folding and pasting machines known as "two-revolution" machines, which are designed to fold and paste a sheet of paper at every other revolution of the main carrier-drum D. It embodies several improvements, more especially upon a certain two-revolution machine, (for which an application for Letters Patent will be filed by us and Thorwald C. Damborg as joint inventors, simultaneously with the filing of the application for a patent for this machine,) whereby the gripping devices which take the forward ends of the sheets in succession upon the main drum are improved, also the pasting devices, and great simplicity, speed, and accuracy are attained.

In the accompanying drawings we show only such parts of the machine as we think sufficient for the clear understanding of our special improvements, as hereinafter described and claimed. Those parts which lie to the rear of the main drum, it will be understood, are similar in operation to other known folders.

Our machine has the usual inclined feed-table, B, from which the sheets to be folded and pasted are fed down one by one against the two or more stop-gages C, whose spurs *e* rest in grooves in the subjacent pulleys *d* of the skeleton drum D. These gages are adjustably secured upon a rock-shaft, which is oscillated to raise and to depress them by means of a suitable cam-and-lever system, not materially differing from that for a like purpose as described in the aforesaid application of ourselves with Thorwald C. Damborg.

The edge of the sheet rests upon the rotating drum D, remaining in contact with the spurs *e* of the gages until these are raised by the properly-timed operation of the devices just referred to. At this instant our improved gripping devices are brought into action to seize the sheet. These devices consist of a fixed bar, M, Figs. 2, 3, and 4, secured transversely at the periphery of the main drum D, and opposite thereto a series of elastic gripper-fingers, G, between the pulleys of the drum upon a shaft, *b'*, pivoted within the latter. The gripper-fingers are made to hold the forward end of the sheet against bar M and to let go the same at the proper times by suitable mechanism hereinafter described. These gripping or sheet-taking devices consist, also, of two or more "feed-segments," N', as we term them, carrying a transverse projecting blade, P', whose function is to bend over the forward end of the sheet against the edge of the bar M at the moment the stop-gages C are elevated and the rotating feed-segments have caught the sheet between their periphery and that of the drum. These segments are faced with

leather, *y*, Figs. 3 and 4, or other flexible material, in order to insure a firm hold of the sheet between them and the drum, and their blade P′ is slotted, so as to clear the pulleys of the latter and the stop-gages and gripper-fingers. They are rotated at the same surface speed as that of the main drum by the gear 1 and gear 2 on the shaft S, which carries the segments N′, and they are long-toothed gears, as it is not necessary to raise the segments while in motion out of contact with the drum, except at the times the sheets are to be gripped and the blade P′ descends to bend over the sheet against the bar M, as stated.

Segment-shaft S runs in vertically-movable boxes *n*, working in frames *a*, and the periodical upward movements of the shaft are produced by means of a lever, L, which takes under the extensions of the said boxes beyond the frames, and is vibrated upon its shaft S′ by means of a suitably-timed cam, 5, on the end of the cam-shaft H^3, which cam is connected with shaft S′ by levers L′ and rod N. (Shown in full lines, Fig. 1, and the positions of the same by dotted lines, Fig. 2.) This shaft S is caused to descend as the cam retrogrades by means of springs *p* upon the set-screws *t* or by gravity; and this downward throw may be checked at any desired point by means of wedges *w* between the boxes and the frame, which wedges are moved in or out by the adjustable carrier-bolts *j*, Fig. 4. When the blade P′ comes into position to bend the end of the sheet over the bar M, the gripper-fingers G must, of course, stand off from the drum, and immediately after the grippers have been forced to hold the bent-over portion of the sheet against the bar M the feed-segments, with their blade P, are elevated to clear the drum, and the opening of the grippers must be timed to let go the sheet at the instant the creasing-blade E has tucked the sheet into the bite of the nipper-roll H. This opening and closing of the grippers is attained by rocking the shaft *b′*, which carries them, in the following manner: The shaft is provided with a bell-crank at one end of the upper or outer arm, C′, which has a roller, B^2, in contact with the periphery of a stationary cam, Z′, which is bolted to the frame of the machine. The periphery of this cam is circular, with a break or depression, Z^2, in the upper side thereof, which depression the roller B^2 of the arm C′ is caused to follow by the action of a compression-spring, O, kept in place upon a rod, S^2, pivoted to the inner arm, A^2, of the bell-crank. This causes the shaft *b′* to rock, and thereby throw back the gripper-fingers from the bar M, thus releasing the sheet. As the drum D rotates, the roller B^2 rides up upon the circular part of the periphery of cam Z′, the same being concentric with the shaft of the main drum, and thus the grippers close upon the sheet and retain it in their grasp until released when the roller again reaches the depression Z^2. A sheet is fed in by the operator at every other revolution of the main drum. As this machine is intended to fold sheets of various lengths, it is obvious that the grippers must let go at different points in the revolution of the drum—that is, always when the creasing-blade E tucks the sheet into the bite of the nipper-cylinder H and the nipper-jaws take the sheet. A longer sheet must be released later—that is, its forward end carried farther around by the drum than a short one. This we regulate by means of an adjusting-segment, B^3, in the present instance pivoted on the shaft D′, secured to the cam Z′ by a bolt, 8, passing through a slot, 9, in the latter. The arc of this segment is on the same circle as that of the circular part of the cam Z′. The roller B^2 of the gripper-finger shaft, the face of which roller is made wide enough to extend over both of said cams, (see Fig. 4,) is allowed to drop into the depression Z^2 of cam Z′ sooner or later, accordingly as the supplemental cam-segment is shifted backward or forward. The farther forward it is brought in the direction of rotation of the main drum the later the roller B^2 drops and the gripper-fingers open. In the drawings this supplemental segment is shown in a position when not actually operating—that is to say, the machine is set to fold sheets of the shortest length which it is adapted to take.

We will now proceed to describe our improved devices for applying the first paste-line to, first, an eight-page sheet and then to a sixteen-page sheet as the same is being carried around upon the main drum. These consist, in the first instance, of a circular blade, F, inserted in and projecting a short distance beyond the periphery of the middle pulley of the drum, and a narrow-faced roller, H^2, rotating in an adjustable fountain, G′, beneath the drum. (See especially Figs. 6, 8, 9, and 10, Sheet 4.) This fountain is raised and lowered at the right intervals by means of levers *m* and *n* on rock-shaft B′, actuated by a suitable cam, C^3, on the shaft H^3, Fig. 2. The movement of this cam is timed so as to raise the paste-fountain, with its roller H^2, to deliver paste to the blade F during every idle revolution of the main drum and to depress the fountain so as to bring its roller out of contact at the turns of the drum when it is carrying a sheet to be pasted and folded. When a sixteen-page sheet is to be folded and pasted, the narrow roller is removed from the said fountain and a long roller, H′, substituted. It is provided with a groove, *q*, Figs. 5 and 7, in the middle in order to prevent the blade F from taking paste when this long roller is used. Adjustable slickers 9 and 10, respectively, are used with these paste-rollers in order to remove any surplus of paste. A scraper, 11, Figs. 5 and 7, is also employed in connection with the long roller, so as to prevent paste from collecting in the groove *q*.

The blade for applying paste to the first paste-line of a sixteen-page sheet (which paste-line is always at right angles to that of the eight-page sheet) is marked K where shown in the drawings. It projects a short distance

beyond the main drum and is adjustably secured to adjustable arms U′ upon the drum-shaft D′. (See Figs. 1, 2, 5, 6, 11, and 12.)

Arms U′ are held in place by means of clamps X′, which bind them to the sides of the two outer pulleys of the drum, respectively. The arms U′ are made thus adjustable on the arc of the main drum in order to bring the blade K to the proper relative position to suit the length of the sheets to be pasted. The cam C^3 is adjusted so as to elevate and depress the paste-fountain G′ at the proper times, in the same way as when the latter is carrying the roller H^2. These paste-applying rollers are caused to rotate at the same surface speed as that of the main drum by means of a system of pulleys and belts, 12, 13, 14, and 15, driven from the main shaft C^2 of the machine.

It will be seen that the first paste-lines are applied to the inner surface of the sheets, which is also the case in the machine hereinbefore referred to, for which an application for a patent is filed by us with Thorwald C. Damborg, but by a different combination of mechanism.

The creasing-blade E is adjustable with relation to the main drum, so that its relative position with regard to the paste-blade K and the depression Z^2 of the cam may be changed to suit the various lengths of sheets which the machine is designed to fold. To this end the said creasing-blade is secured to arms U, pivoted on the main shaft D′, and each of these arms has a curved slot, a', through which passes a bolt, b'', whereby the blade-carrying arms are fastened to the adjacent spokes, respectively, of the main drum. The required adjustment may readily be made when the blade is between the nippers of the nipper-roll H, as in Fig. 2, by simply loosening the bolts and then turning the main drum either way, as circumstances require.

The most important and valuable of the improvements hereinbefore described is that of the gripping or sheet-taking mechanism, whereby the sheets are safely taken by the main carrier-drum (running at a higher velocity than heretofore practicable with such machines) with a positive and certain action, noiselessly, and without tearing of the sheets by the gripping devices. This tearing of the sheet in the act of overcoming its inertia has heretofore been in the way of a more rapid running of the machines; but now, the forward end of the sheet being bent and held over the bar M, a hold or line of resistance is given along the entire width of the sheet.

It will be observed that the gear 2 on the feed segment shaft S engages with the gear 1 on the drum-shaft D′, and the gear 1^a on the end of shaft D′ engages with a gear on the nipper-shaft C^2, (which gear is not shown, it being directly in the rear of gear 1^a in Fig. 1.) By this arrangement the position of the main drum D with relation to both the feed-segments and the nipper-roll H always remains the same as the parts rotate, which, it is obvious, is essential to the successful operation of the described devices, which respectively take the sheet upon the drum and from the same.

We claim—

1. In a folding-machine, the combination, with the rotary main drum having mechanism for gripping and releasing the sheets of paper, substantially as described, of the rotary feed-segments mounted in reciprocating bearings, and the blade, all arranged substantially as and for the purpose set forth.

2. The vertically-reciprocating rotary feed-segments and blade, the stop-gages, the cam Z′, and the main drum provided with the transverse bar M, and the coacting gripper-fingers G, and the creasing-blade E, all constructed, combined, and operating substantially as and for the purposes set forth.

3. The combination, with the rotary main drum having mechanism for gripping and releasing the sheets of paper and the cam, both substantially as described, of the adjustable supplemental cam, the rotary feed-segments mounted in the reciprocating bearing, and the adjustable folding-blade, as and for the purpose set forth.

4. The combination, with the main drum and its gripping mechanism, of the feed-segments formed with the blade and having the shaft mounted in movable boxes, and the lever L on rock-shaft S, actuated by mechanism substantially as described, as and for the purpose set forth.

5. In combination with the main drum provided with the paste-blade F in the arc of a circle concentric with the drum, the paste-fountain provided with the roller H^2, substantially as shown and described.

6. In combination with the main drum provided with the paste-blades F and K, the vibrating fountain G′, adapted to receive either a narrow-faced roller for applying paste to the blade F or a long-faced roller for applying paste to the blade K, substantially as set forth.

7. In combination with the drum and a pasting-blade thereon, the vibrating paste-fountain G′, provided with a roller rotated at a surface speed equal to that of the said drum, substantially as stated.

8. The drum D, having the adjustable creasing-blade E and the grippers G, its shaft D′, carrying the gears 1 and 1^a, the feed-segments, their shaft S, with gear 2, the nipper-roll, and its shaft C^2, having a gear which engages with the gear 1^a on shaft D′, all combined, arranged, and operating substantially as and for the purpose described.

In testimony whereof we have hereunto affixed our signatures this 15th day of September, A D. 1882.

CYRUS CHAMBERS, JR.
WILLIAM MENDHAM.

Witnesses:
MARY P. CHAMBERS,
S. B. CHAMBERS.