

(No Model.)

2 Sheets—Sheet 1.

B. W. CHILD, J. KEATING & M. B. FOY.
SHEET SEPARATING MACHINE.

No. 567,263.

Patented Sept. 8, 1896.

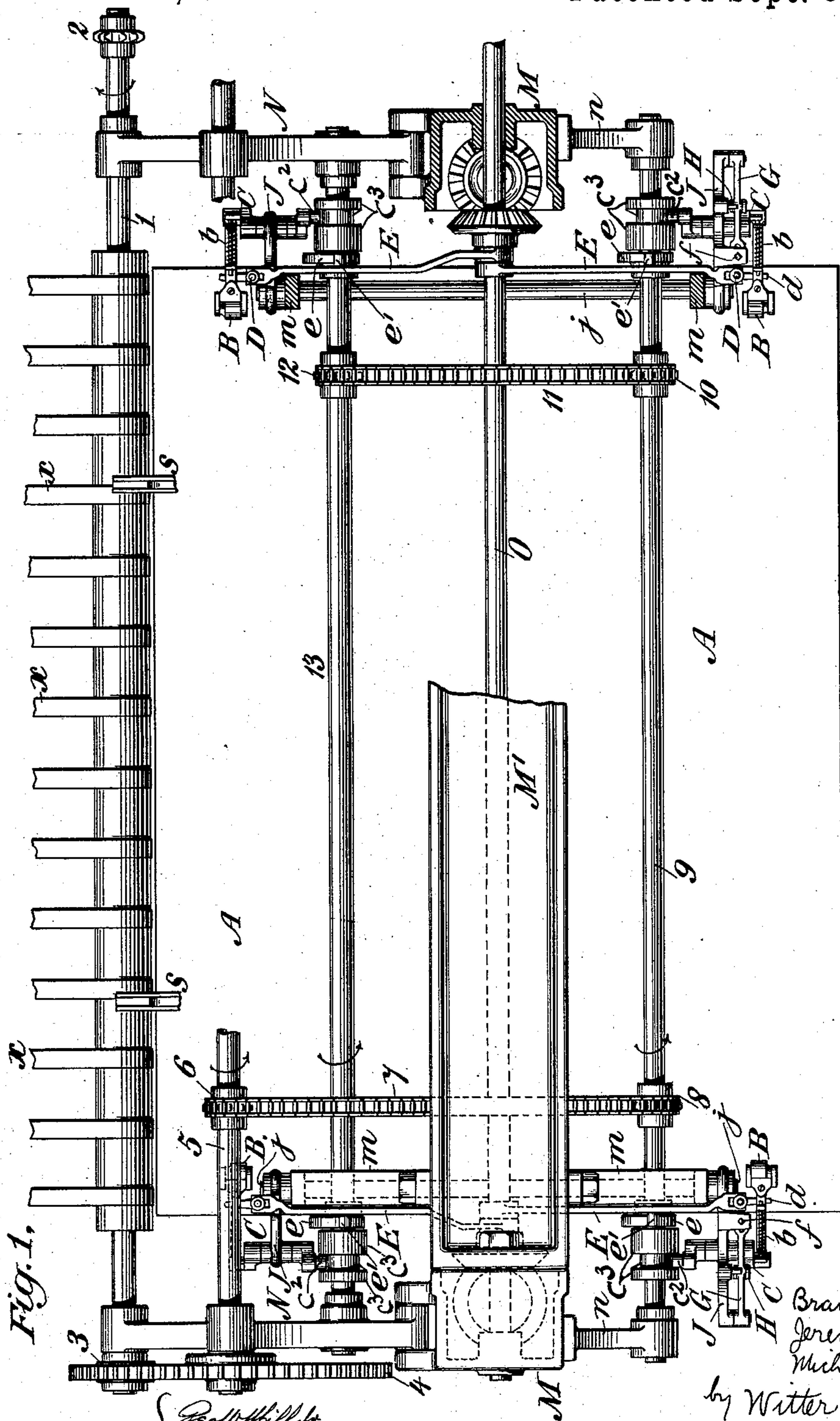


Fig. 1.

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(No Model.)

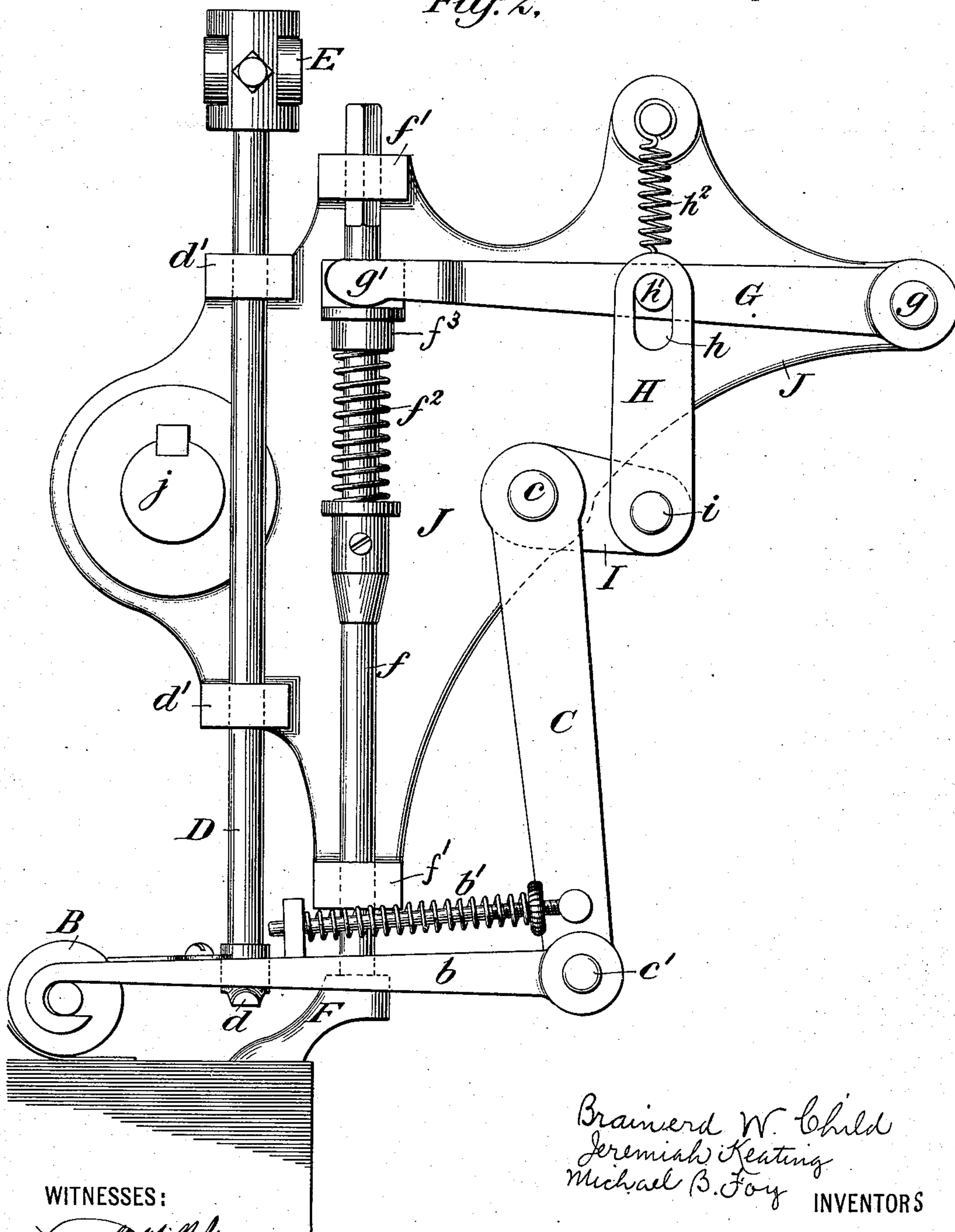
2 Sheets—Sheet 2.

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Fig. 2.



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UNITED STATES PATENT OFFICE.

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SHEET-SEPARATING MACHINE.

SPECIFICATION forming part of Letters Patent No. 567,263, dated September 8, 1896.

Application filed February 2, 1895. Renewed May 29, 1896. Serial No. 593,674. (No model.)

To all whom it may concern:

Be it known that we, BRAINERD W. CHILD, residing in Boston, and JEREMIAH KEATING, residing in Lawrence, State of Massachusetts, and MICHAEL B. FOY, residing in the city and State of New York, citizens of the United States, have invented certain new and useful Improvements in Paper-Feeding Machines, of which the following is a specification.

Our invention relates to paper-feeding machines in which sheets of paper are fed successively from a pile of sheets to a printing-press, ruling, folding, calendering, or other machine in which sheet-paper is operated upon.

It has for its object to feed such sheets successively one by one more surely and in a better manner than has heretofore been done, and to prevent the feeding of more than one sheet at a time; and it consists of the improvements more particularly set forth and recited in the claims at the end of this specification. Heretofore sheets of paper have been fed by buckling the top sheet at one or both of the rear corners of the sheet by any suitable buckling device, the top sheet being buckled between the moving buckling device and a stationary holding-down finger pressing upon the top sheet a short distance from the buckling device, then holding the under sheets down at the rear corner or corners by any suitable pressure device, and at the same time removing the top sheet by any suitable device for feeding it forward onto the tapes. Such buckling and holding devices have uniformly been applied to the rear part of the sheet. Such paper-feeding machines have been subject to the serious objection that it seemed impossible to prevent the frequent feeding of two or more sheets at a time. We have discovered that by buckling the sheets at their front as well as at their rear, and by using a presser-foot at the rear to hold down the sheets underlying the top one, all of these defects are removed. The sheets are fed singly one by one with certainty and precision, and the underlying sheets remain flat and waveless and in their proper places, all ready in their turn to be fed singly and successively to the receiving-tapes. Moreover,

with our improved device no holding-down finger is required to press upon the top sheet a short distance from the buckling device.

Figure 1 represents a top or plan view of a paper-feeding machine containing our improvement, and Fig. 2 is a side elevation of one of the rear buckling-heads.

The drawings omit all the parts of the paper-feeding machine which do not form a part of the invention or which are not necessary to show the mode of operation of the invention and its relation to the rest of the machine.

A is the feed-table upon which are piled the sheets of paper to be fed.

M M' and m and j are different parts of the framework of the paper-feeding machine, which support and carry the different shafts and other parts of the machinery.

x x x represent the tapes usually employed for receiving and carrying away the sheets of paper as they are fed forward by the machine.

J J are the buckling-heads. These are placed at the front and rear corners of the feed-table. Preferably one of these heads is employed at each of the four corners of the feed-table, as shown in Fig. 1. Fig. 2 represents a side view of a buckling-head as employed at the rear of the table. This head contains a buckling device B, operated by suitable machinery, and a presser-foot F, adapted to hold down the sheets underlying the top one while the latter is being fed forward. The particular form of these devices, and the cam and other machinery by which they are actuated, form no part of this invention. In order, however, that a clear understanding of the invention may be had, we will now proceed to describe the particular form of devices shown in the drawings.

The tapes x x x are mounted on an enlarged portion of the shaft 1, to which motion in the direction of the arrow is imparted in any usual manner through the sprocket-wheel 2. A pinion 3 on the other end of shaft 1 gears with a spur-wheel 4 on the shaft 5, thereby imparting rotation, as indicated by the arrow, to that shaft. The chain or belt 7 communicates this motion to the shaft 9, and the lat-

ter, through chain 11, to the shaft 13. These various shafts, through cams and other mechanical devices presently to be described, give the various movements to the buckling-rollers, presser-feet, and other moving parts.

The rear buckling-head J has a buckling device or roller B, which may be of any suitable construction. It is mounted, as shown, on the arm b , which is loosely pivoted at c' to the bell-crank C, mounted on the pivot c , the latter a part of the framework of the head J. The full bell-crank C is shown in Fig. 1, but only the lower part of it is contained in Fig. 2. The upper part has a finger c^2 , which, by cam c^3 on shaft 9, is moved backward and forward in the direction of the length of the said shaft as the shaft revolves. This movement of rock-shaft C alternately pushes the roller B to the left, thus buckling up the top sheet, as shown in Fig. 2, and then retracts the roller to its former position. The spring b' tends to press the roller B down upon the top sheet during the forward buckling operation. During its backward movement the buckling-roller is lifted upward from the surface of the paper by means of the rod D and its projecting toe d . This rod D works up and down in bearing d' d' in the frame J. At its lower end it has a horizontal extension-toe d , which extends under the arm b and has a slight upward projection on the end, so that as rod D is lifted toe d grasps and lifts arm b and roller B. At its upper end rod D is pivoted to bar E, loosely mounted at its other end to the stationary rod O. A vertical oscillating movement is communicated to bar E, and through it to rod D, by means of a projecting lug e' on bar E striking against cam e on shaft 9. This cam is so arranged as to lift bar E, rod D, toe d , and arm b and roller B as soon as the roller has completed its forward or buckling movement. In this way roller B in its return does not tend to pull back the top sheet.

F is a presser-foot adapted, normally, to bear down lightly upon the sheets, so that the buckling-roller may in the first part of its forward movement readily pull the top sheet out from under the presser-foot, whereupon by suitable devices hereinafter to be explained the presser-foot at once presses down upon the underlying sheets with greatly-increased force, thereby preventing the said underlying sheets from being affected either by the buckling action of the roller upon the top sheet or the feeding of the top sheet to the tapes. The presser-foot is an integral part of the rod f , mounted in bearings f' f' of the frame J and capable of vertical motion in said bearings. A spring f^2 is coiled around one part of the rod f and is secured at its lower end to the rod f and at its upper end to a collar f^3 , also mounted on rod f and capable of sliding up and down on said rod. An arm G, loosely pivoted in the framework at g , has a thumb g' at its free end, which is adapted to bear at times against the upper

surface of collar f^3 , and a pin h' , working in a slot h of the rod H.

Rod H is pivoted at i to arm I, securely fastened to rock-shaft C. These parts are shown in Fig. 2 in the positions assumed by them when the buckling-roller has completed its forward or buckling movement. As the roller returns with the swinging of the lower part of bell-crank C upward and to the right, arm I is swung up, carrying with it rod H and slot h , releasing arm G from downward pressure and allowing thumb g' to rest lightly on collar f^3 or be raised from it by spring h^2 , and the spring f^2 exerts no downward pressure upon rod f and presser-foot F. When, however, roller B begins its next forward or buckling movement, arm I and rod H are pulled downward. The upper end of slot h strikes against pin h' and pulls arm G downward, thereby causing thumb g' to press strongly against collar f^3 and compress spring f^2 . This spring thereupon exerts a strong downward pressure against rod f and presser-foot F. The movements are so timed that this pressure is not exerted upon F until the buckling-roller B has removed the corner of the top sheet from under the presser-foot. This presser-foot, preferably, is not used at the front of the paper-feeding table, although it may also be used there, if desired. The drawings show it as used only with the rear buckling-heads. When the buckling-finger is raised from the top sheet at the end of its forward or buckling stroke, the buckled portion of the sheet is released by the finger and again straightened out with its edge overlapping the presser-foot.

The devices S S for feeding the paper forward are not shown in detail, as any devices may be employed for feeding the sheets to the tapes.

By buckling at both front and rear of the top sheet the air works in under the top sheet, separating it from those underneath, thus aiding in its removal without disturbing the underlying sheets, and the underlying sheets being firmly gripped and held at the rear by the presser-feet are the better able to withstand the forward pull of the top sheet as it is fed forward, and they are moreover prevented from becoming wavy or from creasing. By our improvement, accordingly, only one sheet can be fed at a time, and the underlying sheets are maintained in their proper position and condition.

It has been found in practice that when the buckling devices at the front and rear corners of the sheet on the same side of the machine are actuated so that the front and rear portions of the sheet are buckled simultaneously a kink is formed in the sheet where the two buckled portions of the sheet meet at an angle to each other. This is particularly liable to happen when operating upon heavy or comparatively stiff paper, thereby damaging the sheet and rendering the same worthless in the production of fine printed work.

In order to avoid this kinking of the sheets, the front and rear buckling devices are so timed that they work successively and not simultaneously. The rear corners of the sheet are buckled first by the rear buckling devices and then allowed to straighten out again by lifting the buckling devices from the top sheet, after which the front corners of the sheet are buckled by the front buckling devices and then allowed to straighten out again by raising the front buckling device. By this relative timing of the front and rear buckling devices the front and rear portions of the sheet cannot be buckled at the same time, thereby avoiding damaging and wasting of the sheets, which would otherwise result, and also allowing the air to enter underneath the top sheet and separate the same more thoroughly from the next following sheet. It is advantageous to buckle the rear corners first when feeding-off devices are used which take hold of the buckled front edge of the sheet, but otherwise it is sufficient to buckle the front and rear corners successively.

By the use of our improved device holding-down fingers, to press upon the top sheet and hold it while the buckling-roller is buckling the sheet, may be dispensed with.

What we claim as new, and desire to secure by Letters Patent, is—

1. In a paper-feeding machine, the combination with the feed-table supporting the pile of sheets, of a buckling device arranged over the rear portion of the table and adapted to

buckle the rear corner of the sheet, a buckling device arranged over the front portion of the table and adapted to buckle the front corner of the sheet and actuating mechanism connected with both of said buckling devices and so timed that said buckling devices are operated successively, substantially as set forth.

2. In a paper-feeding machine, the combination with the feed-table supporting the pile of sheets, of a rear buckling device adapted to engage with the rear corner of the sheet and buckle the same during its forward movement and to be lifted from the sheet at the end of its forward movement, a front buckling device adapted to engage with the front corner of the sheet and buckle the same during its forward movement and to be lifted from the sheet at the end of its forward movement, and actuating mechanism connected with both front and rear buckling devices and so timed that the rear buckling device is moved forward in contact with the top sheet and then lifted therefrom while the front buckling devices remain inactive, after which the front buckling device is moved forward in contact with the top sheet and then lifted therefrom, substantially as set forth.

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