

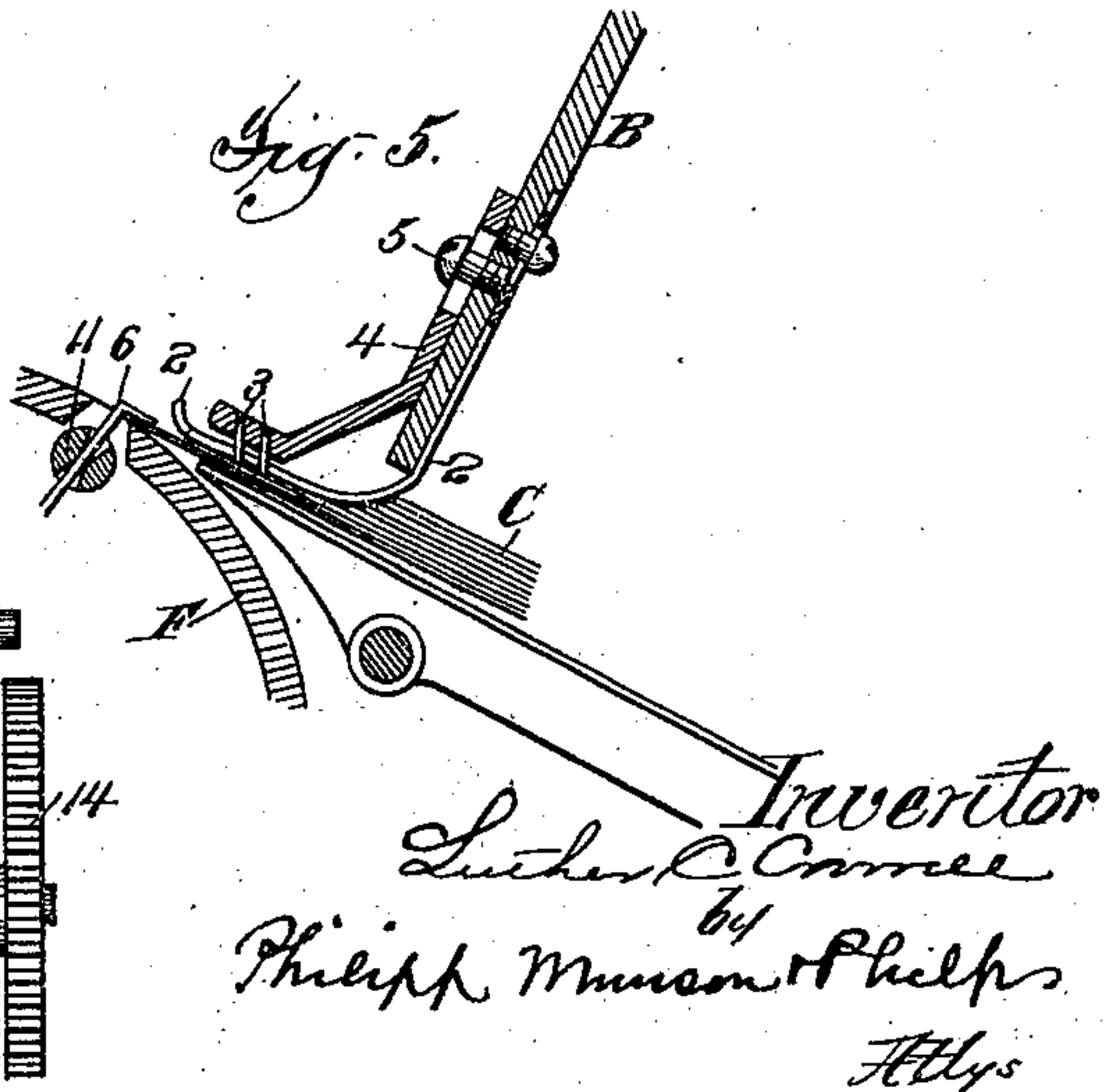
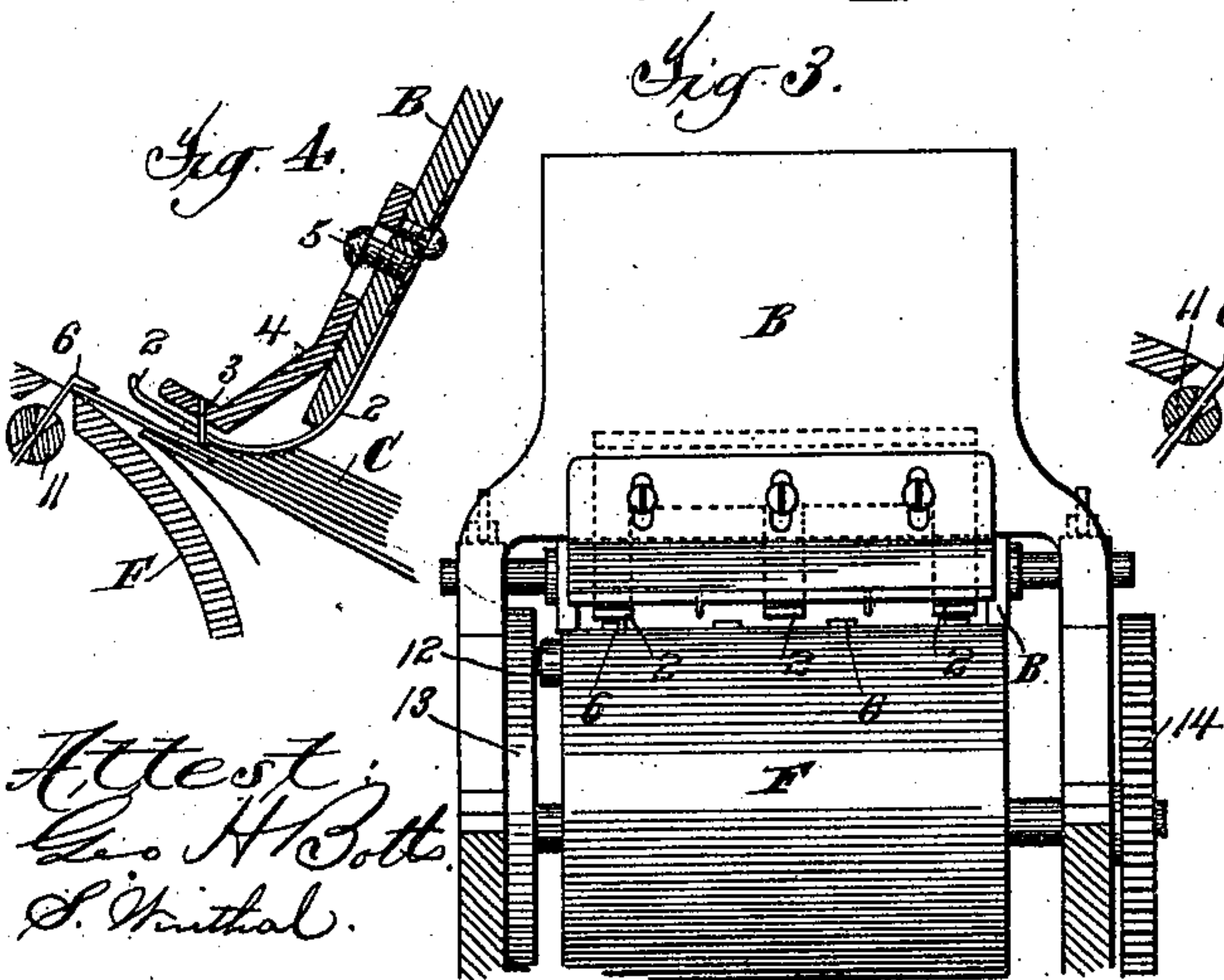
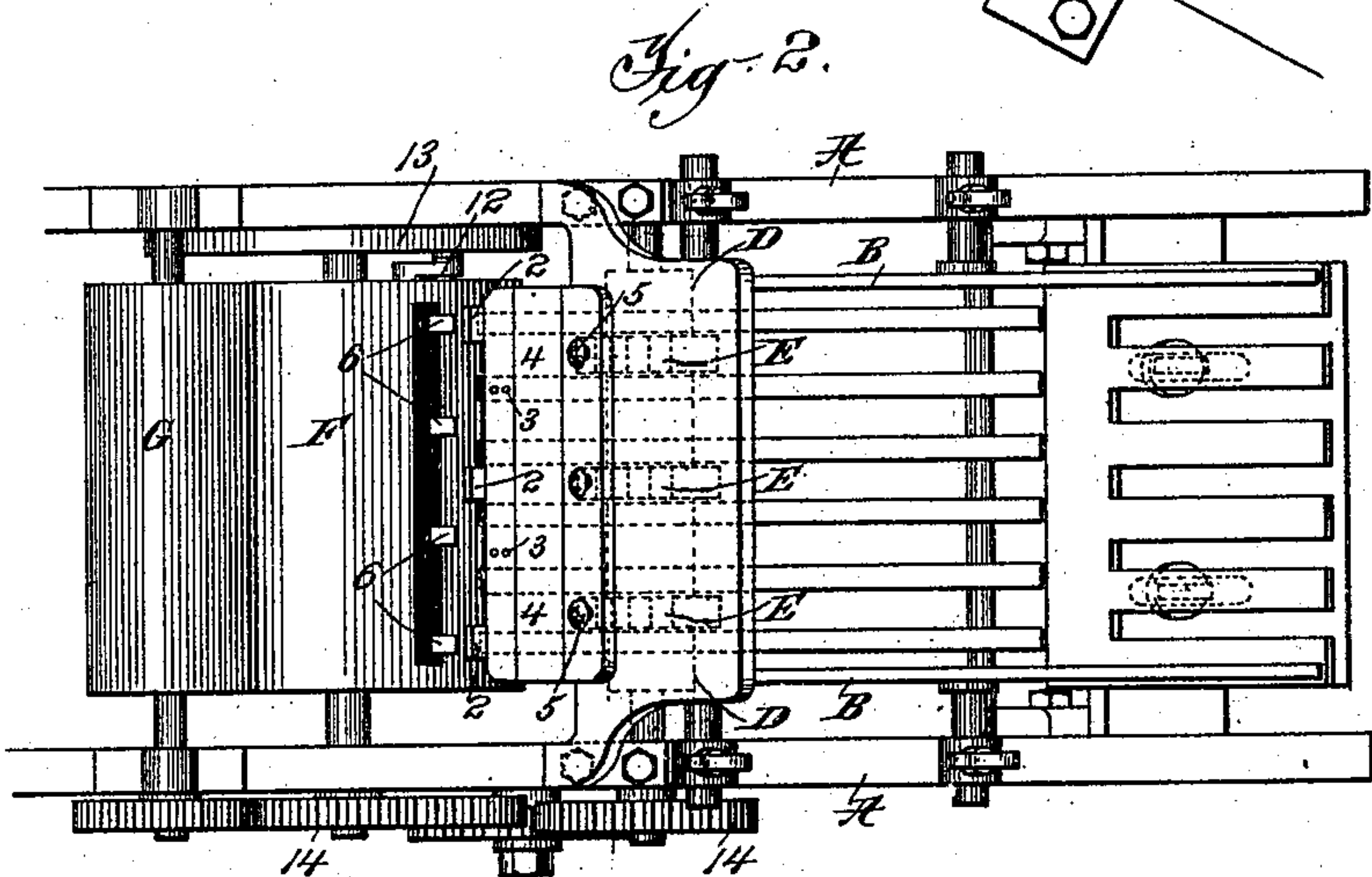
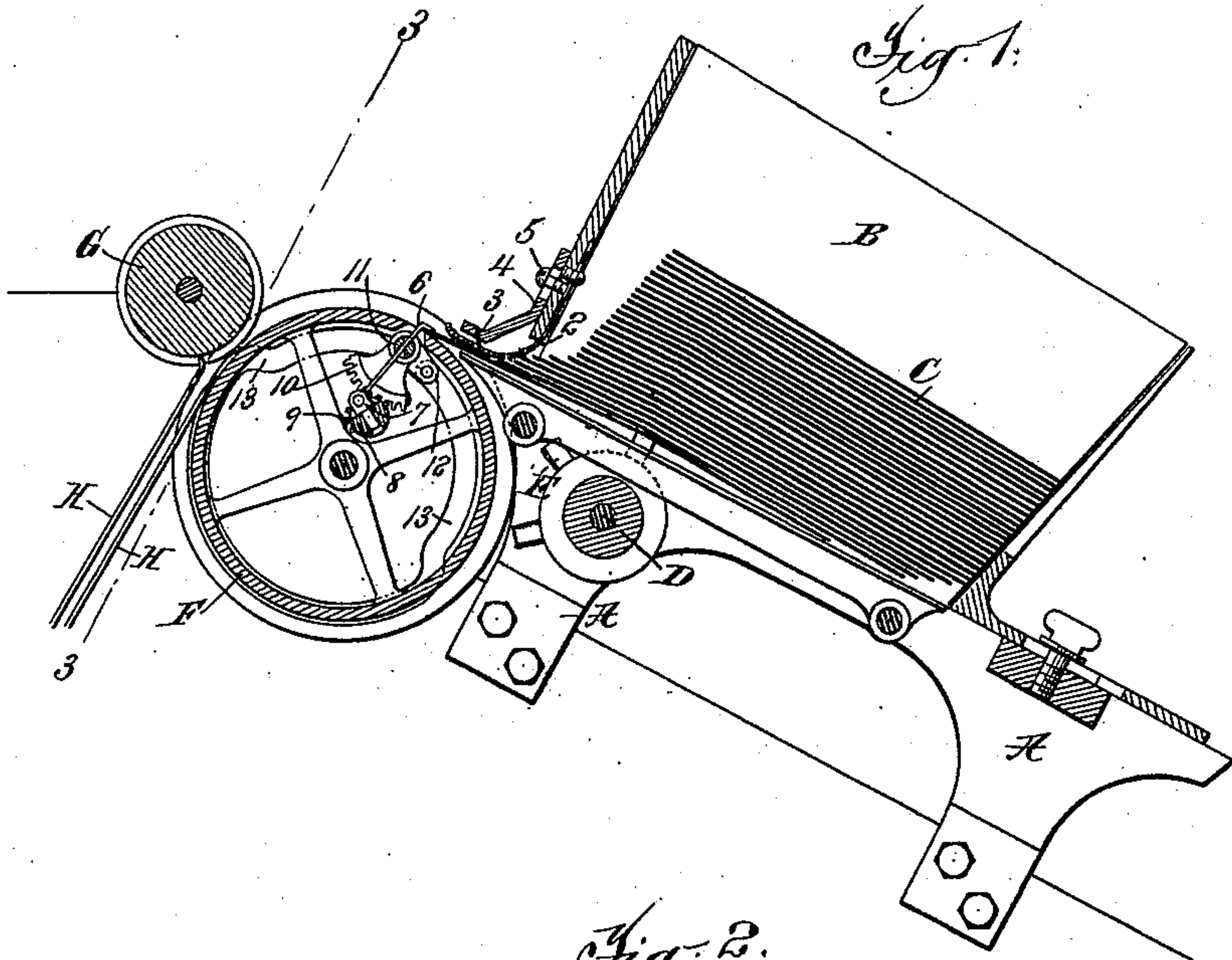
(No Model.)

L. C. CROWELL.

METHOD OF AND MEANS FOR FEEDING SHEETS FROM A PILE.

No. 486,089.

Patented Nov. 15, 1892.



UNITED STATES PATENT OFFICE.

LUTHER C. CROWELL, OF BROOKLYN, ASSIGNOR TO ROBERT HOE, STEPHEN D. TUCKER, THEODORE H. MEAD, AND CHARLES W. CARPENTER, OF NEW YORK, N. Y.

METHOD OF AND MEANS FOR FEEDING SHEETS FROM A PILE.

SPECIFICATION forming part of Letters Patent No. 486,089, dated November 15, 1892.

Application filed November 2, 1891. Serial No. 410,636. (No model.)

To all whom it may concern:

Be it known that I, LUTHER C. CROWELL, a citizen of the United States, residing at Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Methods of and Means for Feeding Sheets from a Pile, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

The object of the present invention is to provide an improved method of and means for feeding sheets of paper and similar material from a pile, whereby the sheets may be fed singly with certainty.

In feeding bottom sheets from a pile it is found difficult to secure the feeding of the sheets singly, as the bottom sheet tends to carry with it one or more of the sheets above it, on account of adhesion of the sheets, which have heretofore been placed either in a horizontal position or inclined in a vertical plane and the bottom sheet fed down the incline, in both of which cases the weight of the pile increases largely the difficulty of feeding the sheets singly by increasing the adhesion between the sheets, and, in the latter case, by constantly tending to carry the sheets downward in the direction of the feed.

In my improved method of feeding I reduce the weight supported by the bottom sheet and at the same time cause the weight of the pile to assist in securing the proper feeding of the sheets by inclining the pile of sheets vertically and feeding the bottom sheet up the incline. By thus positioning and feeding the sheets it is evident that the weight of the pile tends to prevent the feeding of a second sheet by adhesion, as the weight of the sheets tends to resist their feeding up the incline, and by supporting the pile at the rear edges of the sheets the full weight of the pile is not borne by the bottom sheet, thus lessening the increase of adhesion due to the weight of the pile. I prefer, also, to advance the bottom sheet partially from the pile by pressure against its lower surface, the sheet being fully withdrawn from the pile by other means and to release the sheets by the first feeding mechanism during the action of the mechanism by

which they are withdrawn, so that between each feeding operation the weight of the pile shall cause the sheets to settle back down the incline into their original positions, in case any are carried forward with the bottom sheet, this movement tending to loosen and separate the sheets. I find, also, that it is of assistance in securing the proper feeding of the sheets to lift the pile of sheets slightly upon the line of engagement of the feeding mechanism with the bottom sheet during its feeding operation, so as bend the pile of sheets slightly, the sheets returning to their normal positions upon the release of the bottom sheet by the feeding mechanism. By thus lifting the sheets and allowing them to fall, an additional loosening and separating of the sheets is secured, which, in connection with the features previously described, aids in securing the proper feeding of the sheets.

In carrying out my invention any suitable feeding mechanism may be employed; but I prefer to use one or more rotating feeding-fingers projecting through openings in the bottom of the holder containing the pile of sheets sufficiently to lift the pile of sheets upon the line of engagement, the feeding-fingers engaging the sheet only during a part of their rotation, so as to release them, as above described, when the bottom sheet has been advanced to the second feeding mechanism, by which it is withdrawn from the pile. I prefer, also, to employ a series of fingers so constructed as to alternately engage and release the sheets, so that a rapid vibrating movement of the sheets is secured during the operation of feeding, which tends to loosen and separate the sheets.

The mechanism for carrying out my improved method may be used alone; but I prefer to combine therewith means for stopping a second sheet which may by any possibility be fed forward with the bottom sheet, the complete construction thus forming a mechanism by which sheets may be fed from a pile singly with almost absolute certainty. I have devised an improved means for thus stopping the sheets, which in itself forms a part of my invention.

In my improved stopping devices I employ one or more spring-fingers, beneath which the sheets pass, and one or more stops which extend downward beside said fingers, but do not normally project below them, so that a single sheet will pass freely beneath the spring-fingers without engagement with the stops. On the passage of two or more sheets beneath the spring-fingers, however, they are raised sufficiently to uncover and expose the stops, which then engage the second sheet to prevent its passage. These stops may consist simply of blunt pins or plates and the spring-fingers and pins be so constructed and arranged that the fingers are raised by the sheets to uncover the stops in advance of the second sheet, the head of which is then engaged by the stops. The stops may, however, consist of sharp pins and the spring-fingers be so constructed and arranged that they are not raised to uncover the pins until the leading edge of the second sheet has passed the latter, when the pins engage the top of the sheet and act as stops. In this latter construction a comparatively-large number of pins will preferably be used, so that the sheet will be held at many points, thus avoiding the danger of tearing the sheet.

For a full understanding of my invention it is shown in the drawings accompanying this application as embodied in a simple mechanism, and a detailed description of the same will now be given, and the features forming my invention specifically pointed out in the claims.

Referring to the accompanying drawings, Figure 1 is a vertical section of a sheet-feeding mechanism embodying my invention in its preferred form. Fig. 2 is a plan view of the same. Fig. 3 is an end section on the line 3 3 of Fig. 1. Fig. 4 is a detail section on an enlarged scale showing the stops engaging the head of a second sheet. Fig. 5 is a similar section showing the stops engaging the top of a second sheet.

Referring to said drawings, A is the frame on which is supported the sheet-holder B, which may consist of a box or receptacle of any suitable form for supporting the sheets C in the pile and holding them in proper position. As shown, the box is constructed with its sides and rear end adjustable to accommodate sheets of different widths and lengths; but it will be understood that this feature is immaterial so far as the present invention is concerned. The holder B is inclined vertically to secure the proper feeding of the sheets, as above described. As shown, the holder is placed at a slight angle to the horizontal; but it will be understood that this angle may be varied within wide limits from a slight angle to nearly ninety degrees, this depending somewhat upon the character of the sheets to be fed and the form of feeding mechanism employed. The bottom of the sheet-holder B is provided with openings through which the

sheet for advancing it, these openings being preferably provided, as shown, by making the bottom of a series of slats 1 so that the sheets are supported by a comparatively-small portion of their surfaces. With the inclined sheet-holder any suitable feeding mechanism may be employed for advancing the bottom sheet up the incline; but I prefer to use the following construction, as shown: In the frame A, below the holder B, is mounted a feeding-cylinder D, which is provided with projections forming series of feeding-fingers E, which occupy but a portion of the circumference of a circle, so as to engage the bottom sheet during only a sufficient part of their rotation to advance the bottom sheet from the pile, so as to be taken by a second feeding mechanism by which it is withdrawn from the pile. The fingers are shown as narrow, so that three sets are used extending across the sheet; but it will be understood that this is immaterial, and single fingers extending the full width of the sheet may be used or fingers of any width and number transversely to the sheet. These feeding-fingers E are preferably made of rubber or roughened to increase the friction between them and the bottom sheet and preferably extend within the box a sufficient distance to lift the pile of sheets slightly upon the line of engagement of the fingers with the bottom sheet during the feeding movement, when the fingers pass out of engagement therewith, this bending and alternate lifting and falling of the sheets tending to loosen and separate them, so as to secure the feeding forward of the bottom sheet independently of the others, as above explained. I have shown a plurality of feeding-fingers extending in an arc of a circle longitudinally of the sheets and so arranged that the sheets are released by one finger before being engaged by the next, and I prefer this construction, as a rapid lifting-and-falling movement of the pile of sheets is thus secured during the feeding movement, which materially aids in loosening and separating the sheets. It will be understood, however, that a single feeding surface or finger of the thickness required to secure the full feed desired may be used and the release of the sheets at the end of the feeding movement be depended upon for the lifting and dropping of the sheets. It is evident, also, that a series of feeding-fingers extending through a complete circle may be used and the lifting and dropping of the sheets by the successive fingers be depended upon to separate and secure the proper feed of the sheets.

While it will generally be found that the inclined position of the pile of sheets and the special feeding means above described will secure the proper feeding of the sheets singly, I prefer to combine therewith means for stopping a second sheet in case the adhesion between two or more sheets should be sufficient to cause them to be fed forward together by the feeding-fingers, and I have de-

vised the following improved means for this purpose:

Upon the inner side of the front end of the box curved spring-fingers 2 are mounted, so as to permit a single sheet to pass freely below them but to bear upon a second sheet advanced by the feeding-fingers sufficiently to aid in preventing more than one sheet being fed forward at a time. The resistance of the spring-fingers, however, is preferably not so great but that the sheets may in some cases be fed forward below them, and to insure the stoppage of a second sheet I combine with the spring-fingers 2 a series of stops 3, which are shown as pins carried by a plate 4, mounted upon the outside of the front end of the sheet-holder, these stops extending downward beside the spring-fingers, but normally not below them, so that they are covered by the spring-fingers during the passage of a single sheet, and the latter passes freely without engaging the stops. The spring-fingers 2, however, are so arranged relatively to the sheets and stops that the passage of two or more sheets below the spring-fingers raises them sufficiently to uncover the stops 3, which thus engage the second sheet and hold it against movement from the box, the bottom sheet being fed forward below it.

The plate 4, carrying the stops 3, is preferably slotted, as shown, and secured to the box by means of set-screws 5, so that it may be adjusted vertically to and from the spring-fingers to secure the proper position of the stops. The spring-fingers and stops are shown as extending in series across the full width of the sheet, three fingers and stops being shown; but it will be understood that the number of fingers and stops may be varied and that a single finger and stop may be sufficient in some cases, this depending somewhat upon the thickness and width of the sheet. The stops 3 may consist of blunt pins and the spring-fingers be so constructed and arranged that they will be raised by the passage of two or more sheets below them to uncover the stops in advance of the leading edge of the second sheet, so that the latter will be positively stopped by its leading edge coming against the stops, this construction being shown in Figs. 1 and 4. If preferred, however, the stops may consist of sharp pins and the spring-fingers be so constructed and arranged that they are not raised by a second sheet sufficiently to uncover the pins until the leading edge of the second sheet has passed the latter, the uncovered pins then engaging the top of the second sheet and acting as stops, as shown in Fig. 5. In this construction a large number of pins will preferably be used, so that the sheet will be engaged at a large number of points, so as to avoid tearing it. In Fig. 5 two pins in each series are shown.

Any suitable means may be used for receiving the end of the sheet as it is fed from the box and removing the sheet therefrom,

the sheet being preferably advanced, as shown, only a small distance from the box by the feeding-fingers, which pass out of engagement with the sheet when it is seized by the exterior feeding mechanism, so that the sheet is then removed from the box without engagement with the feeding-fingers.

As shown, the feeding mechanism for the sheets after leaving the holder consists of a gripper-cylinder F and feeding-roll G, by which the sheets are delivered to guides H. Any suitable construction may be used for the gripper-cylinder F; but I prefer to use that shown, in which the grippers 6 are pivotally mounted in carriers 7, so as to oscillate freely transversely to the cylinder 6, carriers 7 being carried by a rock-shaft 8, mounted in the heads of the cylinder and provided with a segmental gear 9, by which the shaft is oscillated through a segmental gear 10, carried by a second rock-shaft 11, also mounted in the heads of the cylinder and provided outside one of the heads with a crank-arm 12, carrying a bowl operated by a cam 13, secured to the frame of the machine, this cam being constructed, as shown, so as to operate the grippers to seize a paper as it is fed to it by the feeding-fingers B, and to open to deliver the sheet to the guides H. For the purpose of guiding the grippers 6 during the rocking movement of shaft 8 the shaft 11 is slotted and the stems of the grippers 6 passed through these slots, which are tapered inwardly from both sides of the shaft, as shown, so that the grippers are guided only on a narrow line and are free to oscillate in both directions, the shaft 11 rocking with the grippers, so as to permit free movement of the gripper-stems while guiding them positively. This gripper construction is claimed in my application, Serial No. 401,652, filed August 4, 1891.

The feeding-fingers E, gripper-cylinder F, and feeding-roll G may be driven by a series of gears 14, connecting the shafts directly, as shown, or any other suitable gearing may be employed.

The operation of the mechanism will be understood from the above description and a brief general statement. The feeding-fingers E engage the bottom sheet C of the pile during a portion of their rotation and move the bottom sheet up the incline and into the grasp of grippers 6, the feeding-fingers then releasing the sheet and engaging the next sheet on the completion of their rotation. The sheets are fed up the incline against the weight of the pile, and on the release of the bottom sheet the pile of sheets settle back under the influence of gravity to their positions at the rear side of the box. During the feeding operation the feeding-fingers E in succession lift the papers upon the line of engagement with the bottom sheet, as shown in Fig. 1, so as to bend them, and upon the release of the sheets by each feeding-finger they fall back to the next finger, and upon their release by the last finger they fall back to the bottom of

the box, this bending and alternate lifting and falling tending to loosen and separate them. The bottom sheet passes freely below the spring-fingers 2; but in case two or more sheets adhere together and are advanced by the feeding-fingers E the spring-fingers resist the passage of the extra sheets and tend to secure the feeding of the sheets singly. If two or more sheets adhere together sufficiently to be fed forward under the spring-fingers, they will engage the stops 3 and be stopped thereby, the stops being uncovered by the lifting of the spring-fingers, the leading edge of the second sheet engaging the stops in the construction shown in Fig. 4 or the top of the sheet being engaged by the pins forming the stops 3 in the construction shown in Fig. 5.

While I have shown a complete construction embodying all the features of my invention which coact together to produce a very efficient sheet-feeding mechanism, it will be understood that some of these features form parts of my invention independently of their combination with the other features, and are thus claimed. It will be understood that the term "sheet" used herein is intended to cover sheets of one or more thicknesses, the mechanism shown having been designed especially for feeding newspapers.

What I claim is—

1. The method of feeding sheets from a pile, which consists in placing the pile of sheets in a vertically-inclined position, feeding the bottom sheet up the incline by engagement with the under side of the sheet, and alternately lifting the pile of sheets on the line of engagement and allowing them to fall, substantially as described.

2. The method of feeding sheets from a pile, which consists in placing the pile of sheets in a vertically-inclined position, feeding the bottom sheet up the incline by engagement with the under side of the sheet, and lifting the pile of sheets on the line of engagement during the feeding movement and allowing them to fall after the feeding of a sheet is completed, substantially as described.

3. The combination, with a holder adapted to receive a pile of sheets and having its bottom inclined vertically, of one or more rotating feeding-fingers advancing the bottom sheet up the incline by engagement with the under surface of the sheet and projecting within the holder during the feeding operation sufficiently to lift the pile of sheets on the line of engagement, said finger or fingers being arranged to release the sheets and allow them to fall during a portion of their rotation, substantially as described.

4. The combination, with a holder adapted to receive a pile of sheets and having its bottom inclined vertically, of a series of rotating feeding-fingers advancing the bottom sheet up the incline by engagement with the under surface of the sheet and projecting within the holder during the feeding operation suffi-

ciently to lift the pile of sheets on the line of engagement, said fingers being set at such a distance apart that the sheets are alternately lifted and allowed to fall during the feeding operation, substantially as described.

5. The combination, with a holder adapted to receive a pile of sheets and having its bottom inclined vertically, of feeding devices constructed to receive a sheet advanced from the pile and feeding mechanism advancing the bottom sheet up the incline to the feeding devices by engagement with the under surface of the sheet and arranged to release the pile of sheets as a sheet is advanced by the feeding devices, substantially as described.

6. The combination, with a holder adapted to receive a pile of sheets, of a series of rotating feeding-fingers projecting within the holder during the feeding operation sufficiently to lift the pile of papers on the line of engagement, said fingers being set at such a distance apart that the sheets are alternately lifted and allowed to fall during the feeding operation, substantially as described.

7. The combination, with feeding mechanism for advancing a bottom sheet from a pile, of spring-fingers beneath which the sheets pass and stops projecting downward beside said fingers and normally covered thereby but exposed by the raising of the spring-fingers on the simultaneous passage of two or more sheets below the latter and adapted to engage the second sheet to prevent the passage of a plurality of sheets, substantially as described.

8. The combination, with feeding mechanism for advancing a bottom sheet from a pile, of spring-fingers beneath which the sheets pass and pins 3, projecting downward beside the fingers and normally covered thereby but exposed by the raising of the spring-fingers on the simultaneous passage of two or more sheets past the pins and adapted to engage the top of the second sheet to prevent the passage of a plurality of sheets, substantially as described.

9. The combination, with one or more rotating feeding-fingers adapted to advance the bottom sheet from a pile by engagement of the under surface of the sheet and to release the pile of sheets during a portion of their rotation, of feeding devices to which the sheet is advanced by the feeding-fingers and by which it is advanced when the feeding-fingers have released the pile of sheets, substantially as described.

10. The combination, with a holder adapted to receive a pile of sheets and having its bottom inclined vertically and provided with openings, of a series of rotating feeding-fingers advancing the bottom sheet up the incline by engagement of the under surface of the sheet and arranged to release the sheets during a portion of their rotation, said fingers projecting within the holder during the feeding operation sufficiently to lift the

pile of sheets on the line of engagement, feeding devices to which the bottom sheet is advanced by the feeding-fingers, spring-fingers between the feeding-fingers and feeding
5 mechanism, and stops projecting downward beside the spring-fingers and normally covered thereby but exposed by the raising of the spring-fingers on the simultaneous passage of two or more sheets below the latter
10 and adapted to engage the second sheet to

prevent the passage of a plurality of sheets, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

LUTHER C. CROWELL.

Witnesses:

THOS. F. KEHOE,
C. J. SAWYER.