No. 747,863. PATENTED DEC. 22, 1903.

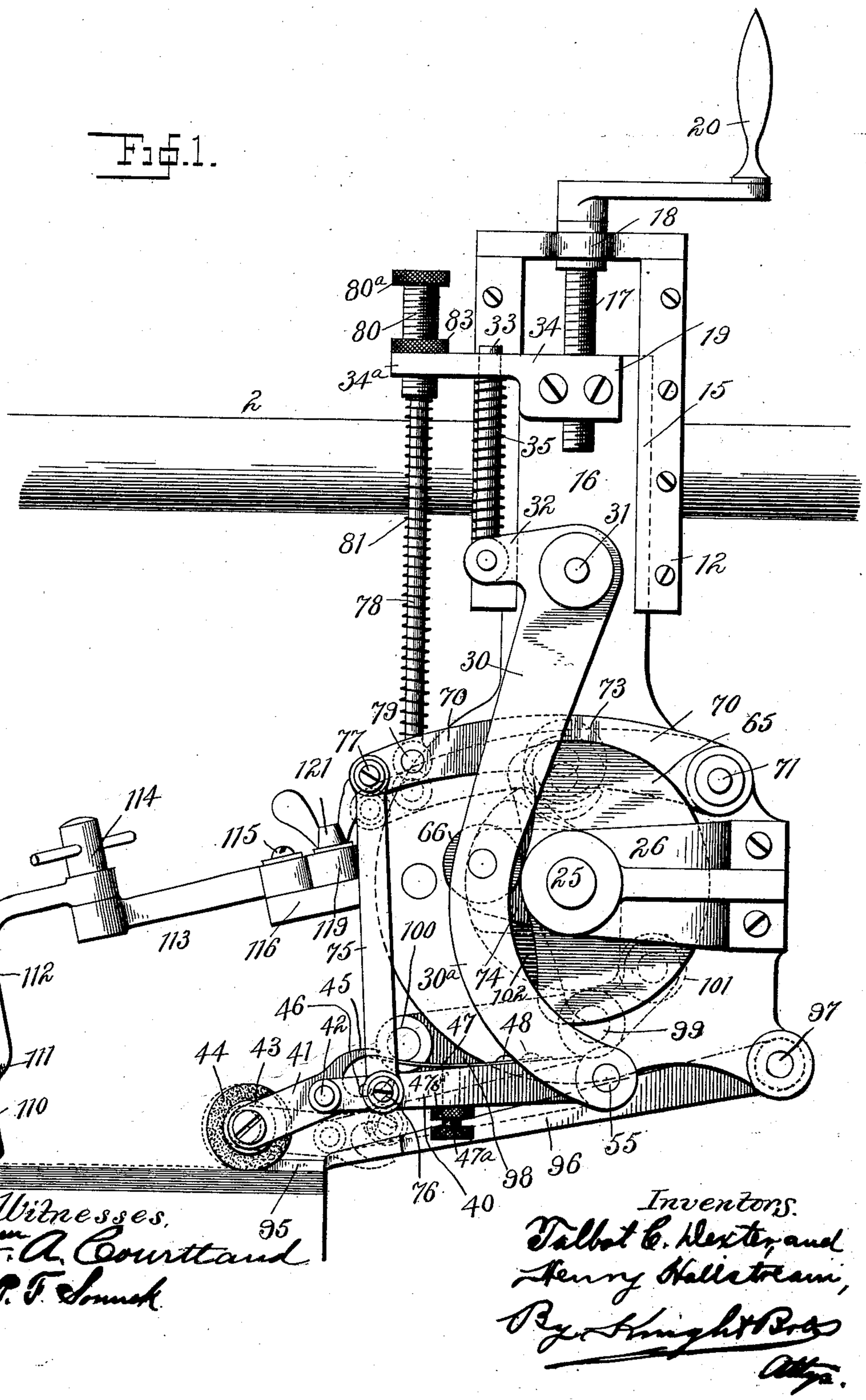
T. C. DEXTER & H. HALLSTREAM.

PAPER FEEDING MACHINE.

APPLICATION FILED APR. 7, 1902.

NO MODEL. 6 SHEETS—SHEET 1.

Fig. 1.



Witnesses.
Wm. A. Courtland
C. F. Somuk

Inventors.
Talbot C. Dexter, and
Henry Hallstream,
By Knight Bros
Attys.

No. 747,863. PATENTED DEC. 22, 1903.

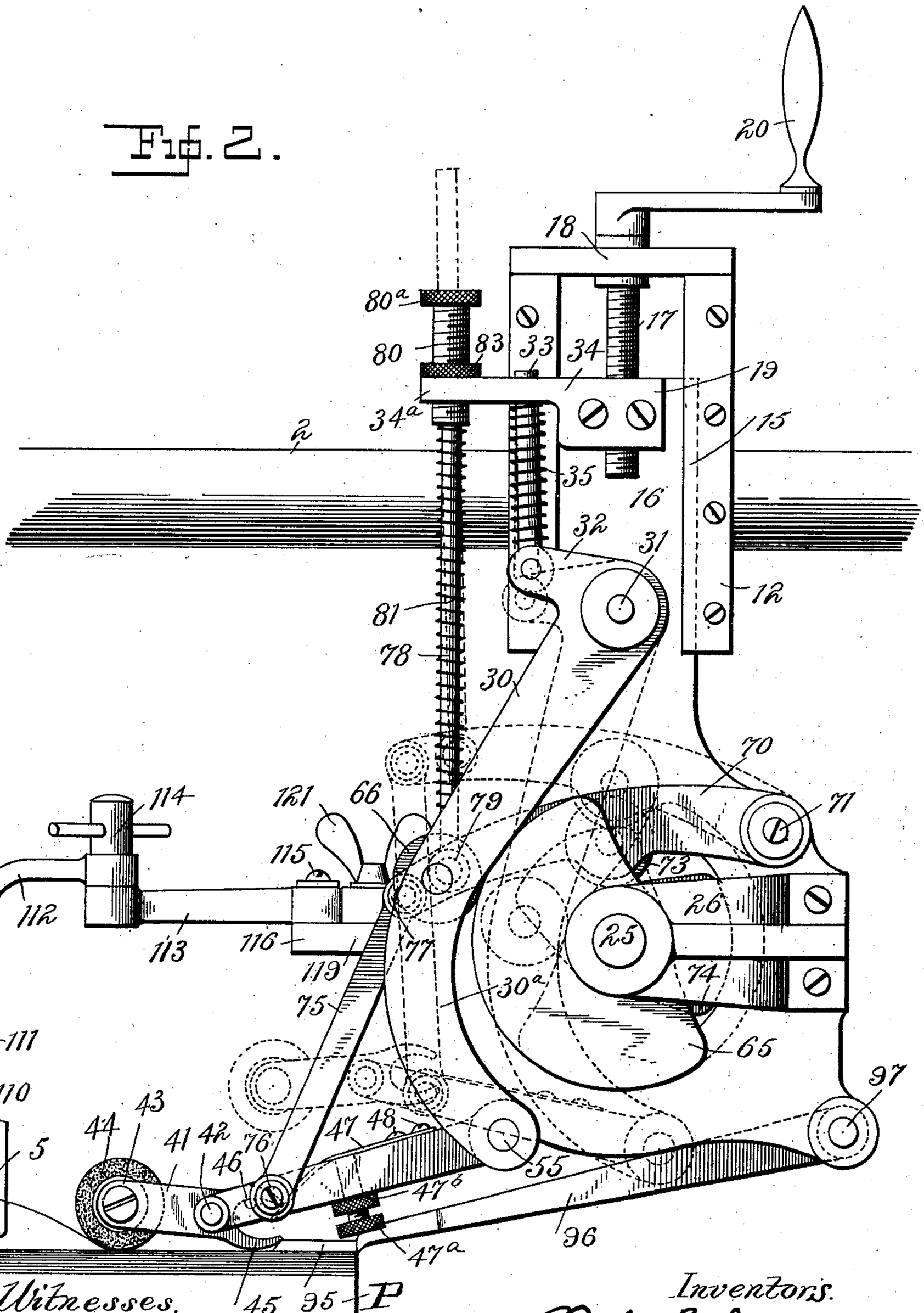
T. C. DEXTER & H. HALLSTREAM.

PAPER FEEDING MACHINE.

APPLICATION FILED APR. 7, 1902.

NO MODEL. 6 SHEETS—SHEET 2.

Fig. 2.



Witnesses.

Wm. A. Coulland

P. F. Smith.

Inventors.

Talbot C. Dexter and

Henry Hallstream,

By Knight Bros.

Attys.

No. 747,863. PATENTED DEC. 22, 1903.

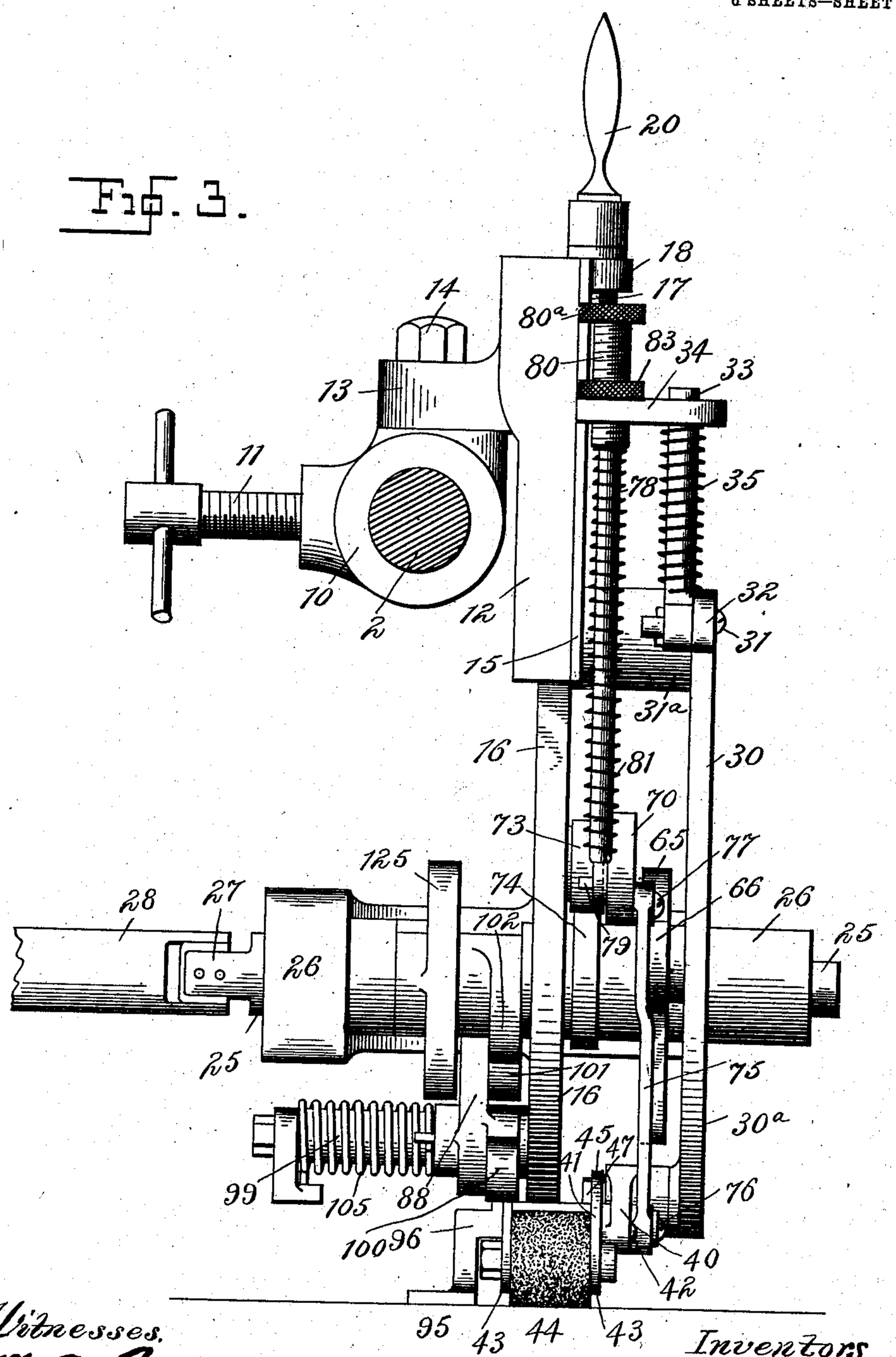
T. C. DEXTER & H. HALLSTREAM.

PAPER FEEDING MACHINE.

APPLICATION FILED APR. 7, 1902.

NO MODEL. 6 SHEETS—SHEET 3.

Fig. 3.



Witnesses.
Wm. A. Coulthard
P. F. Smith

Inventors.
Talbot C. Dexter
Henry Hallstream,
By Knight Bros.
Attys.

No. 747,863. PATENTED DEC. 22, 1903.

T. C. DEXTER & H. HALLSTREAM.

PAPER FEEDING MACHINE.

APPLICATION FILED APR. 7, 1902.

NO MODEL. 6 SHEETS—SHEET 4.

Fig. 4.

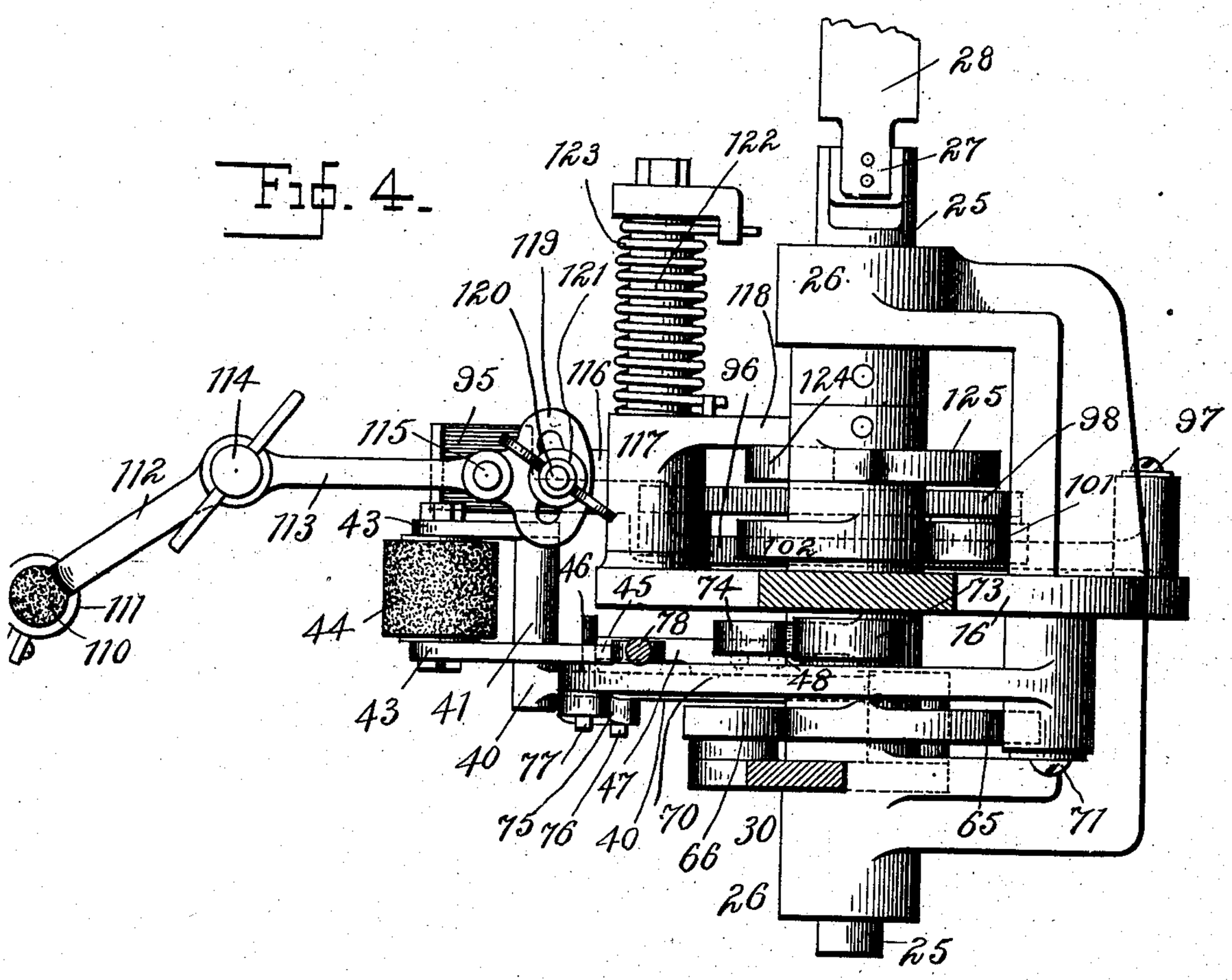
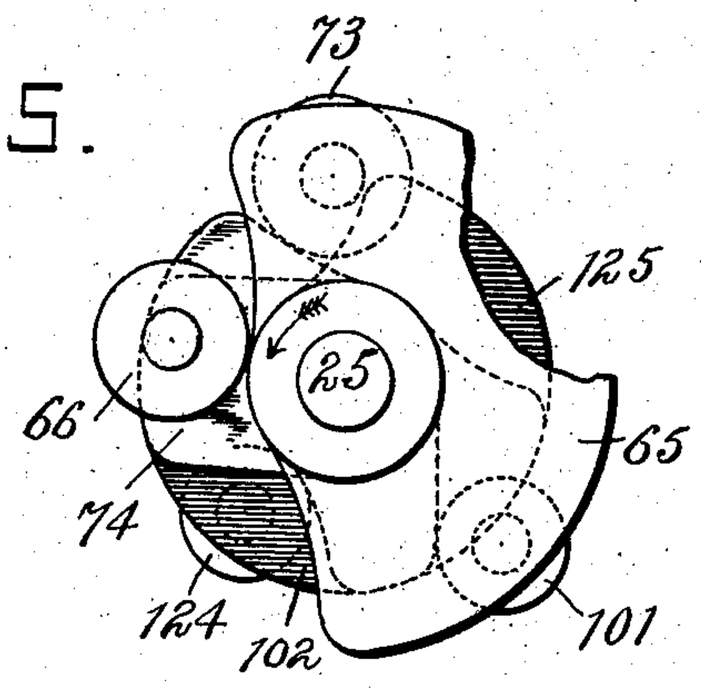


Fig. 5.



Witnesses.
Wm. A. Courtland
P. F. Smith.

Inventors.
Talbot C. Dexter and
Henry Hallstream,
By Knight Bros.
Attys.

No. 747,863. PATENTED DEC. 22, 1903.

T. C. DEXTER & H. HALLSTREAM.

PAPER FEEDING MACHINE.

APPLICATION FILED APR. 7, 1902.

NO MODEL. 6 SHEETS—SHEET 5.

Fig. 7.

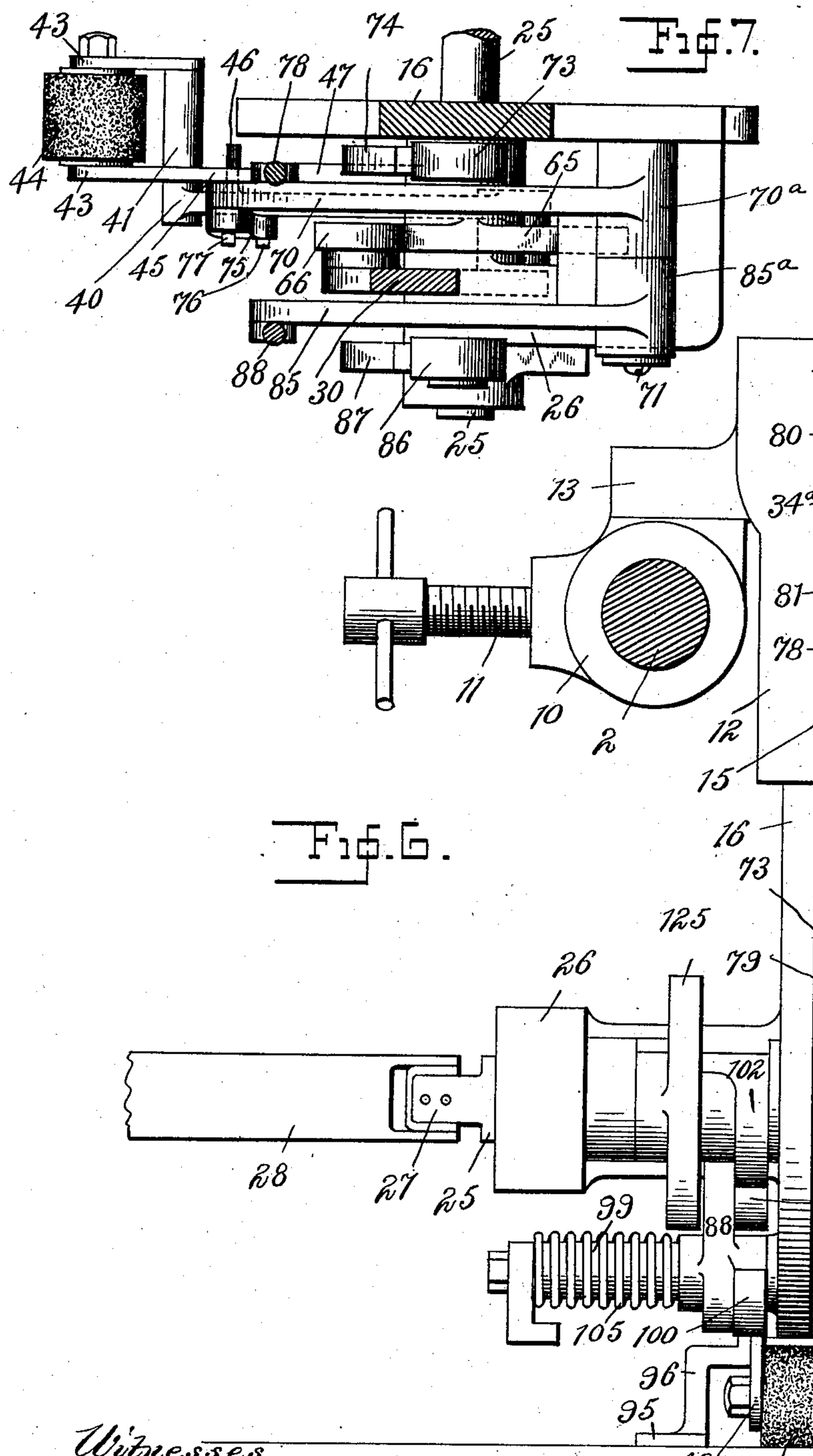


Fig. 6.

Witnesses,
Wm. A. Gouttland
P. F. Sonnek.

Inventors,
Talbot C. Dexter and
Henry Hallstream,
By Knight Bros. Attys.

No. 747,863. PATENTED DEC. 22, 1903.

T. C. DEXTER & H. HALLSTREAM.

PAPER FEEDING MACHINE.

APPLICATION FILED APR. 7, 1902.

NO MODEL. 6 SHEETS—SHEET 6.

Fig. 8.

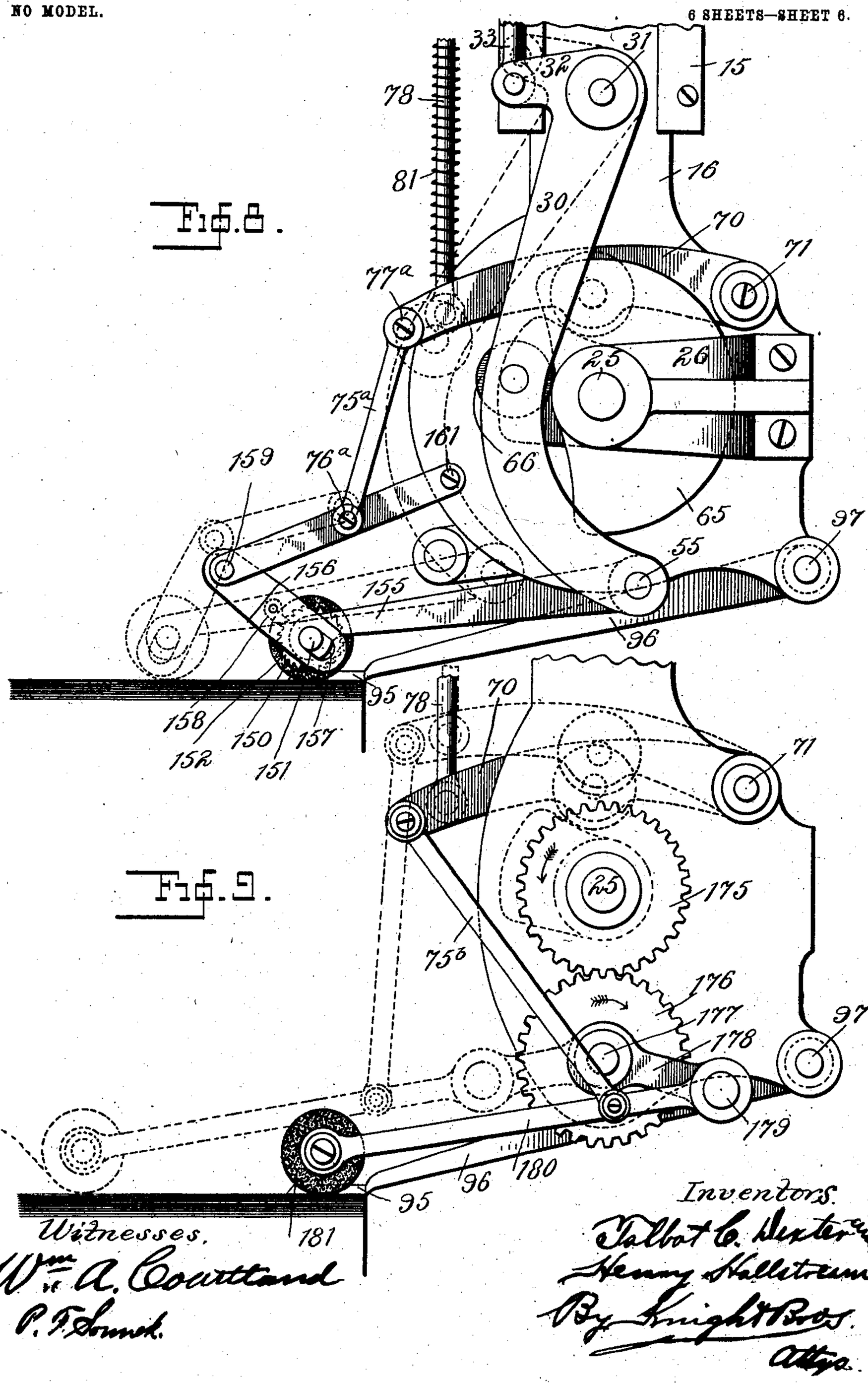


Fig. 9.

Witnesses,
Wm. A. Courtland
P. F. Lomek.

Inventors.
Talbot C. Dexter,
Henry Hallstream,
By Knight Bros.
Attys.

No. 747,863. Patented December 22, 1903.

UNITED STATES PATENT OFFICE.

TALBOT C. DEXTER AND HENRY HALLSTREAM, OF PEARL RIVER, NEW YORK; SAID HALLSTREAM ASSIGNOR TO SAID DEXTER.

PAPER-FEEDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 747,863, dated December 22, 1903.

Application filed April 7, 1902. Serial No. 101,777. (No model.)

To all whom it may concern:

Be it known that we, TALBOT C. DEXTER and HENRY HALLSTREAM, citizens of the United States, residing at Pearl River, in the county of Rockland and State of New York, have invented certain new and useful Improvements in Paper-Feeding Machines, of which the following is a specification.

This invention relates to improvements in paper-feeding machines of the buckler type, in which the successive sheets of an adjustably-supported pile are first buckled at the corners to partially loosen the sheets and afterward fed from the pile by suitable feeding-off mechanism. In this type of machines the sheet-buckling devices are usually constructed to have a single buckling movement inwardly and outwardly over the rear corners of the pile of sheets. Such a buckling movement is usually effective in producing the preliminary separation of sheets; but in operating upon certain kinds of paper and upon piles of sheets which have become very compact we have found that this simple movement of the buckler will not always produce the desired effect.

In buckling sheets of paper the main difficulty encountered is at the beginning of the operation—*i. e.*, the starting of the separation of the corners of the top sheet from the pile. After the corners begin to separate and air gets between the top sheet and the pile the remainder of the buckling operation is readily accomplished, and after the top sheet has been buckled and partially separated it is a simple matter to feed the sheet off from the pile to the machine which is to operate upon it.

In an application filed by us on April 7, 1902, Serial No. 101,776, we have covered a sheet-buckling mechanism for paper-feeding machines in which the buckling-finger has a double buckling movement or impulse, and a differential spring mechanism is arranged to apply a heavy spring-pressure upon the buckling-finger during the initial or first part of the buckling movement and a lighter spring-pressure during the second part or remainder of the buckling movement. Such a construction is adapted to exert more power for separating the sheets at the beginning of the buckling operation, where the greatest difficulty is encountered, and less power for the remainder of the operation after the separation has started, when the operation is more easily effected.

The object of the present invention is the same as in our above-named application, and the improvements covered by the present case may be considered in the light of a modification or extension of the broad idea set forth in such application.

Our present invention comprises a sheet-buckling mechanism for paper-feeding machines in which the buckling instrument is so constructed and arranged that it will be capable of moving inwardly and outwardly with relation to the pile, and just before its inward movement the active surface of its frictional sheet-engaging pad will have imparted to it a forwardly-rotating movement with relation to the instrument. This forward rotation of the active surface of the frictional pad is the initial movement of the buckler for starting the buckling operation when the difficulty encountered is greatest, the second part of the buckling operation being the ordinary inward stroke of the buckling-finger.

Our improved buckling mechanism may be operated with a single spring-tension device capable of exerting the same spring-pressure upon the buckling instrument throughout both parts of the buckling operation or with a double spring-tension device arranged to apply a heavy spring-pressure during the initial part of the buckling operation and a lighter spring-pressure during the remainder of the buckling operation.

Our present invention may be embodied in various forms, and in order that our invention may be fully understood we will first describe the same with reference to the accompanying drawings and afterward point out the novelty with more particularity in the the annexed claims.

In said drawings, Figure 1 is a rear elevation of one of a pair of the improved sheet-buckling mechanisms, representing two positions assumed by the operating parts dur-

ing the initial buckling movement. Fig. 2 is a similar view representing two other positions assumed by the operating parts at the completion of the second part of the buckling movement and at the return of the parts in elevated position. Fig. 3 is an inside edge elevation of the buckling mechanism as seen when looking from the center of the pile of sheets, the buckler-stop being omitted. Fig. 4 is a detail sectional plan view of the same. Fig. 5 is a detail view illustrating the relative positions of the several operating-cams upon the cam-shaft. Fig. 6 is a view similar to Fig. 3, showing a slight modification, in which a double spring-tension device is employed. Fig. 7 is a view similar to Fig. 4, showing the same modified structure. Figs. 8 and 9 are views similar to Fig. 1, showing two other modifications.

The pile of paper P to be fed to the folder, printing-press, or other machine is mounted upon an automatically-adjustable platform or table, (not shown,) which may be mounted and operated in the usual manner. The side frames of the feeding-machine to which the improvements are applied are not illustrated in the drawings. Suitably supported from the ordinary side frames above the pile-supporting table is a suitable frame upon which the sheet buckling separating mechanisms are adjustably mounted. We have shown only the rear transverse bar 2 of this supporting-frame. This bar 2 is adapted to be adjusted longitudinally of the feeding-machine, so as to support the sheet-separating mechanisms and the air-blast devices in proper position above the rear edge of a pile of any sized sheets which is to be fed from the table or platform. The two sets of sheet-separating mechanism are adjustably mounted upon this rear supporting-bar 2, so as to be capable of adjustment transversely of the pile.

In Fig. 2 of the drawings, 5 represents one of the ordinary air-blast tubes adjustably mounted upon the supporting-bar 2 and having air-pipe connections with any suitable blower. (Not shown.) There may be any desired number of these air-blast pipes 5, the number and disposition of them depending upon the size of the sheets to be operated upon and the nature of the paper and of the printing upon the paper if the sheets have been previously printed.

We will now describe the improved sheet buckling separating mechanism, of which two sets are designed to be arranged at opposite sides above the rear edge of the pile. Both sheet-buckling mechanisms are of the same construction and a description of one will be sufficient for both. We have shown only one of the buckling mechanisms in the accompanying drawings.

10 is a suitable bracket adjustably mounted upon the supporting-bar 2 and secured in the desired adjusted position by a set-screw 11.

12 is a vertically-extending guide-bracket formed with a horizontal ear 13, through which passes a vertical set-screw 14 for securing the bracket 12 to the bracket 10 in the desired adjusted position. The bracket 12 is formed in its rear vertical face with guide-flanges 15, between which is mounted the vertically-adjustable buckler-frame 16, formed with an upper oblong portion, which fits between and slides in the guide-flanges 15 of bracket 12, and a lower bracket portion of suitable shape to properly support the operative parts of the mechanism hereinafter referred to. An adjusting-screw 17 is journaled in a lug 18 on bracket 12 and threaded through a nut 19, secured to the vertically-sliding buckler-frame 16. This adjusting-screw 17 has a crank-handle 20 for operating it. By operating the screw 17 the buckler mechanism can be adjusted vertically with relation to the pile of sheets.

25 is the buckler-operating shaft, which is journaled in suitable bearings 26, formed upon the lower bracket portion of buckler-supporting frame 16. This short shaft 25 has universal-joint connection 27 with an operating-shaft 28, which is adapted to be driven from the main shaft of the feeding-machine in any suitable manner. (Not shown.) Mounted upon the shaft 25 between its supporting-bearings are several cams which operate the different parts of the sheet-separating mechanism. These cams will be referred to in connection with the said parts of the mechanism.

30 is the supporting and operating lever of the buckling-finger proper. This lever 30 is journaled at 31 upon a boss 31^a, projecting outwardly from the face of the buckler-supporting frame 16 and has a heel or lug 32 projecting from it adjacent to its journal, to which lug 32 is journaled a vertically-extending rod 33, which passes up through a guide-bracket 34, which is secured to the outer face of the nut 19 of the buckler-supporting frame. A spiral spring 35 surrounds the rod 33 and is confined between the bracket 34 and the lower end of the rod 33. The spring 35 tends to move the lower curved end 30^a of the lever 30 outwardly or to the right of Figs. 1 and 2. The buckling-finger proper in the present construction is formed of two arms or sections 40 41, which are pivotally connected at 42. The main or long section 40 is journaled loosely at its outer end upon a pin 55, carried on the lower end 30^a of the lever 30. The short section 41 is in the form of a yoke, and between the forward yoke ends 43 is clamped a soft-rubber block 44, preferably in the form of a roll. One arm of the yoke-section 41 is extended rearwardly beyond the journal 42 to form a fork 45, between the prongs of which rests a limit-pin 46, mounted on and projecting from the buckler-section 40. The fork 45 and pin 46 allow a limited relative movement between sections 40 41 of the buckling-finger, said pivotally-connected sections constituting toggle-levers in effect when they are in operation,

as hereinafter explained. A leaf-spring 47 is secured at 48 to the section 40 and projects over to a point beneath the upper prong of fork 45, so as to be engaged thereby when said prong of the fork moves downwardly by reason of the relative movement between sections 40 41 of the buckling-finger.

47ª is an adjusting-screw for regulating the tension of spring 47. This spring 47 affords sufficient resistance to the movement of section 41 upon section 40 to insure an effective pressure of the buckling-pad 44 upon the sheet before said movement is accomplished. This will be more fully explained in the description of the operation of the mechanism.

Keyed to the operating-shaft 25 is the main cam 65, which is approximately semicircular in form. This cam 65 operates upon an antifriction-roller 66, journaled in the buckler supporting and operating lever 30. By the rotation of the cam 65 the buckling-finger 40 41 is moved inwardly and outwardly over the pile of sheets, means being provided, as presently to be described, for holding the buckling-finger in engagement with the pile during its inward stroke and elevated from the pile during its outward stroke.

70 is a lever journaled upon a pin 71 on the buckler-supporting frame 16. The lever 70 carries an antifriction-roller 73, which operates upon the periphery of a cam 74, keyed to the operating-shaft 25 and of approximately one-fourth of a circumference in extent. A link 75 is journaled to the free end of lever 70 upon a pin 77 and to the buckling-finger section 40 upon a pin 76 to connect lever 70 with the buckling-finger. The result of this connection is the raising and lowering of the buckling-finger by the cam 74. The connection between lever 70 and buckling-finger 40 41 also serves to transmit the spring-pressure from the tension device, which will now be described.

A rod 78 is journaled to the lever 70 upon a pin 79, adjacent to the free end of the lever 70, and extends upwardly from said pin 79 and passes freely through an externally-threaded elongated nut 80, which is threaded into a suitable opening formed in the lateral extension 34ª of bracket-arm 34. The nut 80 is formed with a milled head 80ª, by which it is operated. A spiral spring 81 surrounds the rod 78 and is confined between the enlarged lower end of said rod and the adjustable nut 80 at its upper end. By screwing the nut 80 downwardly or upwardly in its supporting-bracket 34ª the tension of spring 81 can be regulated. A clamp-nut 83 is threaded upon the elongated nut 80 and is adapted to engage the bracket-arm extension 34ª in its adjusted position. The spring 81 not only holds the buckler-elevating lever 70 into operative relation with the cam 74, but holds the buckling-finger down into operative engagement with the pile of sheets during its working strokes.

95 is the holding-down foot or clamp mounted upon the inner free end of an arm or lever 96, which is journaled upon a pin 97, supported in the buckler-frame.

98 is an arm or lever journaled upon a pin 99, extending from the buckler-frame. The arm 98 carries at one end an antifriction-roller 100, which is adapted to be intermittently forced down into engagement with the arm 96 of the holding-clamp 95. Journaled upon the other end of the lever 98 is an antifriction-roller 101, which travels upon the periphery of a cam 102, keyed to the cam-shaft 25. This cam 102 is approximately one-third of a circumference in extent.

Mounted upon an extension of the pin 99 is a tension-spring 105 of usual construction, which spring is arranged to move lever 98 upon its journal, so as to cause antifriction-roller 101 to closely follow the controlling-cam 102 and to throw the antifriction-roller 100 into engagement with the arm 96 of the holding-clamp for applying the tension of spring 105 to the clamp when the lever 98 is released by the cam. The tension of spring 105 is thrown upon the holding-down foot or clamp 95 to securely clamp the pile immediately after the edge of the top sheet has been buckled from beneath the foot and while the separated sheet is being fed off from the pile by the feed mechanism.

110 is the buckler stop or foot, consisting of a block of rubber mounted in the socket 111, formed in the lower end of a bent arm 112, which is mounted upon the outer end of an arm or lever 113 by means of a vertical screw-bolt 114. The arm 113 is pivoted at 115 to a rock-arm 116, formed integral with a sleeve 117 and an oppositely-projecting arm 118. The rear end of arm 113 is formed with a laterally-extending slotted yoke 119, through the slot of which projects a bolt 120, extending up from arm 116. A nut 121, threaded on the bolt 120, clamps arm 116 in the desired adjusted position. The joints between arms 112 and 113 and 113 and 116 allow the adjustment of buckler-stop 110 horizontally into any position with relation to the buckling-finger. The sleeve 117 is freely journaled upon a pin 122, extending from the buckler-frame, and an adjustable tension-spring 123 is also mounted upon pin 122 and engages the sleeve 117 to throw stop 110 into engagement with the pile. The arm 118 carries an antifriction-roller 124, which runs upon the periphery of a controlling-cam 125, keyed to shaft 25. The rotation of the cam 125 causes the elevation of the buckler-stop 110 at the proper moment at the completion of each buckling operation to allow the sheets to be fed from the pile by the feeding-off devices.

Any suitable feeding devices may be employed for feeding the separated sheets from the pile. It will be clear that two of the improved sheet-buckling separating mechanisms are to be used on each feeding-machine, one arranged at each of the rear corners of the pile of sheets.

The above description refers to the preferred form of the improved sheet-buckling mechanism, as illustrated in Figs. 1 to 5 of the drawings. In the operation of this form of the mechanism (it being understood that two of the mechanisms are operating upon the pile of sheets) the buckling-fingers and buckler-stops descend into engagement with the pile simultaneously. The buckling-fingers engage the pile in the position shown in full lines in Fig. 1, and as the pressure of springs 81 act downwardly upon the buckling-fingers it will be observed that the toggle-levers 40 41, constituting each buckling-finger, will immediately be moved into the position indicated in dotted lines in Fig. 1. The movement of section 41 upon section 40 may be retarded by spring 47 to insure a good frictional hold of pad 44 on the pile before the movement takes place. Springs 47 are not, however, essential and they may be omitted. This relative movement between the buckling-finger sections 40 and 41—that is, the partial rotary movement of section 41 on section 40—will cause the under active surface of the buckling-pad 44 to roll forwardly or inwardly on the pile of sheets. At this moment the holding-down clamps 95 are resting solely by gravity upon the pile, so that this forward roll of the under surface of the buckling-pads 44 will cause the corners of the sheet to be loosened and buckled slightly from beneath the holding-down clamps. This slight forward buckling is caused during the time that the pivot 42 is moved into line with the pivot 55 and center of the buckling-roll 44, which action causes a slight lengthening of the buckling-fingers with a consequent slight inward movement of the buckling pad or roll 44. This slight inward impulse and the simultaneous forward rotation of the active surface of the friction-pad produces the initial buckling or loosening of the corners of the sheet. Immediately following this action as the pivot 44 moves beneath the line of pivot 55 and center of roll 44 there is a slight shortening of the buckling-finger, which partially counteracts the forward rotation of the active surface of the buckling-pad and has a tendency to partially draw the buckled corners of the sheet back under the clamps. This preliminary buckling movement, caused by the partial rotation and slight inward impulse of the buckling-rolls, separates the corners of the sheet sufficiently to insure the free buckling of the corners of the sheet by the final inward stroke of the buckling-fingers which immediately follow. As soon as the buckling-fingers have been depressed to the position shown in dotted lines in Fig. 1 the cams 65 come into operation and force the levers 30 inwardly to cause the buckling-fingers to make their inward buckling strokes for completing the buckling operation. The buckling-fingers are shown at the completion of their inward strokes in full lines in Fig. 2. This completion of the buckling operation has entirely withdrawn the corners of the sheet from beneath the holding-down clamps 95, and the pressure of the springs 105 is immediately afterward thrown onto the holding-down clamps to securely clamp the pile beneath the top sheet. As the buckles in the corners of the sheet are completed the air-blast devices come into play to force the air under the partially-separated top sheet. Immediately following this cams 74, operating upon levers 70, lift the buckling-fingers from the pile, the cams 125 raise the buckler-stops 110, and the cams 65 allow the outward or return movement of the buckling-fingers, as indicated in dotted lines in Fig. 2. Immediately following this the buckling-fingers and buckler-stops again descend upon the pile for another stroke in the manner just explained. It will of course be clear that feeding-off devices of any suitable construction move the partially-separated sheet from the pile as soon as the buckling-fingers and buckler-stops are raised away from the pile.

In the above-described preferred form of the mechanism it will be observed that we employ a single-acting spring device for each buckling mechanism. It sometimes becomes necessary to exert a heavier pressure upon the buckling-fingers during the initial part of their stroke when the buckling-pads are rolling forwardly upon the pile. This is necessary under certain circumstances when the sheets are difficult to separate either by reason of the character of the paper or by reason of the fact that the sheets have become very closely packed together in the pile. To provide for the application of a heavier pressure during the initial movement of the buckling-fingers, we arrange a second spring-tension device with controlling means adapted to periodically throw it into operation. Such a modified structure is illustrated in Figs. 6 and 7 of the drawings and will now be described. This second spring device comprises a lever 85, journaled upon an extension of the pin 71 and carrying an antifriction-roller 86, which travels upon the periphery of a controlling-cam 87, which is about two-thirds of a circumference in extent. The cam 87 is keyed to shaft 25 outside the bearing 26. A spring-supporting rod 88 is journaled at 89 to the lever 85 and extends upwardly therefrom and passes loosely through an elongated nut 90, which is externally threaded and adjustably mounted in the extension 34^b of the bracket-arm 34. The nut 90 is formed with a milled head 90^a, by which it is adjusted. A heavy spiral spring 91 surrounds the rod 88 and is confined between an adjustable collar 92 at its lower end and the adjustable nut 90 at its upper end, the collar 92 being mounted upon the rod 88. By screwing the nut 90 downwardly or upwardly in its support 34^b the tension of the spring 91 can be regulated. The clamp-nut 93 is threaded upon the elongated nut 90 and is adapted to engage the bracket 34^b for clamping the nut 90 in the desired adjusted position. The lever 85 is

formed with a laterally-projecting heel or lug 85ª adjacent to its journal end, which heel or lug 85ª rests over a shoulder 70ª, formed adjacent to the journal of the lever 70 of the light spring-tension device. The purpose of this engagement between the levers 85 and 70 is to connect up the heavy spring device with the light spring device, so that the pressure of both spring devices may be applied to the buckling-finger at the same time at the commencement of the buckling operation and the heavy spring device may be disconnected at the completion of the first stroke or impulse of the buckling-finger to allow the second stroke or impulse to be carried out under the tension of the light spring alone. The controlling-cam 87 is so shaped and arranged upon the shaft 25 that this effect will be produced. With this modified structure, as illustrated in Figs. 6 and 7 of the drawings and just described, the operation is the same as in the preferred form of the mechanism, excepting that when the buckling-fingers move down into operative engagement with the pile the combined pressures of springs 81 and 91 are simultaneously thrown upon the buckling-fingers, so as to effect a stronger engagement of the buckling-pads with the top sheet of the pile during its initial inward impulse and forward rotation. In this form of the mechanism the springs 47 are particularly useful in partially resisting the relative movement of the section 41 upon section 40 of the buckling-fingers, so as to insure the effective heavy pressure of the buckling-pads upon the pile prior to the movement and rotation of the pads in effecting the preliminary separation of the corners of the sheet.

In Figs. 8 and 9 of the drawings we have shown two further modifications of the broad idea of our present invention, in which the sheet-buckling pad is given a forward rotation in addition to the inward movement of the buckling-finger. In both of these modifications there is a slight difference in principle, in that the relative forward rotation of the pad is carried on during the entire inward stroke of the buckling-finger and is not limited to a preliminary movement, as in the forms above described.

Referring first to Fig. 8 of the drawings, it will be observed that the buckling-pad 150 is freely journaled in the forward yoked end of a single-piece buckling-finger 155, which is pivoted at 55 to the lower curved end of the supporting and operating lever 30. Secured to one of the journals 151 of the buckling-pad is a ratchet-wheel 152. A yoke 156 is formed with slots 157 in its arms, which fit over the projecting journal ends 151 of the buckling-pad in such a manner that it is capable of rotating upon the said journal ends and also of having relative lateral movement. The yoke 156 carries a rigid pawl 158, which is adapted to engage with the ratchet-wheel 152, and the upper end of yoke 156 is journaled at 159 to a link 160, which is pivotally connected to the buckler-frame at 161. A link 75ª is pivoted to link 160 at 76ª and to the end of the buckler-lifting and tension lever 70 at the point 77. The other parts of the mechanism are the same as described with reference to Figs. 1 to 5 of the drawings. With this modification, as shown in Fig. 8, it will be clear that the pressure of spring 81 is exerted upon the buckling-pad through links 75ª and 160 and yoke 156. As the buckling-finger 155 is forced inwardly over the pile by the cam 65 operating upon lever 30, the yoke 156 will be caused to oscillate upon the forward end of the buckling-finger by reason of its connection through link 160 with the buckler-frame, and as the stationary pawl 158 is in engagement with the ratchet-wheel 152 the buckling-pad 150 will be positively rotated in the buckling-finger to exaggerate or increase the buckling effect upon the corner of the sheet. The relative movement of the buckling-pad upon the buckling-finger will be clear by comparing the two positions of the parts shown in full lines and in dotted lines in Fig. 8 of the drawings. When the buckling-finger has reached the limit of its inward stroke, it is raised by the lever 70 and cam 74, as in the preferred form of the mechanism, the slots 157 allowing the yoke 156 to move vertically upon the buckling-finger to disengage the pawl 158 from ratchet 152, so that when the parts are returned to their position of starting the pawl 158 will engage a new tooth of the ratchet. By this means the buckling-pad 150 will not be rotated rearwardly, but always in a forward direction, so that a new surface will be presented in engagement with the sheet upon each stroke of the buckling-finger.

The construction just described with reference to Fig. 8 of the drawings forms the subject of our copending application, Serial No. 101,778, filed April 7, 1902, and is not claimed specifically in my present case.

In Fig. 9 another modification is shown, in which the cam-shaft 25 has keyed to its outer projecting end a gear-wheel 175, which meshes with a similar gear-wheel 176, journaled to the buckler-frame at 177. This gear-wheel 176 carries a rotating arm 178, to the outer end of which is pivotally mounted at 179 the buckling-finger 180, having clamped in its forward end a frictional pad 181. The buckling-finger 80 is connected with the tension and lifting lever 70 by means of a link 75ᵇ. In this form of the mechanism it will be observed that as the buckling-finger travels inwardly by reason of the rotation of gear-wheel 176 the rear pivoted end 179 of the buckling-finger will be lowered, causing the frictional pad 181 to roll forwardly slightly on the pile to exaggerate or increase the buckling effect upon the corner of the sheet.

The main feature of novelty in our present invention, as illustrated in the several forms of the mechanism, consists of a buckling-finger constructed and arranged to have a for-

ward-rotating movement upon the pile in addition to the ordinary inward buckling movement of the finger. This rotation of the frictional pad increases the buckling effect of the instrument upon the sheet and is of great importance. In the preferred form the rotating movement of the pad is effected prior to the beginning of the inward movement of the finger; but we would have it understood that we do not limit our invention to this sequence of the motions, as the rotating effect can be carried on during the entire inward buckling stroke.

We consider our invention of sufficiently broad scope to cover a buckling mechanism having the described improvements whether used with a single tension device or with a double tension device and whether used with the other parts of the buckling mechanism described and illustrated or with other devices which may be substituted in their places.

Having thus described our invention, the following is what we claim as new therein and desire to secure by Letters Patent:

1. In a paper-feeding machine, the combination of a support for a pile of sheets, with a sheet-buckling instrument adapted to reciprocate approximately parallel with said support above the pile, and means for forwardly rotating the sheet-engaging part of said instrument while it is in engagement with a sheet, as set forth.

2. In a paper-feeding machine, the combination of a support for a pile of sheets, with a sheet-buckling instrument having a forwardly-rotatable sheet-engaging part and adapted to reciprocate approximately parallel with said support above the pile, and operating means adapted to forwardly rotate said sheet-engaging part in engagement with a sheet while the instrument is moving inwardly over the pile, substantially as set forth.

3. In a paper-feeding machine, the combination of a support for a pile of sheets, with a sheet-buckling instrument adapted to reciprocate inwardly and outwardly approximately parallel with said support and rotate forwardly with reference to its inward movement, and operating means adapted to cause the buckling instrument to simultaneously move inwardly and rotate forwardly in engagement with the pile, substantially as set forth.

4. In a paper-feeding machine, the combination of a support for a pile of sheets, with a sheet-buckling instrument adapted to reciprocate approximately parallel with said support and rotate forwardly with reference to its inward movement, and operating means adapted to cause the buckling instrument to first rotate forwardly and move inwardly a short stroke in engagement with the pile to partially separate a sheet, and then move inwardly a longer stroke in engagement with the pile to complete the buckling separating action, substantially as set forth.

5. In a paper-feeding machine, the combination of a support for a pile of sheets, with a sheet-buckling instrument constructed and arranged to simultaneously rotate forwardly and move inwardly in engagement with the pile, then move outwardly for a short impulse and finally move inwardly to complete the buckling operation, substantially as set forth.

6. In a paper-feeding machine, the combination of a horizontal support for a pile of sheets, with a horizontally-reciprocating sheet-buckling instrument constructed and arranged to move inwardly in engagement with the pile and outwardly raised from the pile, and means for operating said sheet-buckling instrument adapted to positively rotate it forwardly while it is moving inwardly in engagement with the pile, substantially as set forth.

7. In a paper-feeding machine, the combination of a horizontal support for a pile of sheets, with a horizontally-reciprocating sheet-buckling instrument including a frictional sheet-engaging pad which is movably mounted upon the forward end of the buckling instrument, and means for operating said sheet-buckling instrument adapted to cause it to move inwardly and outwardly with relation to the pile and to positively cause the frictional sheet-engaging pad to rotate forwardly relatively to the buckling instrument while the instrument is moving inwardly in engagement with the pile, substantially as set forth.

8. In a paper-feeding machine, the combination of a support for a pile of sheets, with a sheet-buckling instrument formed of two pivotally-connected sections, a movable support for one of said sections, means for operating said movable support, a frictional sheet-engaging pad mounted upon the other of said sections, and means for forcing said sectional buckling-finger downwardly into engagement with the pile, whereby the active surface of the buckling-pad will be given a forwardly-rotating movement in addition to the inward movement of the buckling-finger, substantially as set forth.

9. In a paper-feeding machine, the combination of a support for a pile of sheets, with a sheet-buckling finger formed of two pivotally-connected sections, a movable support upon which one of said sections is pivotally mounted, operating means adapted to reciprocate said support to cause the buckling-finger to move inwardly and outwardly with relation to the pile, a frictional sheet-engaging pad carried in the other of said buckling-finger sections, and a spring device engaging said sectional buckling-finger and adapted to force it downwardly into engagement with the pile to cause the active surface of said frictional pad to have a forwardly-rotating

movement in addition to the inward movement of the buckling-finger, substantially as set forth.

10. In a paper-feeding machine, the combination of a support for a pile of sheets, with a sheet-buckling finger formed of two pivotally-connected sections, a movable support upon which one of said sections is pivotally mounted, operating means for said movable support adapted to cause the buckling-finger to move inwardly and outwardly with relation to the pile, a frictional sheet-engaging pad mounted in the other section of said buckling-finger, a lever suitably connected with said buckling-finger, a spring device engaging said lever, and operating and controlling means for said lever adapted to apply the pressure of said spring device to the buckling-finger to force it downwardly into engagement with the pile and cause the active surface of said frictional pad to have a forwardly-rotating movement in addition to the inward movement of the buckling-finger and to raise said buckling-finger from the pile during its outward movement, substantially as set forth.

11. In a paper-feeding machine, the combination of a support for a pile of sheets, with a sheet-buckling finger formed of two relatively movable connected sections, a frictional sheet-engaging pad mounted upon one of said buckling-finger sections, and operating and controlling means adapted to move the buckling-finger inwardly in engagement with the pile, outwardly raised from the pile, and to cause the frictional pad to rotate forwardly on the pile to facilitate the buckling action, substantially as set forth.

12. In a paper-feeding machine, the combination of a support for a pile of sheets, with a sheet-buckling finger formed of two relatively movable pivoted sections, a frictional sheet-engaging pad mounted upon one of said buckling-finger sections, means for limiting the relative movement of said sections, and operating and controlling means adapted to move the buckling-finger inwardly and outwardly with relation to the pile and to cause the frictional pad to rotate forwardly on the pile, substantially as set forth.

13. In a paper-feeding machine, the combination of a support for a pile of sheets, with a sheet-buckling finger formed of two relatively movable pivoted sections, a fork or bifurcated arm extending from one section, a pin on the other section projecting between the two parts of said fork or bifurcated arm for limiting the relative movement of the sections, a frictional sheet-engaging pad mounted upon one of said buckling-finger sections, and operating and controlling means adapted to move the buckling-finger inwardly and outwardly with relation to the pile and to cause the frictional pad to rotate forwardly on the pile, substantially as set forth.

14. In a paper-feeding machine, the combination of a support for a pile of sheets with a sheet-buckling finger formed of two relatively movable pivotally-connected sections, 40, 41, a frictional sheet-engaging pad mounted upon section 41, a fork or bifurcated arm extending from section 41, a pin mounted upon section 40 and extending between the two prongs or parts of said fork or bifurcated arm for limiting the relative movement of said sections, a spring mounted upon section 40 and projecting between the prongs or parts of said fork and arranged to retard the relative movement between the said sections, and operating and controlling means adapted to move the buckling-finger inwardly and outwardly with relation to the pile and to cause said frictional pad to rotate forwardly on the pile, substantially as set forth.

TALBOT C. DEXTER.
HENRY HALLSTREAM.

Witnesses:
WM. E. KNIGHT,
FRANCIS M. APPLEGATE.