B. R. STICKNEY.

SHEET FEEDING MACHINE.

APPLICATION FILED JUNE 30, 1909.

939,177.

Patented Nov. 2, 1909.

3 SHEETS—SHEET 1.

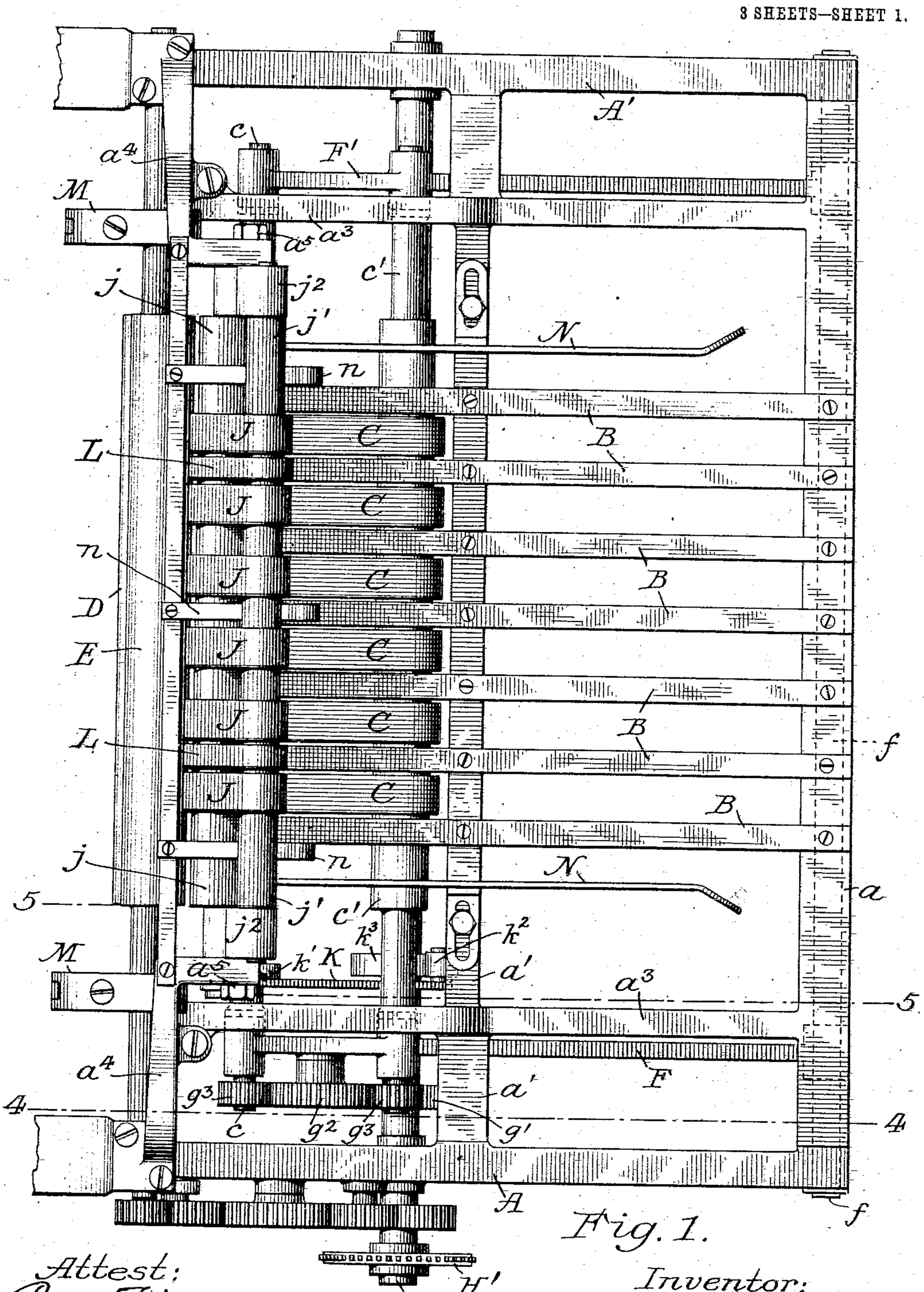

Fig. 1.

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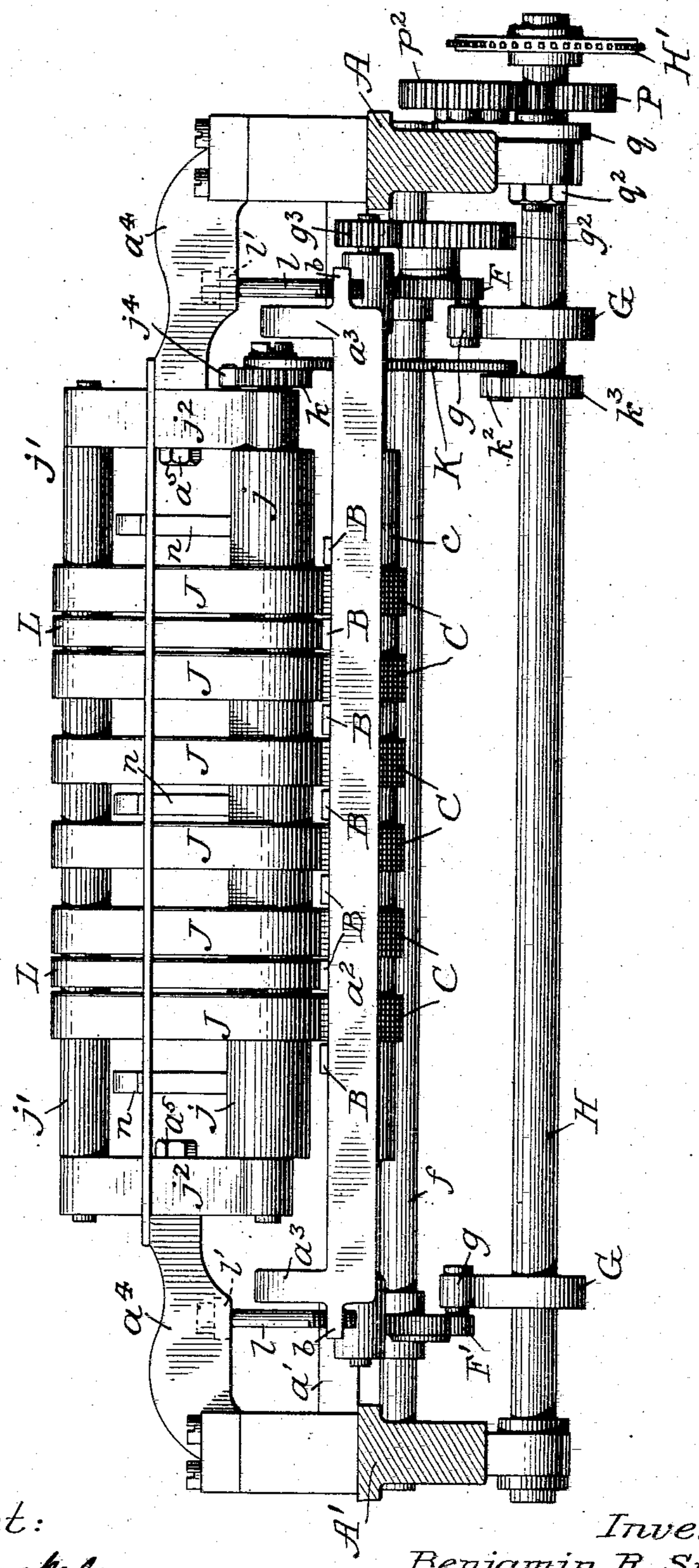

Fig. 2.

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3 SHEETS—SHEET 3.

Fig. 3.

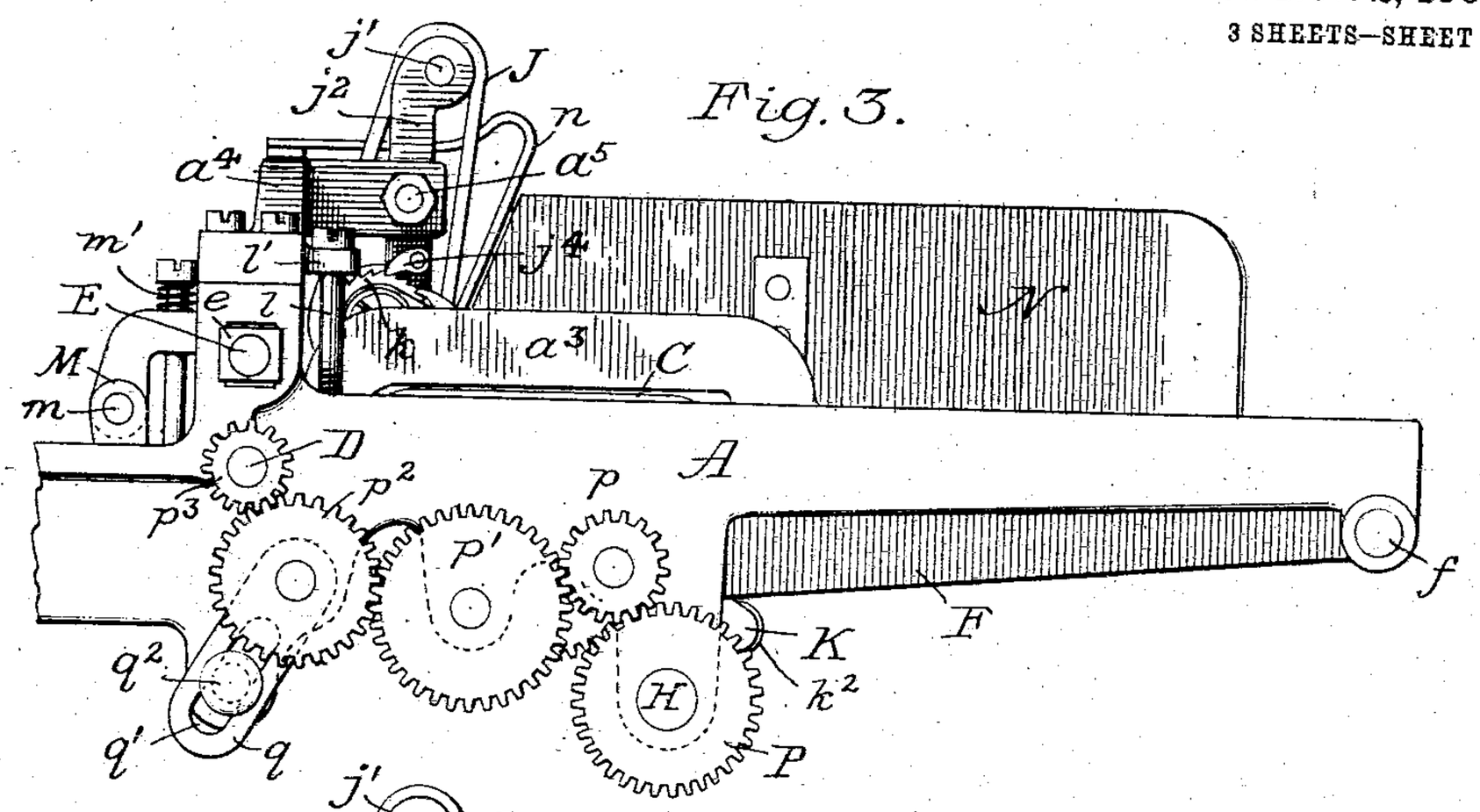


Fig. 4.

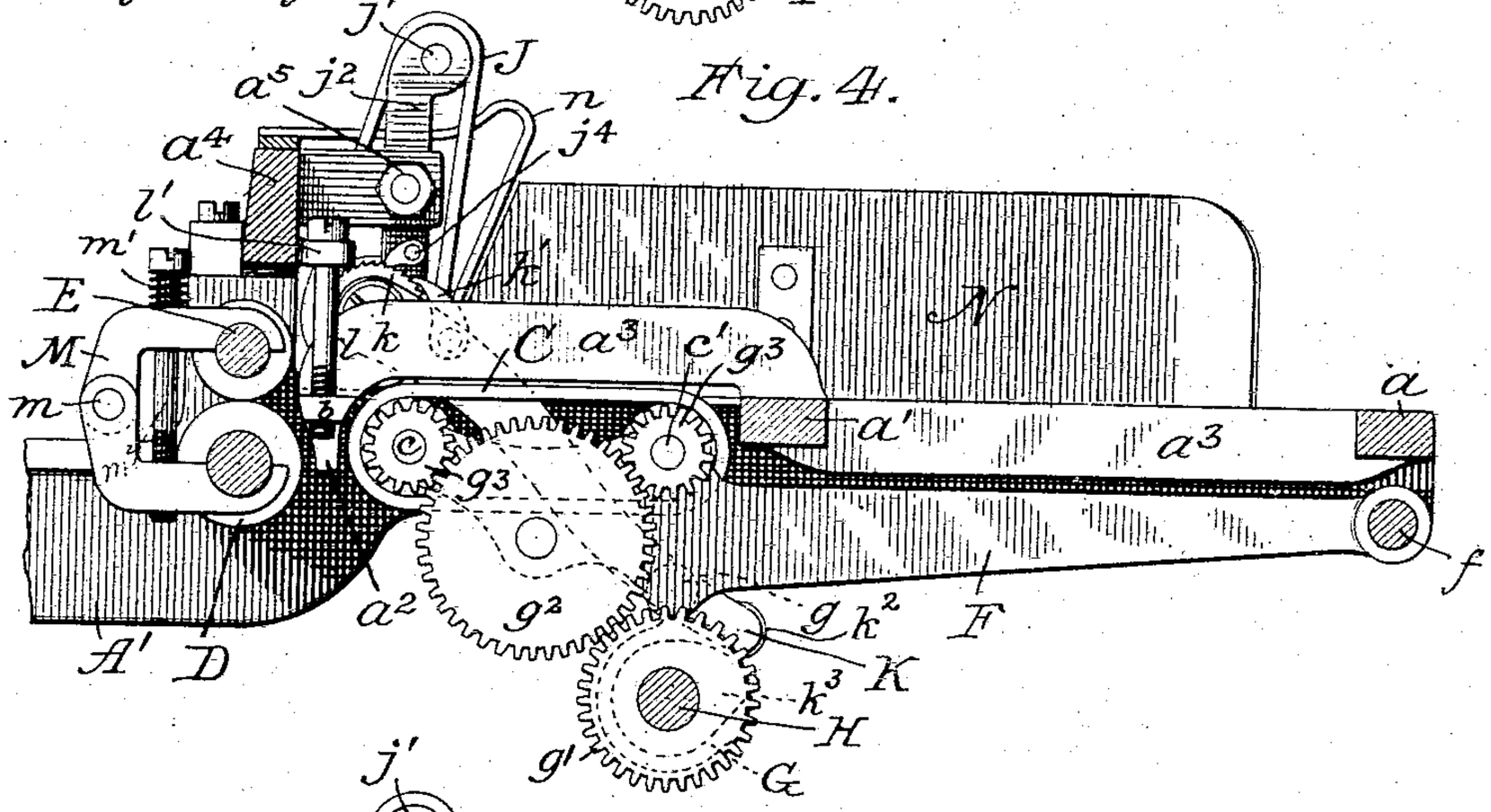
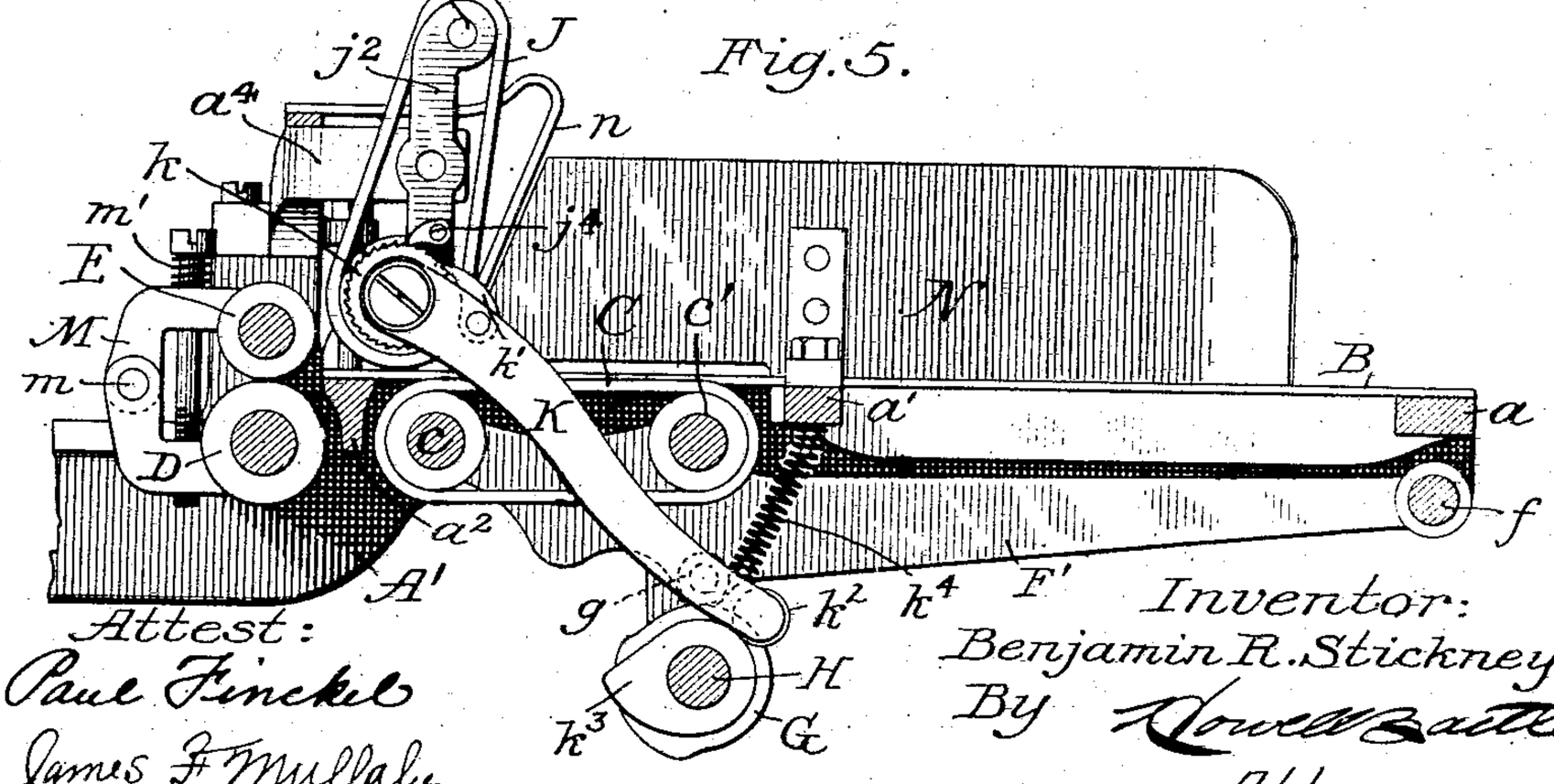


Fig. 5.



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UNITED STATES PATENT OFFICE.

BENJAMIN R. STICKNEY, OF TICONDEROGA, NEW YORK, ASSIGNOR OF ONE-HALF TO JOSEPH E. RALPH, OF JOLIET, ILLINOIS.

SHEET-FEEDING MACHINE.

939,177. Specification of Letters Patent. **Patented Nov. 2, 1909.**

Application filed June 30, 1909. Serial No. 505,229.

To all whom it may concern:

Be it known that I, BENJAMIN R. STICKNEY, a citizen of the United States, residing at Ticonderoga, in the county of Essex and State of New York, have invented new and useful Improvements in Sheet-Feeding Machines, of which the following is a specification.

This invention relates to that class of machines which are used for feeding sheets of paper from a stack or pile to a printing press or other apparatus; and it has for its object to produce a simple and efficient mechanism for this purpose.

In the accompanying drawings, Figure 1 is a plan view of a sheet feeding mechanism embodying my invention. Fig. 2 is a front view thereof with the withdrawing rolls removed. Fig. 3 is a side elevation. Fig. 4 is a section on line 4—4 of Fig. 1, and Fig. 5 is a section on line 5—5 of Fig. 1.

As illustrated, the main frame of the machine includes side plates A and A′ which may form integral extensions of the frame of the printing press or other apparatus to which the sheet feeding mechanism is applied; but when necessary or desirable the sheet feeding mechanism in its entirety may be constructed and supported independently of other apparatus.

The side plates A and A′ are connected together by a horizontal frame comprising transverse bars a, a' and a^2, which are connected together by two longitudinal bars a^3, the latter being located near the side plates A and A′. The bars a and a' are bolted or otherwise secured to the side plates, but the bar a^2 terminates at its juncture with the longitudinal bars a^3, as best shown in Fig. 2.

Extending across the bars a, a' and a^2, are a series of slats B which constitute the bed or support for a stack or pile of paper, the individual sheets of which are to be successively fed to the printing press or other apparatus, said slats being spaced apart to receive between them the sheet advancing bands C which engage the bottom sheet of the stack and advance it to the withdrawing rolls D and E.

Mounted beneath the bar a is a rock shaft f, and mounted on said shaft are two levers F and F′ which extend forwardly of the shaft, and which carry two rolls c and c', said rolls being mounted between the levers with their ends journaled therein. Around said rolls are mounted a series of endless bands C, preferably composed of rubber, which, when the levers are elevated, as shown in Fig. 4, project slightly above the plane of the slats B in position to frictionally engage the bottom sheet of the stack and advance it to the withdrawing rolls. Said bands are arranged to occupy the spaces between the slats B during the sheet advancing operation, and to then drop down below the slats to release the sheet from frictional contact during the operation of the withdrawing rolls which pull the sheet from beneath the stack and deliver it to the printing press or other apparatus. The levers F and F′ are raised and lowered for raising and lowering the bands C by means of cams G mounted on the main driving shaft H of the machine, each of said levers being provided with an anti-friction roller g which rests on one of the cams G, as shown in Figs. 2, 4 and 5. The cams G are so shaped that they will raise the levers F and F′ once in every revolution, the period of elevation being about one-third of the complete revolution, this, in the machine shown, being sufficient to advance the sheet to the withdrawing rolls.

The rolls c and c' are positively rotated by means of a gear g' mounted on the shaft H, said gear meshing with a gear g^2 mounted on the lever F, the gear g^2 in turn meshing with a pinion g^3 on each of the rolls c and c'. The gears g' and g^2 are provided with teeth of sufficient length to permit the levers F and F′ to be raised without separation of the gears, the rolls c and c' being constantly driven during the operation of the machine, the direction of rotation being such as will cause the upper portions of the bands to travel in the direction of the withdrawing rolls.

Mounted above the slats B are a series of endless bands J which coöperate with the sheet advancing bands C to separate the lowermost sheet of the stack of paper from the next adjacent sheet or sheets, and these bands I term the sheet separating bands. Said bands are mounted on rolls j and j' journaled at their ends in coupling blocks j^2, the latter being adjustably supported by brackets a^4 secured to the main frame of the machine. The two rolls j and j' are arranged one above the other with the upper

roll j' slightly to the rear of the lower roll so as to provide for adjustments of the bands J with reference to the bands C, as will be hereinafter explained.

In the machine illustrated, there are six sheet advancing bands C, and each operates in conjunction with a sheet separating band J, the latter being arranged to engage the bands C at a point slightly in advance of the stack or pile of paper from which the sheets are fed. The bands J are intermittently moved in a direction opposite to the direction of movement of the bands C, and for this purpose I provide the roll j with a ratchet wheel k which is engaged by a spring pressed pawl k' mounted on a lever K. Said lever is pivotally mounted on the roll j concentric with the axis of the ratchet wheel and extends rearwardly and downwardly therefrom to a point above the driving shaft H. At its outer end said lever carries an antifriction roller k^2 which rests on a cam k^3 mounted on the shaft H, said cam being so shaped and positioned with respect to the cams G that the lever K will be raised just after the cams G have raised the levers F and F'. The pawl k' being in engagement with the ratchet wheel k, an upward movement of the lever K will cause said wheel to be rotated for moving the roll j and bands J in a direction opposite to the advancing movement of the bands C. A pawl j^4 mounted on the coupling block j^2 engages the ratchet wheel k and holds it and the bands J against movement in an opposite direction when the lever K descends. A spring k^4 is mounted between the lever K and a part of the frame of the machine to insure a prompt return movement of said lever.

When the levers F and F' are raised by the cams G, the bands C engage the bottom sheet of the stack and advance it to the withdrawing rolls D and E, and when the sheet reaches the bands J, which are then in contact with the bands C, said bands J are moved in a direction opposite to the travel of the sheet, so that should more than a single sheet be advanced by the bands C, the bands J will separate the sheets by holding back the extra sheet or sheets, the two sets of bands coöperating in a manner identical to the action of the thumb and finger of the hand when slipped one over the other for separating two or more sheets.

It sometimes happens that two or more sheets will be so stuck together that they cannot be readily separated by the bands C and J, and to prevent the possibility of two or more sheets passing to the withdrawing rolls, I provide additional bands L which are mounted on the rolls j and j' in spaces between the bands J. Two such bands are shown, and this will be sufficient in most instances, but a greater number may be provided when found necessary. These bands L are each arranged over one of the slats B, and are so adjusted with reference thereto that only a single sheet may pass between them. The adjustment is effected by means of screws l which pass through lugs l' on the brackets a^4, said screws engaging lugs b on the frame bars a^2, the arrangement being such that by turning the screws l in one direction or the other, the bands L and the slats B will be moved toward or from each other, as will be readily understood.

The coupling blocks j^2 which directly support the rolls j and j' are each secured to a bracket a^4 by a single screw or bolt a^5, the bolt being located midway between the journaled ends of the rolls. The coupling blocks may therefore be angularly adjusted with reference to the supporting brackets and locked thereto in any desired angular position. This angular adjustment is provided for regulating the frictional engagement of the bands J with the sheet advancing bands C. On referring to Fig. 4, it will be seen that the frictional contact may be increased or diminished by moving the lower roll j toward or from the bands C, this adjustment being initially necessary to a proper working of the machine.

The withdrawing rolls D and E have their ends journaled in the frame plates A and A', a sliding box e being provided at each end of the upper roll E so that the two rolls may be maintained in proper yielding contact. At or near the ends of the rolls I provide yokes M, the two arms of which are pivotally connected together as at m. The outer ends of the arms are arranged to bear on the rolls to hold them in yielding contact, a bolt m^2 and spring m' operating to hold and press the arms together, as clearly shown in Figs. 4 and 5.

The withdrawing rolls are driven by a gear P on the main shaft H, which, through intermediate gears p, p' and p^2 drives a pinion p^3 on the end of roll D. The gears p and p' are mounted on the frame plate A, but the gear p^2 is mounted on an adjustable arm q, said arm being provided with a slot q' for the reception of a bolt q^2 which secures the arm to the plate A. The purpose of this arrangement is to permit gears of different sizes to be placed between the gear p' and the gear p^3, so that the speed of the withdrawing rolls may be changed according to the size of the sheets to be fed. When it is necessary to change the speed of the withdrawing rolls, the gear p^2 is removed from the arm q and another of different size is placed thereon and the arm adjusted accordingly, as will be understood.

The bed of the machine is provided with adjustable guides N between which the stack or pile of paper is placed, said guides serving to properly position the sheets with reference to the feeding mechanism. Guards

n are provided for preventing the stack from contacting with the bands J and L.

The operation of the machine is as follows: A stack or pile of paper having been placed between the guides N, the main driving shaft is set in motion in any suitable manner. I show a sprocket wheel H′ mounted on the end of said shaft which may be driven by a chain from the source of power. During each revolution of the driving shaft, the sheet advancing bands C will be raised and lowered as hereinbefore explained, the bands being constantly driven for advancing the bottom sheet of the pile to the withdrawing rolls. When said bands are raised they frictionally engage said sheet and move it forward beneath the separating bands J, the latter at the proper moment moving back against the advancing sheet to separate it from the next adjacent sheet or sheets which may have been moved forward by the movement of said bottom sheet. The movement of the bottom sheet is continued until its forward end is engaged by the withdrawing rolls D and E. At that moment the advancing bands C drop away from the sheet so that its further advance is effected wholly by the withdrawing rolls free from the friction of said bands. The sheets are therefore free from any liability of being torn or mutilated. The speed of the withdrawing rolls must be sufficient to withdraw the sheet entirely from the stack before the bands C are again elevated, and it will therefore be understood that the speed must be regulated to suit the size of sheets being fed by the machine, this being effected by changing the size of the gear p^2, as already explained. Should two or more sheets be stuck together so that they cannot be separated by the bands J, they will be prevented from passing to the withdrawing rolls by the bands L, in which case the machine must be stopped until said sheets are removed.

The machine may be run at high speed, and it will be obvious that the feed will be the same regardless of the size of the sheets being fed.

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

1. In a machine for feeding sheets from a stack or pile, the combination of a pair of withdrawing rolls, a sheet advancing device adapted to engage a sheet and advance it from the stack or pile to said withdrawing rolls and then move away from said sheet, and an intermittently movable sheet separating device movable in a direction opposite to the travel of the sheet and adapted to coöperate with the sheet advancing device for separating the advancing sheet from the next adjacent sheet or sheets.

2. In a machine for feeding sheets from a stack or pile, the combination of a pair of withdrawing rolls, a sheet advancing device adapted to engage a sheet and advance it to said rolls and then move away from said sheet, an intermittently movable sheet separating device movable in a direction opposite to the travel of the sheet and adapted to coöperate with the sheet advancing device for separating the advancing sheet from the next adjacent sheet or sheets, and means for relatively changing the speed of operation of the withdrawing rolls and sheet advancing device.

3. In a machine for feeding sheets from a stack or pile, the combination of a pair of withdrawing rolls, a constantly rotating sheet advancing device movable toward and from the stack or pile and adapted to engage a sheet and advance it to the withdrawing rolls, and an intermittently rotating sheet separating device having an intermittent rotating movement in a direction opposite to the travel of the sheet and adapted to engage therewith for separating it from the next adjacent sheet or sheets.

4. In a machine for feeding sheets from a stack or pile, the combination of a pair of withdrawing rolls, a series of continuously moving endless bands adapted to frictionally engage a sheet and advance it from the stack or pile to the withdrawing rolls and then move away from the sheet, and a second series of endless bands intermittently movable in a direction opposite to the travel of the sheet, said second set of bands being adapted to operate against the sheet advancing bands for separating the advancing sheet from the next adjacent sheet or sheets.

5. In a machine for feeding sheets from a stack or pile, the combination of a pair of withdrawing rolls, a support for a stack or pile of paper, a series of endless traveling bands adapted to be moved into contact with the bottom sheet of the stack of paper arranged on said support for advancing the sheet to the withdrawing rolls and to thereafter move away therefrom, a second series of endless bands mounted above said support and adapted to frictionally engage the advancing sheet, and means for intermittently moving said second set of bands in a direction opposite to the travel of the sheet.

6. In a machine for feeding sheets from a stack or pile, the combination of a pair of withdrawing rolls, a paper support, a series of endless traveling bands adapted to be moved into contact with the bottom sheet of a stack of paper arranged on said support for moving it to the withdrawing rolls and to then move away from said sheet, a roll mounted above the plane of the paper support and adjustable with reference thereto, said roll being intermittently rotated in a direction opposite the direction of the moving sheet, a series of endless bands carried by said roll adapted to coöperate with the

sheet advancing bands for separating the advancing sheet from the next adjacent sheet or sheets, and additional bands also carried by said roll above a portion of the paper support for the purpose specified.

7. In a sheet feeding machine, the combination of a pair of withdrawing rolls, a paper support, a series of continuously moving bands adapted to frictionally engage the bottom sheet of a stack or pile of paper arranged on said support and advance it to said rolls and to thereafter move away therefrom, a pair of rolls above the plane of the paper support, blocks connecting said rolls together at their ends, brackets supporting said blocks, the latter being angularly adjustable with reference to the brackets, a series of bands mounted on said rolls and adapted to coöperate with the sheet advancing bands for separating the advancing sheet from the next adjacent sheet or sheets, and means for intermittently moving said bands in a direction opposite to the travel of the sheet.

8. In a machine for feeding sheets from a stack or pile, the combination of withdrawing rolls, a paper support, a pair of levers, rolls carried by said levers, a series of endless bands carried by said rolls, a driving shaft, a cam on said shaft adapted to cause said levers to move toward and from a stack of paper on said support, said bands being adapted to frictionally engage a sheet of paper and advance it from the stack or pile to the withdrawing rolls, a gear on said shaft and suitable gears on one of said levers meshing therewith for rotating the belt carrying rolls, and a series of endless bands adapted to coöperate with the sheet advancing bands for separating the advancing sheet from the next adjacent sheet or sheets, said bands being intermittently movable in a direction opposite to the travel of the sheet.

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

BENJAMIN R. STICKNEY.

Witnesses:

HOWELL BARTLE,

CHAPMAN W. FOWLER.