B. R. STICKNEY.

SHEET FEEDING MACHINE.

APPLICATION FILED MAR. 17, 1911.

1,074,221.

Patented Sept. 30, 1913.

2 SHEETS—SHEET 1.

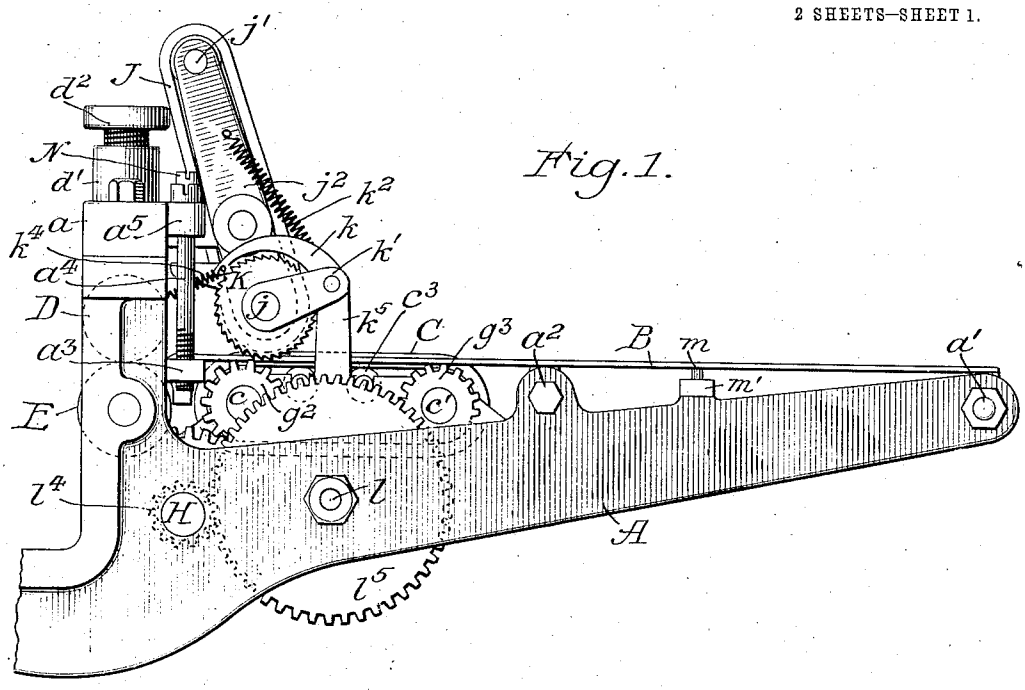


Fig. 1.

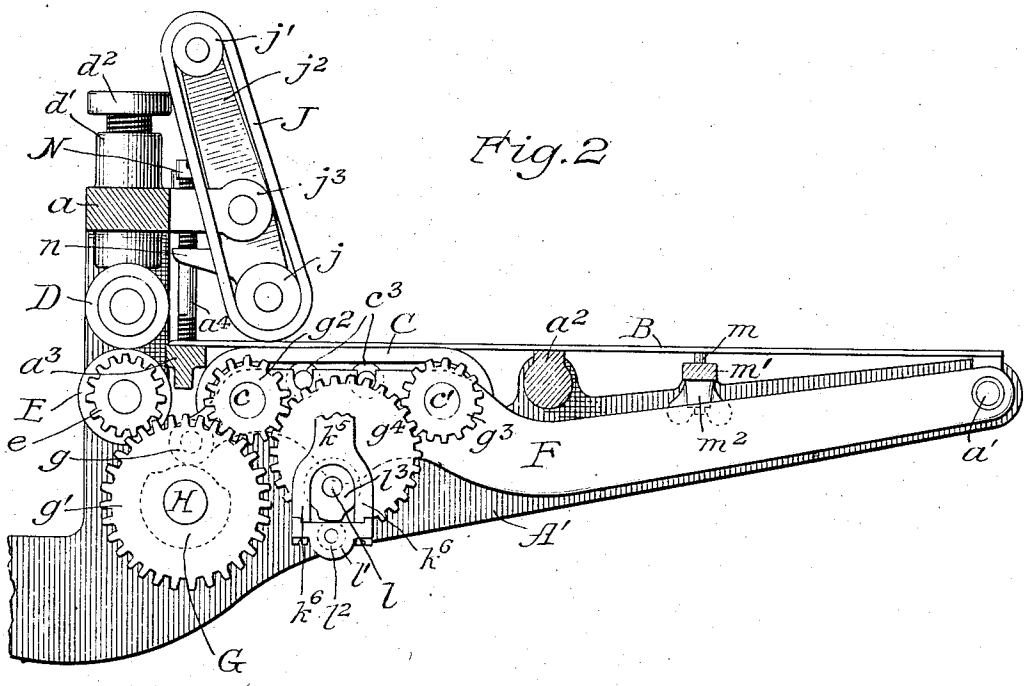


Fig. 2.

Attest:

Anna Cooper

Paul Finckel

Inventor:

Benjamin R. Stickney,

By Howell & Gatlin

Attorney.

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2 SHEETS—SHEET 2.

Fig. 3.

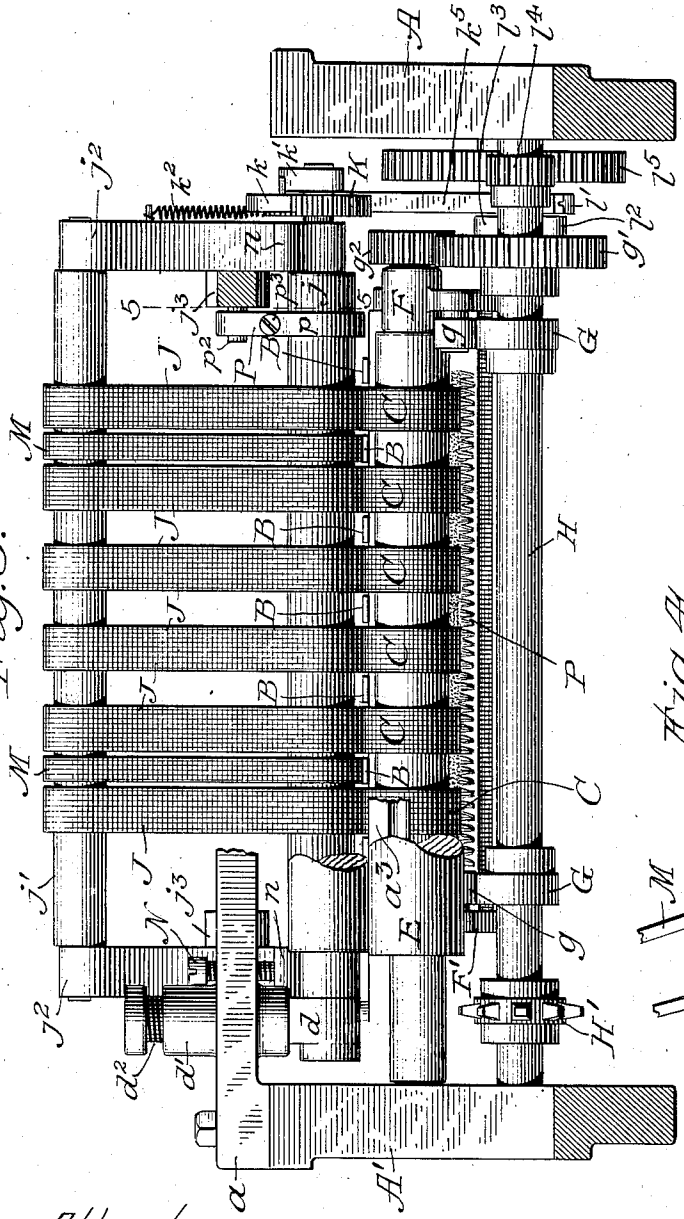


Fig. 4.

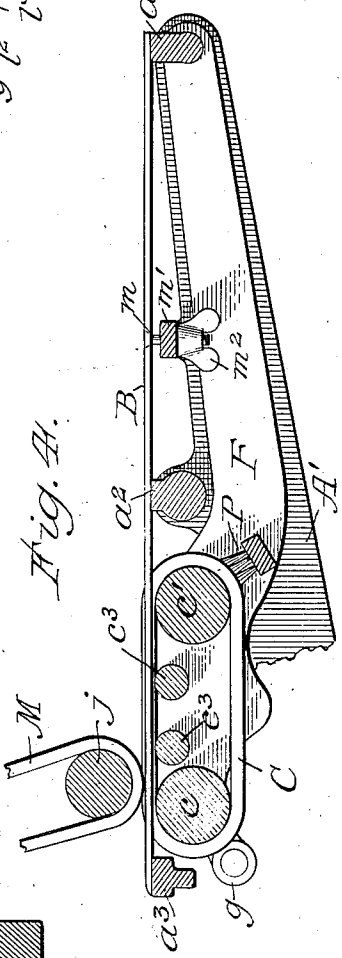
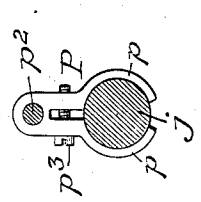


Fig. 5.



Attest:

Annie Cooper

Paul Sinckel

Inventor:

Benjamin R. Stickney,

By Howell & Battle

Attorney.

UNITED STATES PATENT OFFICE.

BENJAMIN R. STICKNEY, OF TICONDEROGA, NEW YORK.

SHEET-FEEDING MACHINE.

1,074,221. Specification of Letters Patent. Patented Sept. 30, 1913.

Application filed March 17, 1911. Serial No. 615,171.

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 a machine for feeding sheets of paper from a stack or pile to a printing press, or to any other machine where it may be necessary to successively feed single sheets, the invention being an improvement on the machine illustrated and described in U. S. Letters Patent #939177, granted to me November 2, 1909. Said patent shows a sheet feeding mechanism embodying means for advancing a sheet from a stack or pile to a pair of withdrawing rolls which take hold of the sheet, withdraw it from the stack or pile and deliver it to the printing or other machine. A sheet separating means coöperates with the sheet advancing means for separating the sheet from the next adjacent sheet or sheets. In the particular machine referred to, the sheet advancing means consists of a series of endless traveling belts which are intermittently moved into and out of contact with the bottom sheet of the stack or pile of sheets, said belts operating by frictional contact to advance the bottom sheet far enough to be taken hold of by the withdrawing rolls. The sheet separating device also consists of a series of endless belts which are located so as to be engaged by the advancing belts when the latter are raised for advancing a sheet, the sheet traveling between the two sets of belts. The sheet separating belts are given a slight movement in a direction opposite to the travel of the sheet to separate it from the next adjacent sheet or sheets. Said machine was designed for general purposes and has proved thoroughly efficient except where very thin tissue paper is being fed. The front edges of the sheets of the stack or pile contact with the sheet separating belts, and the latter in their backward movement have a tendency to turn up or curl the edges of the sheets, which my present invention seeks to avoid.

It is necessary that the sheet separating device, whatever its form, be moved one way or another to avoid uneven wear. Rolls may be employed in lieu of bands or belts, but the latter are preferred because of their extended wearing surface. If the separating belts or roller be moved in the direction of the travel of the sheet while the latter is in contact therewith, there is a tendency for the roll or belt to carry or feed the next adjacent sheet or sheets, especially if very thin paper is being fed. If a backward movement is employed as in the before mentioned patent, the tendency is to injure or curl up the edges of the sheets. I have found, however, that if the separating device be held stationary while the sheet is being advanced, and is moved during the interval between the feed of the sheets, or at a time when the sheet advancing bands are out of contact therewith, all difficulty will be overcome, especially if the separating bands or roll be moved in the direction of the travel of the sheet. There will then be no tendency to advance more than a single sheet at a time, and the front edges of the sheets will be brushed or smoothed down in proper condition for the separating and feeding operation. The machine hereinafter described carries out this broad idea, and I have also embodied other novel features which will be specifically pointed out in the appended claims.

To more particularly describe my invention I will refer to the accompanying drawings, in which—

Figure 1 is a side view of a sheet feeding machine embodying my invention. Fig. 2 is a view similar to Fig. 1, with a portion of the main frame and parts of the mechanism removed for more clearly disclosing the underlying mechanism. Fig. 3 is a front view of the machine with a part of the main frame and parts of the withdrawing rolls broken away. Fig. 4 is a detail sectional view showing the sheet advancing band, their supporting rolls, and a part of the frame of the machine, and Fig. 5 is a detail of the friction holding device taken on line 5—5 of Fig. 3.

As illustrated, the main frame of the machine includes side plates A and A′ which may form integral extensions of the frame of a printing press or other machine 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 at the front of the machine by a cross bar *a* and at the rear of

the machine by a connecting rod or bar a'. There is also a connecting rod or bar a^2 located about midway between the ends of the machine. These connecting bars are bolted or otherwise secured to the side plates A and A′ and with said plates form the main frame of the machine. Extending across the bars a and a^2 are a series of slats B which constitute the bed or support for a stack or pile of paper, the front ends of said bars extending to and resting upon a cross bar a^3, the latter being adjustably suspended by screws or bolts a^4 which pass through perforated lugs a^5 projecting from the cross bar a. The bar a^3 may be raised or lowered by turning the bolts in one direction or the other, as will be readily understood. The slats B are spaced apart to receive between them the sheet advancing bands C which engage the bottom sheet of the stack or pile of paper and advance it to the withdrawing rolls D and E.

Two levers F and F′ are pivotally mounted on the cross bar a', said levers extending forwardly of said bar and carrying rolls c and c' which are mounted between the two levers with their outer 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. 1, 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 therewith 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 drive 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 dotted lines in Fig. 2, and in Fig. 4. The cams G are so shaped that they will raise the levers F and F′ once in every revolution and hold them in their raised position long enough 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 roll c. These two gears are provided with teeth of sufficient length to permit the raising and lowering of the levers F and F′ without separation of the gears. The roll c' is also provided with a gear g^3 which is driven from the gear g^2 by means of an intermediate gear g^4 mounted on the lever F. The rolls c and c' are constantly driven during the operation of the machine so that the upper portions of the belts will travel in the direction of the withdrawing rolls.

Mounted above the plane of the slats B and alining with the bands C 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' which are journaled at their ends in coupling blocks j^2, the latter being adjustably supported by brackets j^3 projecting from the cross bar a of the main frame. The two rolls j and j' are arranged one above the other with the upper roll j' slightly forward 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 for the purpose of preventing excessive wear at any particular point. Each movement is very slight and is preferably in the direction of travel of the sheet. The movement does not, however, take place while the sheet is passing between the two sets of bands, but is so timed as to take place when the bands C are lowered out of contact with the paper and after a sheet has been drawn away from the bands by the withdrawing rolls. For preventing movement of the bands J during the travel of the sheet, I provide a friction brake P shown in Figs. 3 and 5. Said brake comprises a pair of spring arms p, p, which encircle the roll j and which are preferably integrally united at their upper ends and suspended from a stud or pin p^2 which connects one of the coupling blocks j^2 with its supporting bracket j^3. The two spring arms p, p are drawn together for frictionally engaging the roll j by means of a screw p^3, the friction being regulated to suit conditions as will be readily understood.

As hereinbefore indicated, the stack or pile of paper rests on the slats B with the front edges of the lowermost sheets in contact with the bands J. If the bands J be moved in a direction opposite to the travel of the sheet they will tend to curl or comb up the edges of the paper, especially if the paper be extra thin. By moving the belts in the direction of travel of the sheet the edges of the paper will be smoothed down by the belts in proper condition for the feeding operation. The movement of the belts J need not take place between the feed

of each individual sheet, but should be moved at frequent intervals, as for instance after every fourth sheet, as in the machine shown, this being regulated by the size of the gearing employed. The belts J are moved by means of a ratchet wheel K mounted on the roll j, said ratchet being engaged by a pawl k carried on the end of an arm k' loosely mounted on the shaft j. The outer end of the arm k' is held in an elevated position by means of a spring k^2 secured thereto and to one of the coupling blocks j^2. The pawl is held in engagement with the ratchet wheel by means of a spring k^4 secured to the pawl and to the frame of the machine, all as clearly shown in Fig. 1. The arm k' is pulled down against the tension of spring k^2 for moving the ratchet K by means of a rod or bar k^5 connected to said arm, said bar, at its opposite end, being forked, as at k^6, so as to embrace a stub shaft l secured to the side plate A of the main frame, as clearly shown in Figs. 1 and 2. The forked arms k^6 of the rod k^5 are connected together below the shaft l by a cap or plate l' and mounted on said cap or plate is a roller l^2 which is engaged by a cam l^3 mounted on the shaft l. Sufficient space is allowed between the shaft l and the surrounding fork of the bar k^5 to permit the latter to be drawn down by the cam l^3, and thereafter raised by the spring k^2. Mounted on the shaft l is a gear l^5 meshing with a gear l^4 on the main shaft H, the gears as shown being of such size as will cause the bar k^5 to be raised and lowered about once in every four revolutions of the shaft H, but this, as heretofore explained, is immaterial so long as the parts are so timed that the arm k^5 will be pulled down at an interval between the feed of the separate sheets so that the bands J may remain stationary while a sheet is being advanced and withdrawn by the withdrawing rolls. 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 at such times stationary, said bands J operate by their frictional contact to hold back the next adjacent sheet or sheets so that only one sheet will pass to the withdrawing rolls. It sometimes happens, however, that two or more sheets will be stuck together so that they cannot readily be 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 M which are mounted on the rolls j and j' in spaces between the bands J, one of said bands M being mounted between the bands J which are adjacent the ends of the rolls, so that said bands M will contact with the sheets at or near their side edges. These bands M are each arranged above one of the slats B and are so adjusted with reference thereto that only a single sheet may pass between the band and the slat. The adjustment is effected by means of screws m which pass through countersunk holes in the slats at a point between the cross bars a' and a^2 of the main frame. These screws pass through a bar m' secured to and extending across the main frame, and beneath said bar said screws are engaged by a thumb nut m^2 so that by turning the thumb nut the screws will operate to draw down the slat between the bars a' and a^2 and thus elevate the end of the bar which is in contact with the band M.

All of the bands J and M are initially adjusted by means of screws N which pass through lugs in the bar a of the main frame and bear upon a lug n which projects from each of the coupling blocks j^2. The coupling blocks being pivotally mounted upon the supporting brackets j^3, and being held in inclined position as shown, will have a tendency to assume an upright position, so that by turning the screws N the inclination of the coupling blocks j^2 may be varied for the purpose of varying the frictional engagement of the bands J and C, and for the purpose of properly supporting the belts C between the rolls c and c' I provide small supporting rolls c^3, as clearly shown in Figs. 1 and 2.

In addition to the independent adjustment of the two slats B which engage the bands M, I provide for initially adjusting all of the slats by means of the cross bar a^3 hereinbefore referred to. All of the slats have their front ends resting upon the bar a^3 and the latter may be raised or lowered by the screws a^4 as previously explained.

The withdrawing roll E has its ends journaled in the side plates A and A′ of the main frame, and at one end said roll carries a gear e which meshes with the gear g on the shaft H, so that said roll is positively and continuously driven in a direction for withdrawing and feeding the sheets. The roll D is suspended from the cross bar a by means of adjustable brackets d which are pressed downwardly by means of springs mounted in housings d', said springs operating against adjustable abutments d^2 which are adjusted for varying the pressure of the roll D on the roll E, in a well known manner, the roll D being frictionally driven by the roll E, or by the paper which passes between the rolls.

For maintaining the belts C in proper condition for advancing the sheets, I provide a brush P which is mounted between the levers F and F′ so that said brush is in constant contact with the bands C. This brush may be made of stout bristles or of wire, and should be mounted so that it may

be adjusted toward and from the bands to compensate for wear. The brush operates against the surface of the bands and prevents said surfaces from becoming polished or smoothed to such an extent as would materially decrease the frictional engagement with the paper to be fed. The operation of the machine is as follows: A stack or pile of paper having been placed in proper position upon the slats B, the main driving shaft is set in motion in any suitable manner. In Fig. 3, I show a sprocket wheel H' mounted on said shaft which may be connected by a chain to 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, which operate to separate the sheet from the next adjacent sheet or sheets. The movement of the bottom sheet by the bands C is continued until the forward end of the sheet is engaged by the withdrawing rolls D and E. At that moment the 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 speed of the withdrawing rolls should be such as to withdraw the sheet entirely from the stack or pile before the bands C are again elevated, and preferably before the bands J are moved. 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 M, in which case the machine must be stopped until said sheets are removed. During the interval between the feed of one sheet and the next sheet, the bands J are moved a slight distance in the direction of the travel of the sheet so that they brush down the edges of the sheet as heretofore explained. Should said bands be moved during the travel of a sheet between the two sets of bands, the tendency would be to feed the next adjacent sheet, and while it is necessary in feeding thin paper to move the bands J in the direction of the travel of the sheet, they may be moved in an opposite direction when feeding heavier paper, but should, in any event, be held stationary during the feeding of the sheet.

It will be understood that the structure of my machine may be widely varied without departure from the main features of my invention.

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 sheet withdrawing device, a sheet advancing device adapted to frictionally engage each successive sheet and advance it from the stack or pile to the withdrawing device, a sheet separating device coöperating with the sheet advancing device for separating the advancing sheet from the next adjacent sheet or sheets, and means for moving said separating device during the interval between the feeding of successive sheets for preventing uneven wear thereon, said device remaining stationary while each sheet is being advanced.

2. In a machine for feeding sheets from a stack or pile, the combination of a sheet withdrawing device, a sheet advancing device adapted to frictionally engage each successive sheet and advance it from a stack or pile to the withdrawing device and then move away from said sheet, a sheet separating device adapted by frictional engagement to coöperate with the sheet advancing device for separating the advancing sheet from the next adjacent sheet or sheets, and means for moving said separating device during an interval between the feeding of successive sheets for preventing uneven wear thereon, said device remaining stationary while each sheet is being advanced.

3. In a machine for feeding sheets from a stack or pile, the combination of a sheet withdrawing device, a constantly moving sheet advancing device adapted to frictionally engage each successive sheet and advance it from a stack or pile to the withdrawing device and then move away from said sheet, a sheet separating device adapted by frictional engagement to coöperate with the sheet advancing device for separating the advancing sheet from the next adjacent sheet or sheets, and means for moving said device during the interval between the feeding of successive sheets for preventing uneven wear thereon, said device remaining stationary while each sheet is being advanced.

4. In a machine for feeding sheets from a stack or pile, the combination of a sheet withdrawing device, a series of continuously moving endless bands adapted to frictionally engage a sheet and advance it from the stack or pile to the withdrawing device and then move away from the sheet, a second series of endless bands adapted to coöperate with the sheet advancing bands for separating the advancing sheet from the next adjacent sheet or sheets and means for moving said second set of bands during the interval between the feeding of successive sheets, said bands remaining stationary while each sheet is being advanced.

5. In a machine for feeding sheets from a stack or pile, the combination of a sheet withdrawing device, a series of continu-

ously moving endless bands adapted to frictionally engage a sheet and advance it from a stack or pile to the withdrawing device and then move away from the sheet, a second series of endless bands adapted to coöperate with the sheet advancing bands for separating the advancing sheet from the next adjacent sheet or sheets and means for moving said second series of bands in the direction of travel of the sheet during the interval between the feed of successive sheets, said bands remaining stationary while each sheet is being advanced.

6. In a machine for feeding sheets from a stack or pile, the combination of a sheet withdrawing device, 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 for advancing the sheet to the withdrawing device and to be thereafter moved away therefrom, a second series of endless bands mounted above said support and adapted to frictionally engage the advancing sheet, and means for holding said second series of bands stationary while a sheet is being fed, and means for moving said second set of bands during the interval between the feed of successive sheets.

7. In a sheet feeding machine, the combination of a sheet withdrawing device, a support for a stack or pile of paper, said support consisting of a series of slats which are spaced apart from each other, a sheet advancing device adapted to operate through the spaces between the slats for engaging the bottom sheet of the stack, and advance it to the withdrawing device, a second series of endless bands coöperating with the sheet advancing bands for separating the advancing sheet from the next adjacent sheet or sheets, additional bands coöperating with one or more of said slats for preventing the feeding of more than a single sheet, and means for independently adjusting said slat or slats toward and from said last mentioned bands.

8. In a machine for feeding sheets from a stack or pile, the combination of a sheet withdrawing device, a support for a stack or pile of papers consisting of a series of slats spaced apart from each other, and supported at a point intermediate their length, means operating through the spaces between the slats for engaging the bottom sheet of the stack and advancing it to the withdrawing device, one or more endless bands mounted above said paper support and adapted to coöperate with one or more of said slats for preventing the feed of more than a single sheet, an adjusting screw for said slat or slats located to the rear of the slat supporting means for depressing the slat at that point and thereby elevating it at the point adjacent said bands, for the purpose specified.

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

BENJAMIN R. STICKNEY.

Witnesses:
HOWELL BARTLE,
JOS. H. BLACKWOOD.