(No Model.) 5 Sheets—Sheet 1.

H. BRADSHAW.

METHOD OF AND MACHINE FOR SEPARATING AND FEEDING SHEETS OF PAPER.

No. 528,918. Patented Nov. 13, 1894.

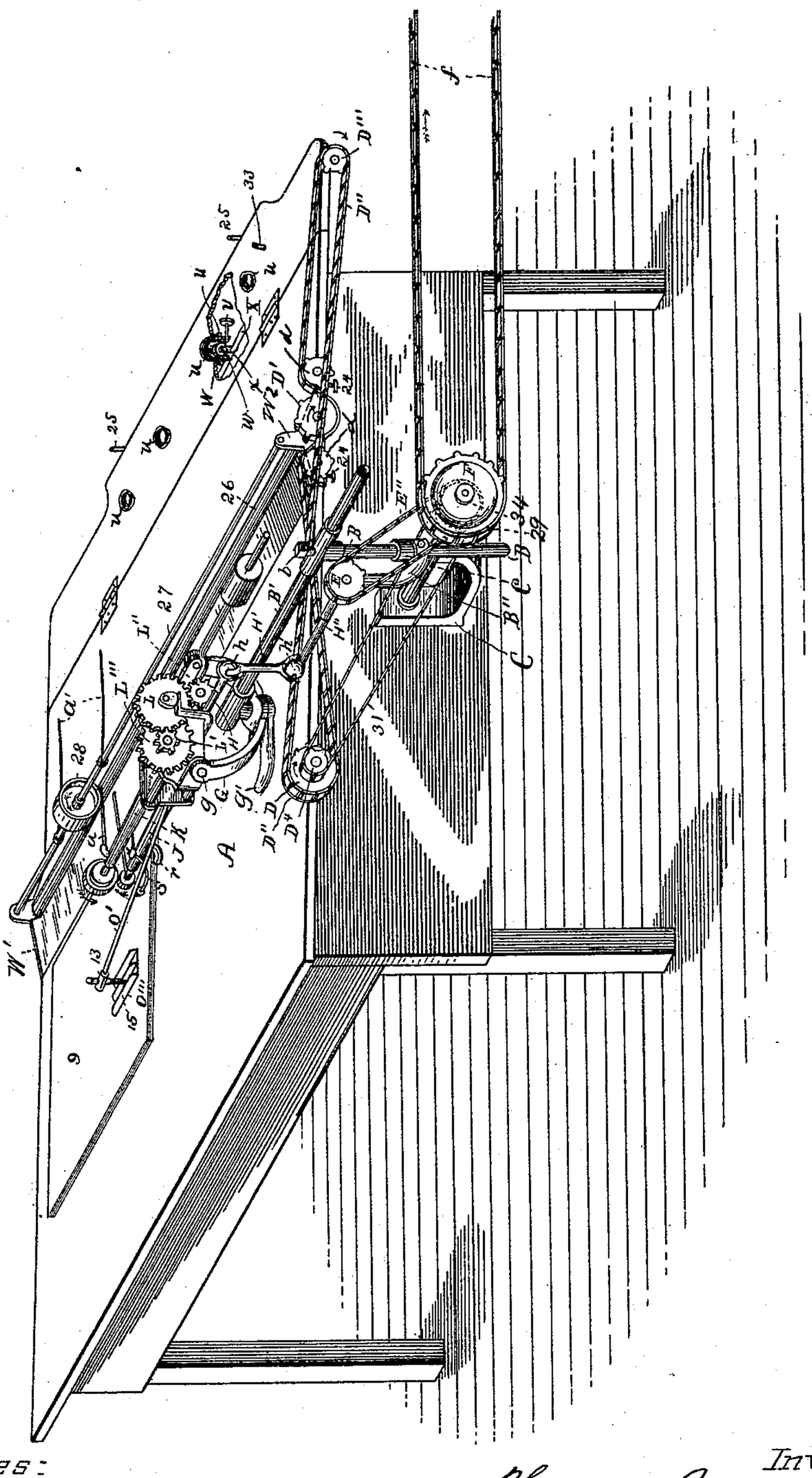

Fig. I.

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(No Model.) 5 Sheets—Sheet 2.

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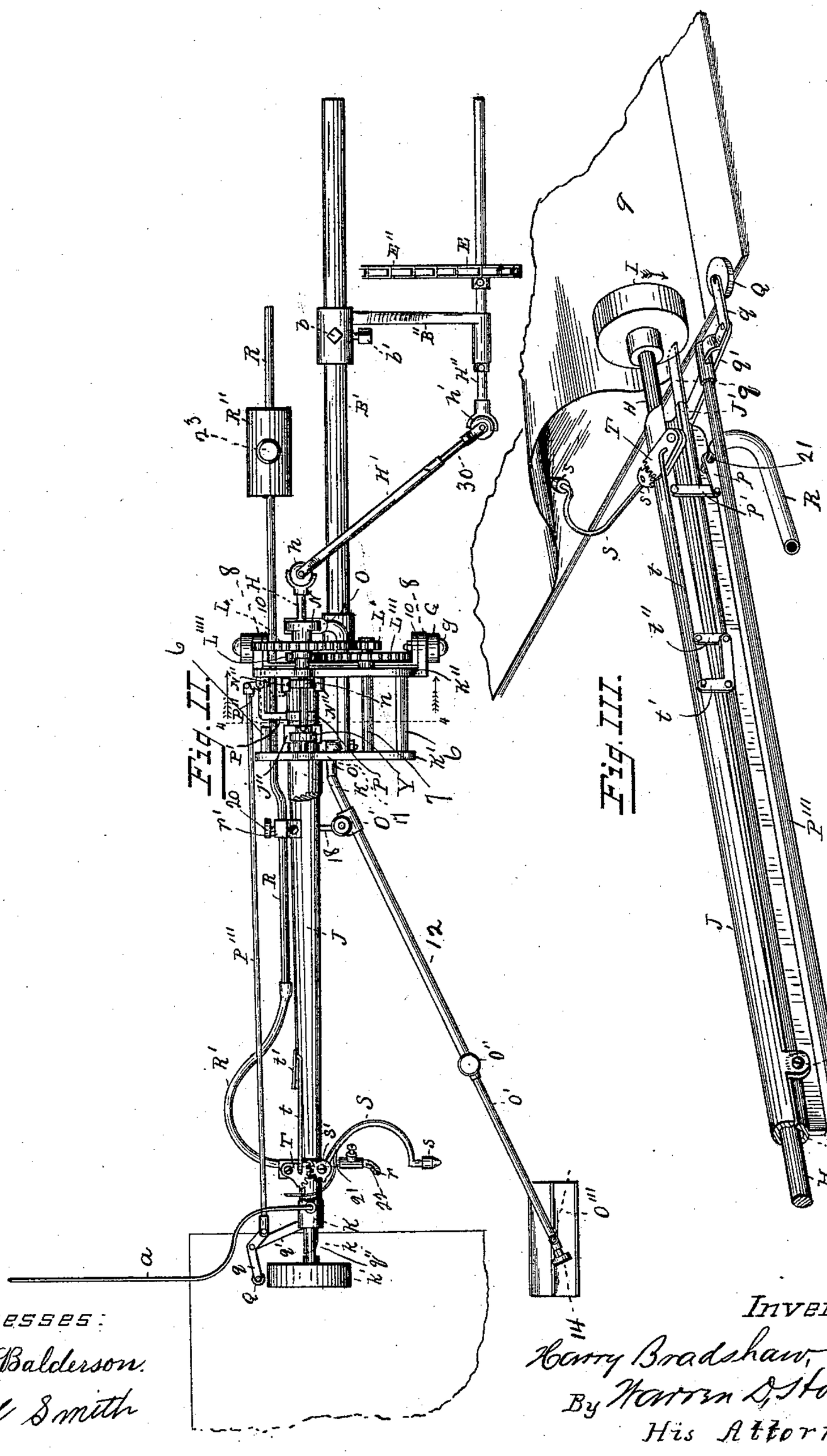

Fig. II.

Fig. III.

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(No Model.) 5 Sheets—Sheet 3.

H. BRADSHAW.

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Fig. IV.

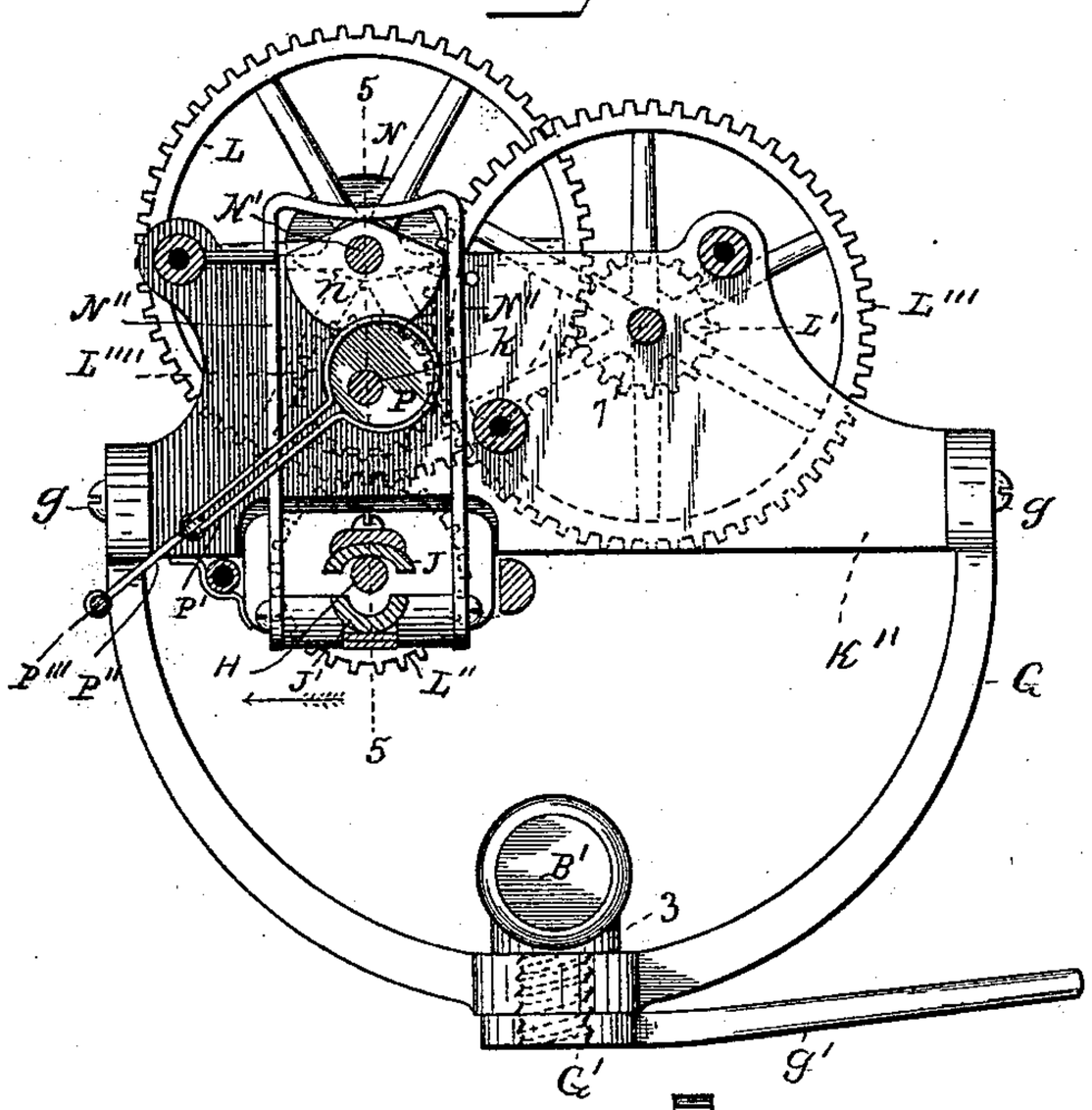


Fig. V.

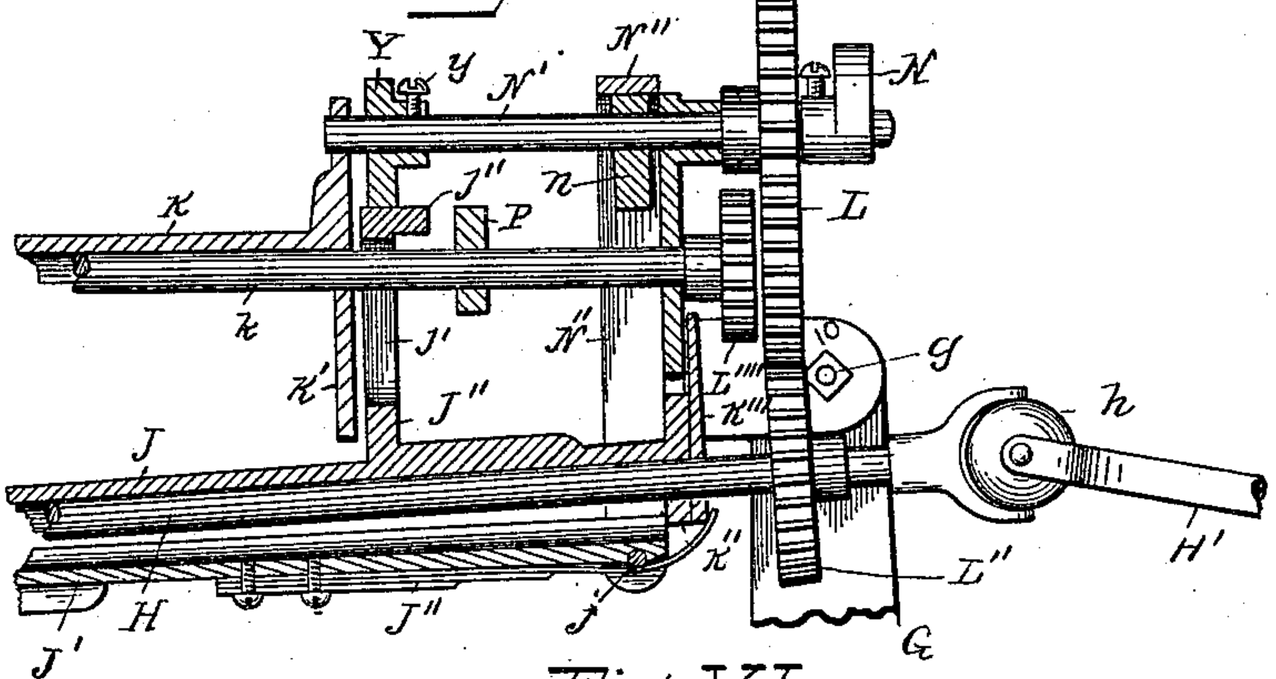
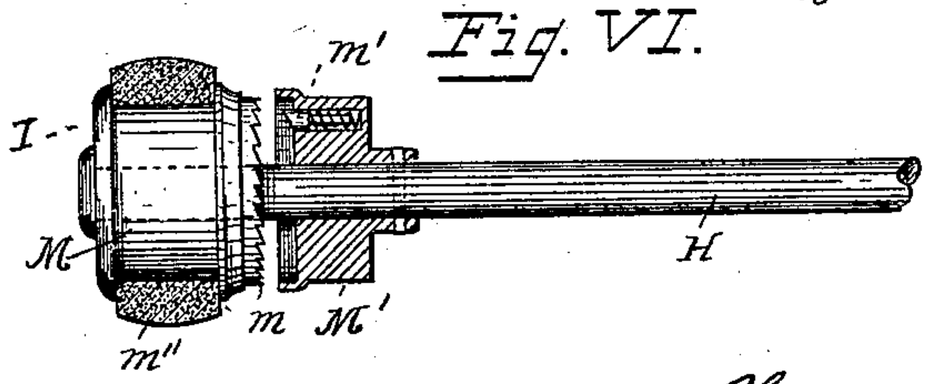


Fig. VI.



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H. BRADSHAW.

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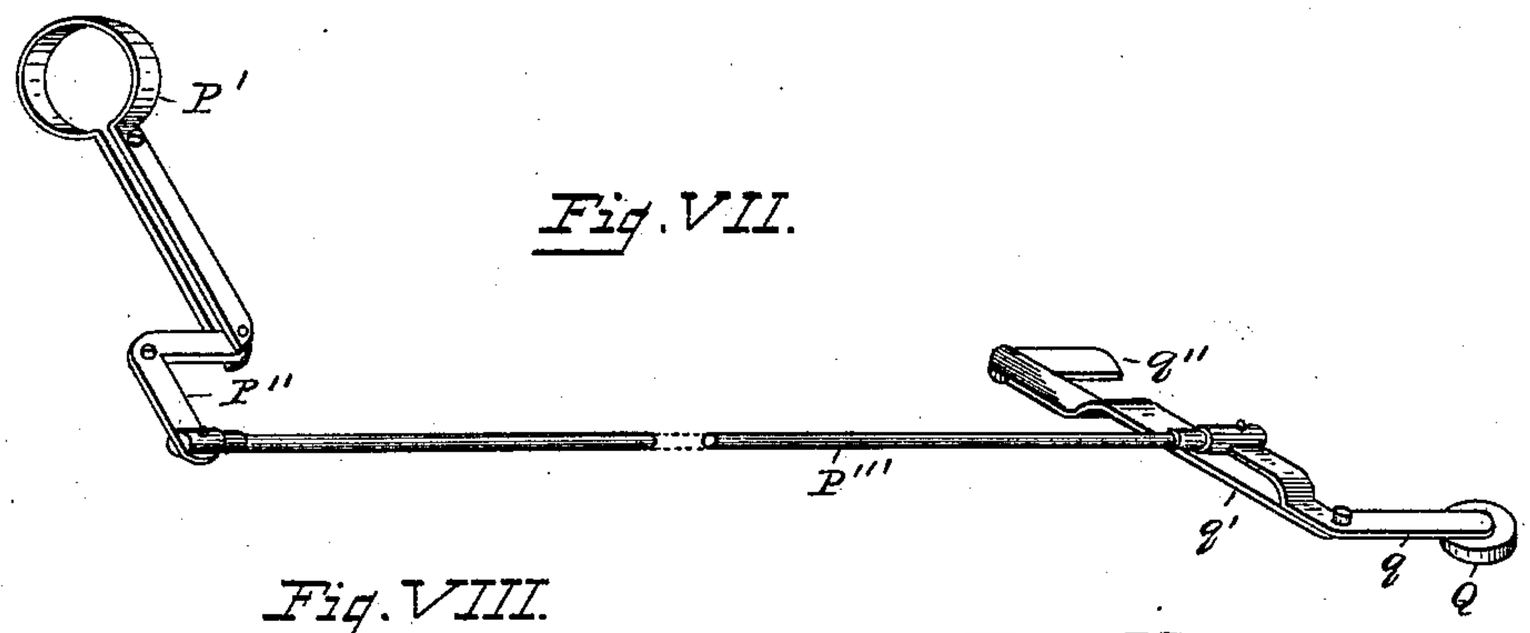


Fig. VII.

Fig. VIII.

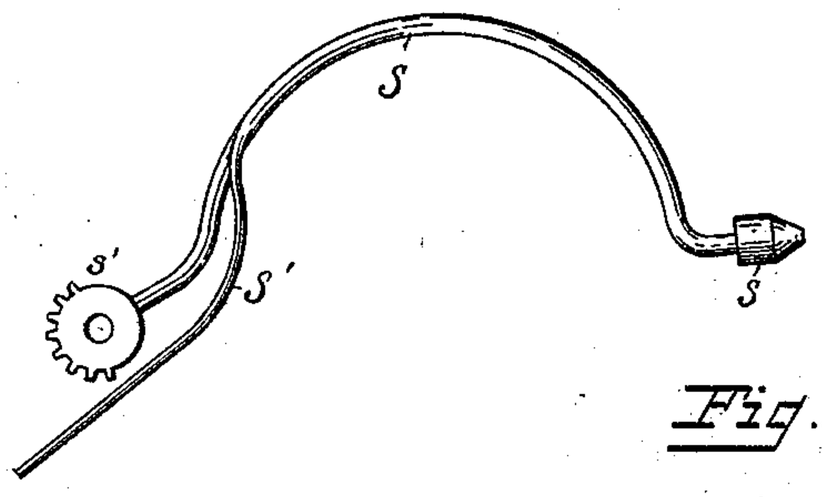


Fig. IX.

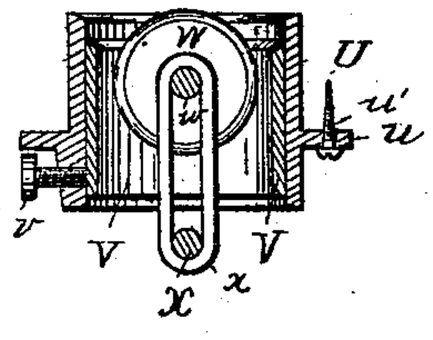


Fig. X.

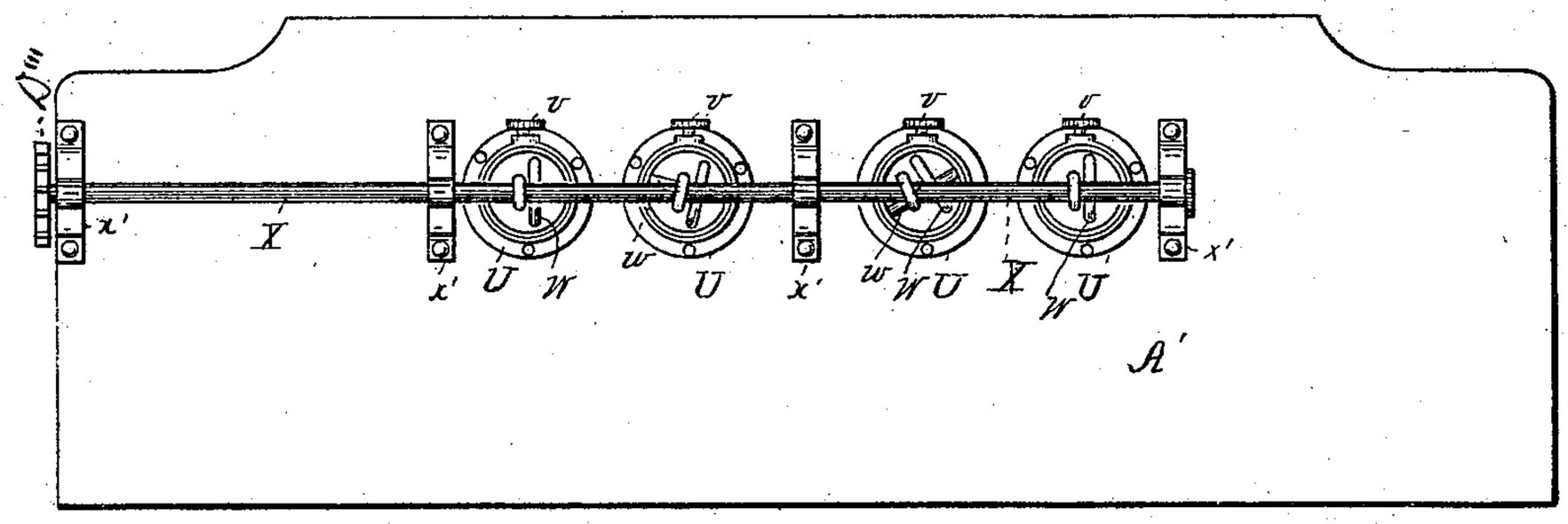
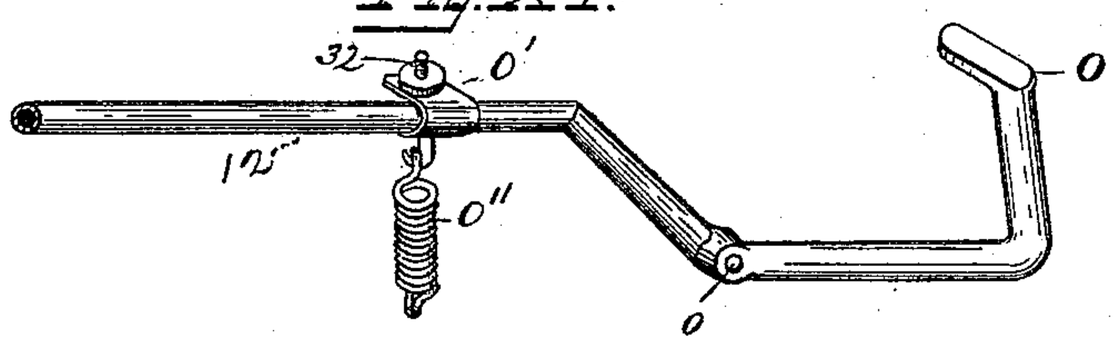


Fig. XI.



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(No Model.) 5 Sheets—Sheet 5.

H. BRADSHAW.

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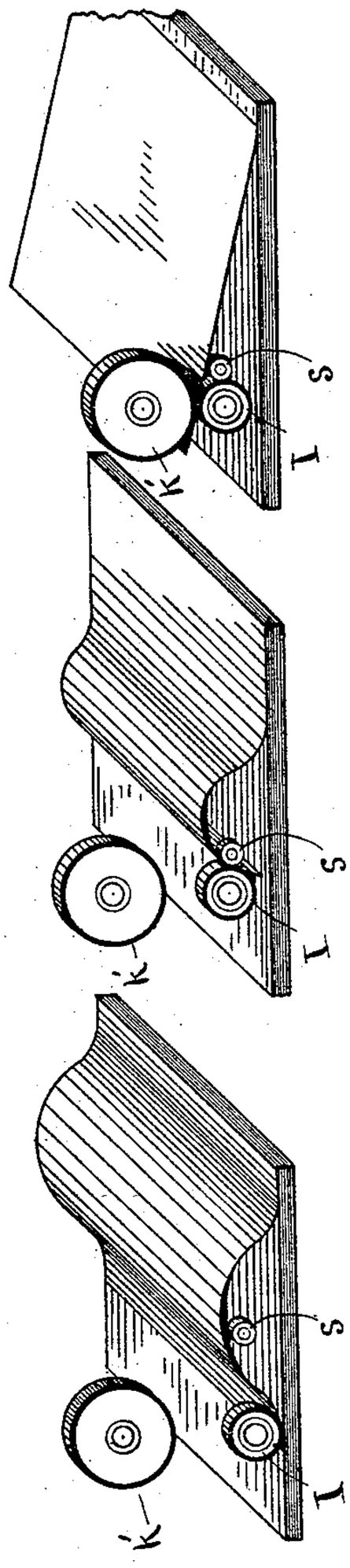
FIG. 1.



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UNITED STATES PATENT OFFICE.

HARRY BRADSHAW, OF TOPEKA, KANSAS, ASSIGNOR TO THE BRADSHAW PAPER FEEDER COMPANY, OF SAME PLACE.

METHOD OF AND MACHINE FOR SEPARATING AND FEEDING SHEETS OF PAPER.

SPECIFICATION forming part of Letters Patent No. 528,918, dated November 13, 1894.

Application filed August 31, 1891. Serial No. 404,209. (No model.)

To all whom it may concern:

Be it known that I, HARRY BRADSHAW, a citizen of the United States, residing at Topeka, in the county of Shawnee and State of Kansas, have invented certain new and useful Improvements in Paper-Feeding Devices, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to an improvement in devices for feeding single sheets of paper, from a pile, to a printing press, ruling machine, or other machine to which it may be desired to feed separate sheets of paper.

My invention has for its object the providing of an automatic device, simple in construction, reliable in operation, easily attachable to the machine with which it is desired to operate, and quickly adjusted to feed sheets of any size and thickness, and to deliver the same in a proper position to be seized by the grippers of the machine with which it may be used.

More specifically stated, my invention consists in a paper feeder provided with a friction roller, which when revolved in the proper direction and resting on the sheet, raises the sheet by bending it, to the top of the friction roller; a counter roller revolving in a direction opposite to that of the friction roller, and working against the friction roller for the purpose of passing the detached sheet to a straightening or aligning device, the rollers being mounted on shafting in a suitable framework, and provided with the gear wheels and cams necessary for imparting proper motion to the rollers.

My invention further consists in an "agitator" arm resting on the top sheet and being given a rapid vibratory motion by means of arms and levers connected to an eccentric mounted on a shaft having a geared connection with the shaft carrying the friction roller, for the purpose of loosening the upper sheet preparatory to its being lifted by the friction roller.

My invention consists further in two transverse rollers mounted in sliding clamp supports movably mounted on the side edges of the feed board, and adapted to an adjustment up or down the feed board to suit different sized sheets.

My invention further consists in special features of construction, hereinafter fully described.

In the accompanying drawings, similar letters and figures of reference indicate similar parts.

Figure I represents a rear perspective view of my invention as attached to a feed table and board. In this view a portion of the feed board A is broken away so as to show the construction and location therein of the wheels W, and parts connected therewith, the tubes U and V being shown in vertical section. Fig. II represents a plan view of the feeder proper and a portion of the propelling mechanism. For clearness, the top of the inverted U shaped strap, N″, is broken away so as to show the location of the cam, *n*. A portion of the arm, K, is also shown broken away. Fig. III represents a detailed perspective view of the friction roller, I, and "agitator," showing the sheet bent up and the arm, S, about to pass thereunder Fig. IV represents a vertical sectional view taken on the line IV—IV in the direction of the arrow of Fig. II. Fig. V represents a vertical sectional view taken in the direction of the arrow on the line V—V of Fig. IV. Fig. VI represents a vertical longitudinal section of the friction roller and ratchet device. Fig. VII represents a detailed perspective view of the "agitating" or separating device. Fig. VIII represents a plan view of the presser arm, S and gear segment, *s′* attached. Fig. IX represents a vertical sectional view of the holder and aligning disk W of the straightening device. Fig. X represents a plan view taken from below of the aligning disks, W, and holders together with their propelling shaft, X, and attached sprocket wheel, D‴, of the straightening device. Fig. XI represents a side elevation of the shoe bar and retracting spiral spring O″, the extensible end of the shoe bar being omitted in this view. Fig. XII represents the relative position of the rollers *s*, I, and *k′*, when the roller I, while resting on the pile of paper, is pushing the top sheet backward. Fig. XIII represents the relative positions of the rollers *s*, *k′*, and

I, when the sheet is being carried to the top of the roller I. Fig. XIV represents the relative positions of the rollers *s*, *k'*, and I, at the time the top sheet is being removed from the pile.

For convenience in describing, I divide the feeder into four principal parts, the feeder proper, the forwarding mechanism, the aligning device, and the propelling mechanism.

Referring to the drawings and describing the feeder proper, a vertical plate, K'', is pivoted by means of two rearwardly projecting lugs, 8, and the nut bolts, *g*, to the arms of a U shaped supporting yoke, G. A horizontal arm, J, secured to the plate, K''', projects forward therefrom and is provided at its outer end with a bearing for a horizontal shaft, H. At the rear end of the shaft, H, and back of the plate, K''', is secured a spur gear wheel, L''. Motion is imparted to the feeder proper from the propelling mechanism by means of a universal joint connection, *h*, at the rear end of the shaft, H. A horizontal arm, J', is pivoted on a lug, 19, on the arm, J, as shown in Fig. III. A flat spring, J'' is secured to the rear end of the arm, J' at one end the other end having a bearing on the vertical plate, K''', best shown in Fig. V, so as normally to keep the outer ends of the arms J, J', together. A framework consisting of two vertical plates, K', and K'', connected by the transverse rods, 6, best shown in Fig. II, is pivoted, by means of rearwardly projecting lugs, 8, on the plate, K'' and nut bolts, *g*, upon the arms of the yoke, G.

A horizontal arm, K, secured to the plate, K', is provided at its outer end with a bearing for the outer end of the shaft, *k*, which also has bearings in the vertical plates, K', K''. Motion is imparted to shaft, *k*, by means of a spur gear wheel, L'''', secured to the rear end of the shaft, and meshing into the larger gear wheel, L''', secured upon the horizontal shaft, 7, having bearings in the vertical plates, K', K'', and having secured upon its rear end a spur gear wheel, L', which in turn meshes into a larger spur gear wheel, L, secured upon a horizontal shaft, N'. Into the spur gear wheel, L, is meshed the spur gear wheel, L'', that is secured upon the shaft, H. The best representation of the location of these gears is shown in Fig. IV.

The arm J, is provided with a vertical projection, J'', the upper surface, *j''*, of which serves as a bearing for a cam, Y, secured upon the shaft, N', by means of a set screw, *y*. A vertical longitudinal opening, *j'*, within said projection, J'', permits an upward and downward movement therein of the shaft, *k*, when the cam Y, is revolved upon its bearing, *j''*. When this cam is turned through the intermediacy of its shaft, N' an upward and downward motion is imparted to the framework and arm, K. This upward and downward movement of the bracket, K, and the shaft, *k*, during a revolution of the cam, Y, upon the top of the projection, J'', of the arm, J, is due to the fact that the bracket, K, is provided with a pivoted connection with the bracket, G, while the arm, J, although having a pivoted connection also with the bracket, G, has its outer end resting upon the pile of paper, through the intermediacy of the shaft, H, and roller, I. Therefore, the outer end of the bracket K, being free to move, and the bracket, J, being held by the weight of the parts in an immovable position, saving as the paper is fed away, when the cam Y, is revolved, it is the bracket, K, and shaft, *k*, that is imparted a vertical motion.

Pivoted to the rear end of the arm, J', by means of screws, *j*, is an inverted U shaped strap, N'', the upper inner surface of which serves as a bearing for a cam, *n*, secured upon the shaft, N'. When the shaft N', is revolved, the cam, *n*, in approaching its highest position raises the strap, N'', against the pressure of the flat spring, J'', and rocking the arm, J', pivoted upon the arm, J, separates the outer ends of said arms, while the tension of the spring, J'', brings the outer ends of the arms together when the downward motion of the cam, permits.

A rocking shoe bar, 12, pivoted to the arm, J, at *o*, in any suitable manner, is provided with an upwardly projecting rear end, having a bearing surface, O, upon which a cam, N, secured upon the rear end of the shaft, N', operates against the pressure of the spiral spring, O'', which is secured at the lower end to the arm, J, by means of pin, 18, secured to one side of said bar, and the upper end being fastened to a threaded pin, or screw, O', passing through an opening in a projection on the shoe bar, 12, and provided with a nut, 32.

Telescoped within the tubular shoe bar, 12, is an extension *o'*, secured in position, by means of a set screw, O'', working in a threaded opening in the shoe bar. Adjustably secured, by means of a set screw, 14, within a vertical opening in the T shaped end of the rod extension, *o'*, is a vertical rod, 13, having a flat clamping shoe, *o'''*, pivotally secured to the lower end of the rod. This clamping shoe is designed to support a portion of the weight of the feeder proper, and also to prevent the top sheet from being slipped backward on the pile. When the top sheet is withdrawn by means of mechanism hereinafter described, the cam, N depresses the rear end of the shoe bar, rocking the bar on the pivot, *o*, and raises the shoe from the paper. The spiral tension spring, O'', provides means of adjusting the pressure of the clamping shoe, *o'''*, upon the pile of paper to suit the weight and character of paper to be fed.

A horizontal tube, R, parallel to the arm, J, and secured thereto, by means of a lug, *r'*, through which the pipe, R, passes, being secured therein by means of a set screw, 20, is connected by means of a flexible tube, R', to a rocking transverse tube, 21 fitted within an opening in and near the outer end of the arm

J'. A sliding balance weight, R'', is secured upon the tube, R, by means of a set screw, 23. By sliding this weight upon the tube, R, to different positions, the weight resting upon the pile of paper may be varied to suit the paper used. The tube, R, is adapted to be connected at its rear end to a blower, for the purpose of forcing air through the tube and out the bent end 22 of the transverse tube, 21, and under the sheet at the top of the pile, at such time as the sheet has been bent to the position shown in Fig. III. This jet of air serves to completely separate the top sheet from the one beneath and insures the detaching of but one sheet from the pile at a time. For the purpose of removing the jet of air from the paper when not needed, the transverse tube, 21 is given a rocking motion by means of the arm, P, rigidly secured at right angles to it, and connected by means of the pitman, P', to the arm J. When the outer ends of the arms, J, J', approach each other, the tube, 21, is rocked into the position shown in Fig. II, with the opening, *r*, away from the paper.

A friction roller, I, provided with a groove, M, in its periphery within which is fitted a flexible ring, *m''*, preferably of soft rubber, is revolubly mounted upon the extreme outer end of the shaft, H. On the inner side of the roller, I, are ratchet teeth, *m*, within which engages a spring pawl, *m'*, located within the collar, M', secured to the shaft, H, adjoining the roller, I. A detailed sectional view of roller and pawl is shown in Fig. VI. Immediately over the friction roller, I, and firmly secured to the extreme outer end of the shaft, *k*, is a counter roller, *k'*, the periphery of which is covered preferably with soft rubber, or other yielding material.

A bent arm S, having a movable friction roller, *s*, at one end, is secured to a segment of a gear wheel, *s'*, pivoted to the upper side and near the outer end of the arm, J. This geared segment meshes into a corresponding segment, T, pivoted on the arm, J, and connected to one end of a right angled lever, *t'*, by means of a rod, *t*. The right angled lever, *t'*, is pivoted at its angle to the arm, J' and has its other arm connected by means of a pitman, *t''*, to the arm J. An opening and closing movement of the arms J, J', will cause a backward and forward movement of the arm, S, which is adapted to press the friction roller, I.

An L shaped lever, *q*, pivoted at its angle to a projection, *q'*, extending to one side from the arm, J', is provided with a rubber disk, Q, secured to one arm of the lever. Another projection q^2, connected to *q'*, and projecting forward from the arm J', and best indicated in Figs. II and VII, serves as a supporting finger for the arm J'. A horizontal rod, P''', is pivotedly connected to the other end of the lever, *q*, and also to one arm of a right angled lever, P'', pivoted at its angle to the plate, K''. The other arm of the lever, P'', is pivotedly connected to the eccentric strap, P' connected to an eccentric, P, secured upon the shaft, *k*. When the shaft, *k*, is revolved, the agitating rubber disk, Q, is given a vibratory motion, and at the times when it rests on the paper, it loosens by its rubbing motion, the top sheet from the pile, so that the friction roller, I, raises but a single sheet at a time. The "agitator" or loosening device is best shown in Fig. VII.

Transversely across the feed table, and to the right of the feeder proper, as shown in Fig. I, is located a revoluble roller, 26, mounted at each end in the sliding clamp supports, W^2, W', adapted to be secured in a given position on the feed table by means of set screws, 24. At the end of the roller 26, nearest the propelling mechanism, is secured a chain wheel, D'.

Pivoted one on each side of the chain wheel D' to the clamp support, W^2, are idle chain wheels, *d*, *d*. A counter roller, 28, having a bearing pressure against the long roller, 26, is revolubly mounted upon a stationary rod, 27 that is secured at each end to the clamp slide supports, W^2, and W', respectively. Motion is imparted to roller 26, by means of a chain D^2 passing around and on chain wheel D, pivoted to one side of the feed board and to the left of the chain wheel, D', thence around chain wheel, D''', secured to a shaft, X, mounted in bearings, *x'* secured to the under side of the feed table, and said shaft extending transversely across the board, thence over the idle sprocket wheels, *d*, *d*, and under the chain wheel, D'.

Within a circular opening located at one end of the feed board and to the right of the forwarding mechanism, as shown in Fig. I, is secured a vertical tube U, provided with a collar or flange, *u*, having openings through which pass wood screws, *u'*, for securing the tube to the feed board. The flange, *u*, is secured to the under side of the board. A tube V, revolubly and circumferentially adjustable within the tube, U, is provided with a revoluble shaft, *w*, located transversely across the tube, V, and having mounted thereon a disk roller, W, the periphery of which is preferably covered with a rubber ring. A rubber ring, *x*, serves as a belt for imparting motion to the transverse shaft, *w*, and disk, W, from the shaft, X, when revolved. A set screw, *v*, in the side of the tube, U, and bearing upon the side of the inner tube, V, secures the tube V, and therefore the disk, W, in any position in which it may be set. Four of these tubular supports and disks are arranged transversely across the feed board, each one being a counterpart of the other, and all connected to the shaft, X. It will be understood that each disk roller may be given an independent adjustment, so that one may be revolved in a direction different from the others, or all different, or all alike.

A U-shaped support C for the propelling mechanism, is secured at one side to the feed table. A transverse shaft, *c*, is provided with bearings in the arms of the support C. Secured to the outer end of the shaft, *c*, is a

chain wheel F, connected by a chain, *f*, to a chain wheel secured upon the main shaft of the press or ruling machine. An arm projection, B″, on the outer arm of the U support, C, is provided with a horizontal opening in which revolves a horizontal shaft, H″. Secured upon the shaft H″, is a chain wheel, E, connected by a chain, E″, to a chain wheel, 34, secured to the shaft, *c*. Shaft H″, is connected to the shaft, H, of the feeder proper, by means of a universal joint, *h′*, secured to the rod, 30, fitted within and having a feather and groove connection with the tubular rod, H′, and longitudinally movable therein. One end of the tubular rod H′, is connected to the shaft, H, by means of a universal joint, *h*, Secured to the chain wheel D, is a chain wheel, D⁴, connected by a chain, 31, to a chain wheel, 29, secured to the shaft, *c*.

In a vertical opening in the outer arm of the support, C, is a longitudinally and circumferentially adjustable bar, B, secured in position by a set screw, *b′*, shown in Fig. II, and said bar, B, being provided with a T-shaped end having a horizontal opening therein, into which is fitted a longitudinally and circumferentially adjustable bar, B′, secured in position by means of a set screw, *b*.

A shouldered and threaded screw projection, 3, on the farther end of the bar, B′, is provided with a nut, G′, having a handle, *g′*. The yoke, G, is provided with a central vertical opening fitted to the screw, 3, and said yoke is circumferentially adjustable thereon, and is clamped in position by means of the handled nut, G′.

The rod 27 carries the guide wires *a′* fixed at one end to said rod, and whose function is to prevent the paper from rising from the table while being carried to the straightening device.

The operation of my invention is as follows:—The mechanism having been previously secured to the free board, and the pile of paper, having been placed in a suitable position thereon, the feeder proper is adjusted to a proper vertical height, by sliding the bar, B, up or down in its opening and securing it in place by tightening the set screw, *b*. The proper transverse position over the feed board is obtained by sliding the bar, B⁷, in its opening forward or backward and then securing it in place by tightening the set screw, *b′*. The right angle of the arms K, and J, J′, with reference to the pile of paper is then obtained by turning the yoke, G, upon the screw, 3, and securing it by means of handled nut, G′. When properly set upon the paper, the friction roller I, and the "agitator" Q, will be immediately above the near lower corner of the pile of paper, and one or the other will rest by gravity on the paper. The clamping shoe, *o‴*, being adjusted in proper position on the paper, and being given the proper initial pressure on the paper, by means of adjusting spiral spring, *o″*, the weight of the feeder resting on the paper is regulated by sliding the weight, R″, upon the tube, R, to the proper position and securing it in such position by tightening the set screw, 23. The sliding clamp supports, W², W′, carrying the rollers 26 and 28, are moved together with the inclined plates on each side of the roller, 26, upward or downward on the feed board to a position to suit the length of sheets to be fed, and are secured in place by tightening the set screws, 24. The tubes V, are then revolved within the tubes, U to a position in which the disk rollers, W, are in the required angle with reference to the feed board, and the tubes V are at the same time adjusted to the right height and are then secured by means of the set screws, *v*. The roller, 28 together with the guiding wires, *a′* are then moved upon the rod, 27, to the position required by the size of the paper fed. A guide wire, *a*, secured upon the arm K, serves to guide the sheet to the rollers, 26 and 28. If the chain wheel, F, be now revolved in the direction of the hands of a clock, movements will be imparted to the several parts, as indicated by the arrows in Fig. I. The "agitator" Q, will be given a rapid vibratory side motion on the top sheet, (a portion of the weight of the machine resting on the disk Q, being in fact about equally divided between the disk, Q, and the end of the arm J⁷, at the time when they are in contact with the pile of paper.) By this vibratory side motion, the top sheet is loosened from the pile. The friction roller revolving in the direction shown by the arrow in Fig. I, backward from the way that the sheet is to be carried, is then brought down against the top sheet, through the intermediacy of the cam, *n*, operating upon the strap, N″, thus allowing the spring, J″ to separate the rear ends of the arms, J and J′, and raising the arm J′ at its outer end together with the "agitator" from their bearing on the sheet, and transferring the weight of the front part of the machine upon the friction roller, I, which now rests upon the paper. The friction on the paper and its revolving motion now curls the sheet, 9, backward and upward in the position shown in Fig. III, the clamping shoe, *o‴* preventing the sheet from sliding backward on the pile. At this time the arms, J and J′, are beginning to separate owing to the position of the cam, *n*, and the presser arm, S, is taking a forward motion, and the bent tube 22, is turning to a position to send the air jet between the top sheet and the pile of paper. As the arms, J′ and J, continue to separate the arm S passes under the bent upper sheet, and presses the roller, *s′*, against the paper which in turn is pressed against the friction roller, I, the revolving motion of which carries the sheet over on top of the friction roller I. Ordinarily the spring of the bent sheet will cause it to pass over the top of the roller I, at the proper time. The presser-roller *s*, simply acts as an accessory part to make the action certain. At this point the cam, Y, on the shaft, N′, and oper-

ating upon the projection, J'' of the arm J, permits the counter roller, *k'*, which has been in a raised position, to descend and rest by gravity on the friction roller, I. The counter roller, *k'*, having a much more rapid rotary movement than the friction roller I, the friction roller is revolved at an increased speed, the ratchet device permitting. The clamping shoe, *o'''*, being at this time raised from the paper, by means of the cam N, bearing down on the shoe bar, 12, at O, the detached sheet is rapidly carried between the friction roller, I, and the roller, *k'* to the forwarding rolls 26 and 28, between which it passes. At this time the friction roller, I again descends to the paper and moves back the next sheet, the arm J', and the agitator, rising from the paper, and allowing the weight of the machine to rest on the friction roller, I, as before. At the same time the shoe, *o'''*, comes to rest again on the paper and one operation of the feeder proper is completed. The forwarding rollers 26 and 28, pass the sheet down the feed board until it comes against the stops 25 of the press. Here the sheet rests upon the aligning rollers, W, which are so set as to carry the sheet along until it strikes the pin, 33, which is set at a point on the feed board to suit the size of the paper that is being fed. The sheet is now in position to be taken away by the grippers of the press.

The bottom sheet of the pile should be placed on a roughened surface that is directly under the friction roller I so that when the roller nears the bottom of the pile but one sheet will be taken at a time. A sheet of tin covered with shellac and sanded serves very well for this purpose. I have also found that a piece of sandpaper answers very well.

It will be observed that all of the friction action of either the friction roller or of the "agitator" is upon but one corner of the sheet. This is a valuable feature especially, when the paper is printed on both sides. as there is no liability to deface the printing, by frictional action, of the feeding mechanism. There is also much less liability of creasing the paper. Another important feature is the readiness with which the machine may be adjusted to feed sheets of different size, texture and weight. The machine as a whole is also readily attached to the feed board and press without making alterations of any amount to presses or ruling machines already on the market. In the straightening device, the weight of the sheet itself is used to assist in adjusting it in the proper place to be seized by the grippers of the press the disk friction rollers W, being set at a height above the feed board to suit the strength of paper fed. By changing the shoe bar to the opposite side of the feeder proper from the one shown, and by reversing the motion of the machine to the contrary direction, and arranging the shapes of the cams to suit, the feeder may be used on the opposite side of the feed board to the one shown.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. In a paper feeder, for feeding sheets from a pile, the method of detaching the top sheet which consists, first in vibrating a part of the sheet and thereby loosening it; secondly, bending the loosened part of the sheet; thirdly, injecting a jet of air under the bent sheet, whereby the sheet is separated from the pile; substantially as described.

2. In a paper feeder, the combination with a friction roller mounted upon a revoluble shaft journaled in a suitable frame-work, of a rubbing device for loosening the top sheet from the pile, and means for imparting to the rubbing device a plurality of reciprocations between successive actions of the friction roller, substantially as described.

3. In a paper feeder, the combination with a friction roller mounted upon a revoluble shaft journaled in a suitable frame-work, of a vibratory arm having a frictional contact with the top sheet, and means for imparting a plurality of reciprocations to said arm during each revolution of the revoluble shaft, substantially as described.

4. In a paper feeder, the combination with a revoluble friction roller mounted upon a shaft journaled in a suitable frame-work and adapted to rest upon the top sheet of the paper, of a counter roller revoluble above and upon the friction roller but in an opposite direction thereto, a clamping shoe, and timing mechanism for causing the clamping shoe to descend upon the top sheet during the initial part of the operation of the friction roller, substantially as described.

5. In a paper feeder, the combination with a revoluble friction roller, of a counter roller revoluble above and upon the feed roller but in an opposite direction thereto, a device for injecting a jet of air under the bent sheet, a clamping shoe, and timing mechanism for causing the clamping shoe to descend upon the top sheet during the initial part of the operation of the friction roller, substantially as described.

6. In a paper feeder, the combination with a revoluble friction roller, of an arm pivoted to the frame-work, mechanism for advancing said arm and causing it to press the top sheet against the friction roller when the sheet is raised by the friction roller from the pile, and a revoluble counter roller located above the friction roller and co-operating therewith, substantially as described.

7. In a paper feeder, the combination with a friction roller mounted upon a revoluble shaft journaled in a frame work pivoted to a suitable support, of a counter roller mounted upon a shaft having its bearings pivoted to the frame work and revoluble in a direction contrary to that of the friction roller shaft, and connected by gearing therewith, said feed roller shaft being provided with a cam for raising the counter roller from the friction

roller when the cam is revolved, substantially as described.

8. In a paper feeder, a straightening device, consisting of a series of circumferentially and vertically adjustable revoluble disk rollers mounted in suitable supports at one end of the feed board, and suitable registering gages substantially as described.

9. The combination with the shaft, X, mounted in bearings, x', of the tubular support, U, revoluble tube, V, transverse revoluble shaft, w, having mounted thereon disk roller, W, elastic belt, x, connecting shafts, X and, w, and set screw, v, and a suitable support for said mechanism for the purposes specified substantially as set forth.

10. The combination with the feed table, of the support, C, secured thereto, adjustable vertical shaft, B, set screw, b', horizontal bar, B', set screw, b, yoke, G pivotedly connected to the framework in which is journaled the shaft, H, having mounted thereon the feed roller, I, connecting rods, H', 30, connected by universal joint, h, to shaft, H, universal joint, h', revoluble shaft, H'', projecting arm, B'', chain wheels, E, and 34, connected by chain, E'', for the purposes specified, substantially as set forth.

11. The combination with eccentric, P, mounted on shaft, k, of eccentric strap, P', lever, P'', connecting rod, P''', lever q, elastic disk, Q, projection, q', on the arm J', for the purposes specified, substantially as set forth.

12. The combination with the shoe bar, 12, pivoted to the arm J, of extension, o', set screw, o'', vertical rod, 13, set screw, 14, clamping shoe, o''' pivoted to the lower end of the rod, 13, and cam, N, mounted upon the shaft, N', for the purposes specified, substantially as set forth.

13. The combination with the tube, R secured to arm, J, flexible tube, R', transverse pipe, 21 having bent extension, 22, and arm, p, pitman, p', connected to arm, J, for the purposes specified, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

HARRY BRADSHAW.

Witnesses:

CARL KOEHLER,

R. A. BALDERSON.