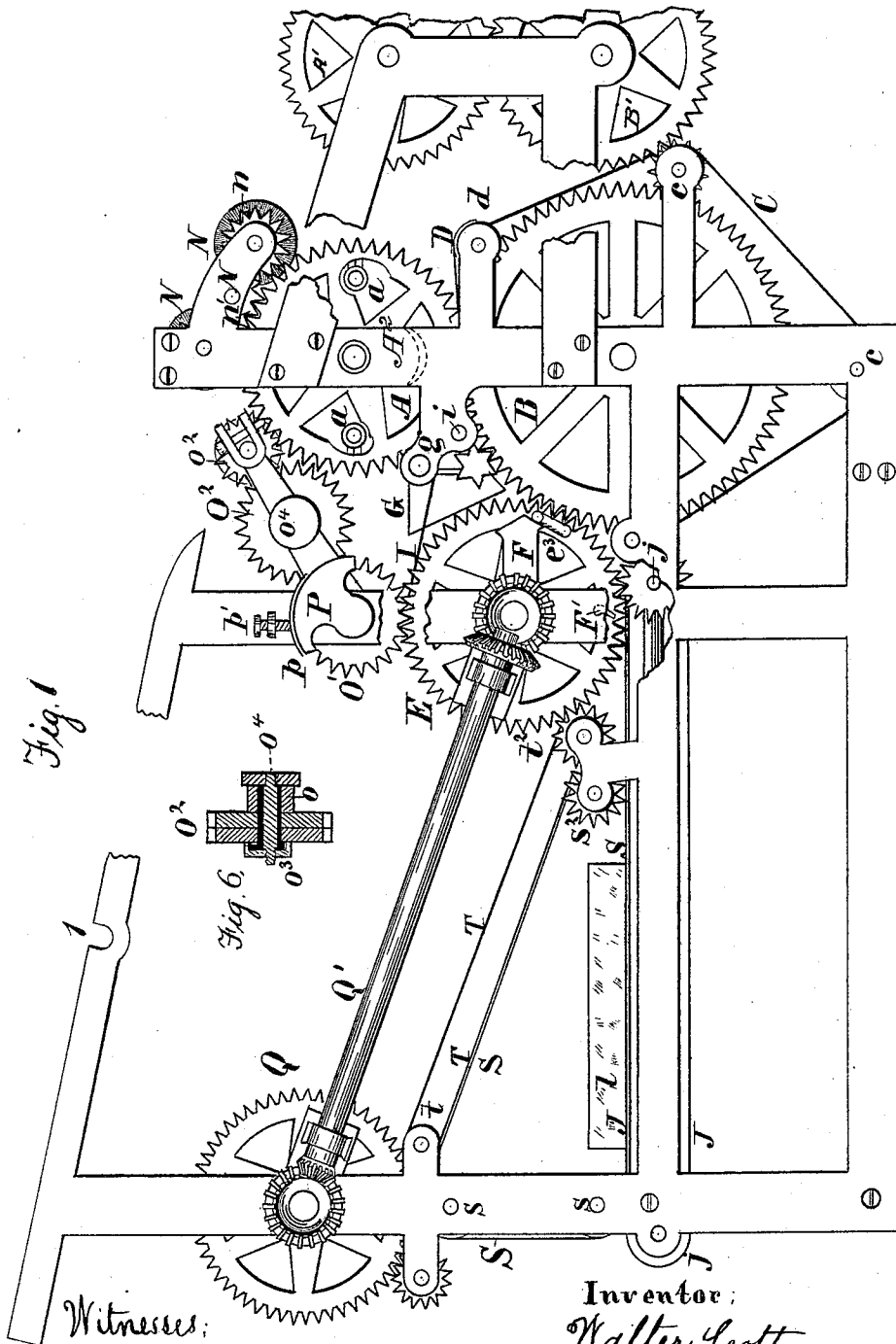


W. SCOTT.

SHEET DELIVERY APPARATUS FOR PRINTING MACHINES.

No. 470,307.

Patented Mar. 8, 1892.



Witnesses:
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Jno. C. Macgregor

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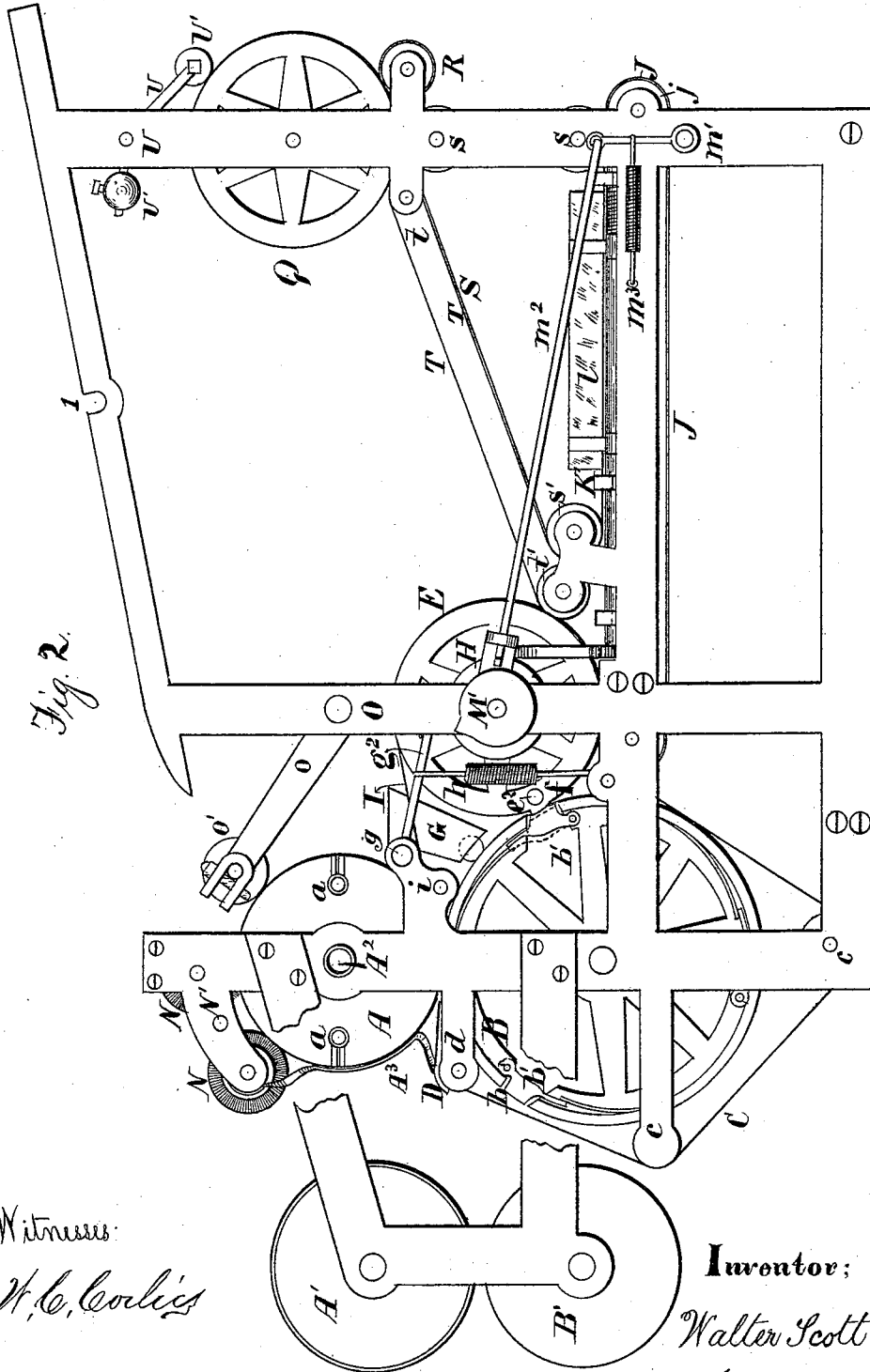


Fig. 2.

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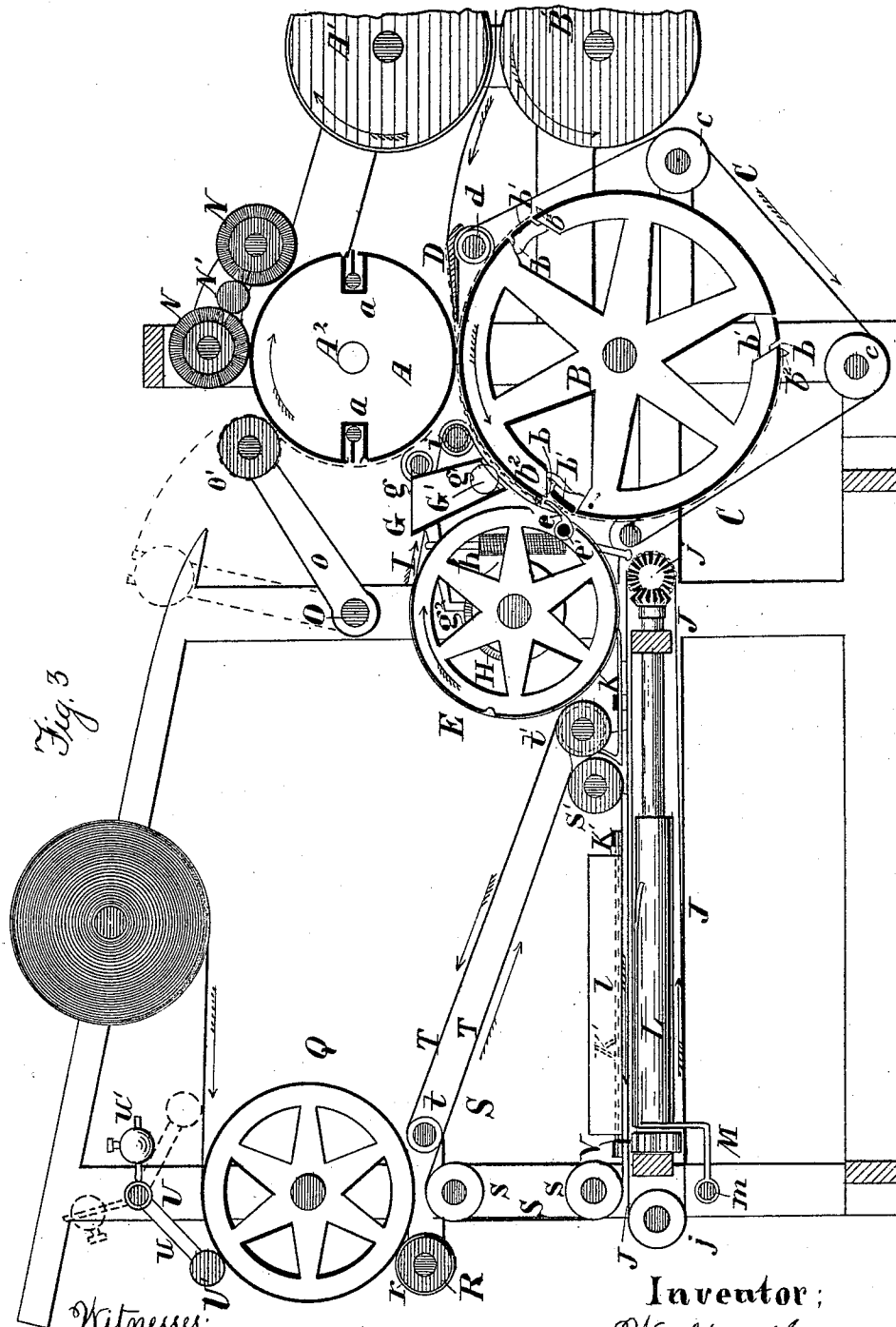


Fig. 3

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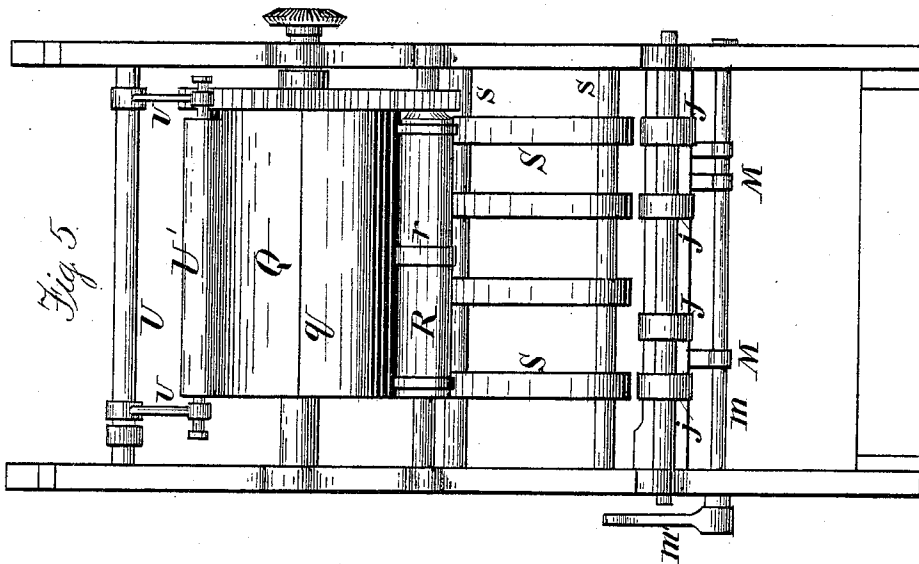


Fig. 5.

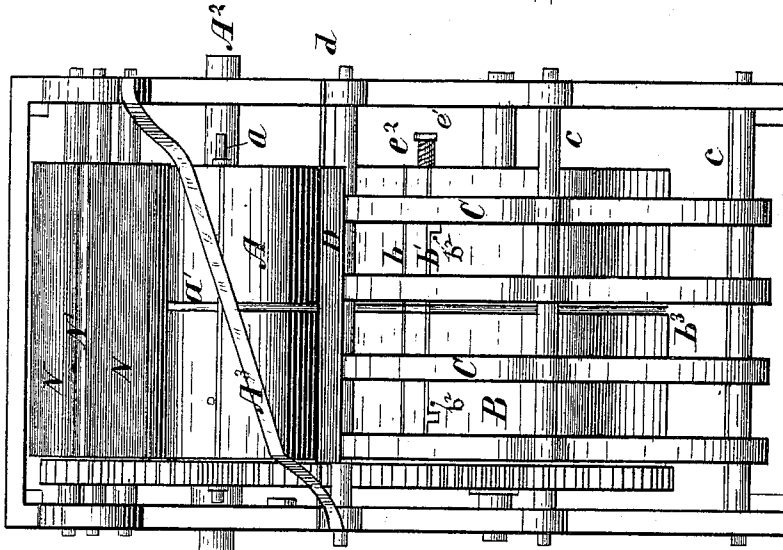


Fig. 4.

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UNITED STATES PATENT OFFICE.

WALTER SCOTT, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO ROBERT HOE, STEPHEN D. TUCKER, THEODORE H. MEAD, AND CHARLES W. CARPENTER, OF NEW YORK, N. Y.

SHEET-DELIVERY APPARATUS FOR PRINTING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 470,307, dated March 8, 1892.

Application filed February 9, 1878. (Model.)

To all whom it may concern:

Be it known that I, WALTER SCOTT, of Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Sheet-Delivery Apparatus for Printing-Machines, which is fully described in the following specification, reference being had to the accompanying drawings, in which—

Figure 1 represents a side elevation of a machine embodying my improvements looking toward the gearing side of the machine; Fig. 2, a similar view of the same looking toward the opposite side; Fig. 3, a longitudinal section of the same; Fig. 4, a front end elevation of the same; Fig. 5, a rear end elevation of the machine, and Fig. 6 a detail sectional view of the double gear-wheel used with the mechanism for rerolling the supplement-web.

My invention relates to a machine in which the sheets of paper are taken from the printing-machine and transferred automatically to the folding mechanism.

The object of my invention is to obtain a machine in which the sheets, after being printed, are pasted and collected up to a certain number and subsequently delivered together to the folding mechanism, which machine is also adapted to introduce or "inset" other or supplementary sheets when required and to calendar the sheets as they are delivered by the press, if desired.

It consists in special devices and combinations of devices, all of which will be herein after more fully set forth, and specifically claimed.

In the drawings, A and B represent the cutting-cylinders of a printing-machine, A being the male or blade cylinder, and B the female or grooved cylinder.

The last set of cylinders belonging to the printing-machine is represented by A' B' in the drawings, the rest of the printing-machine not being shown, as the present invention is applicable to any form of web-printing machine.

The cylinder A is provided with two cutting-knives *a*, arranged opposite to each other and made capable of being projected at the proper intervals to sever the web into sheets in any well-known way. The circumference

of the cylinder B is one and a half that of the cylinder A, and its shell is divided into three equal parts by longitudinal grooves *b*, each division being equal to one of the divisions of cylinder A, constituted by the space between the knives *a*. The grooved cylinder is constructed substantially as described in Letters Patent No. 164,695, granted to me June 22, 1875, so far as the yielding sections *b'* in its shell are concerned. These sections *b'* are arranged, respectively, at the longitudinal grooves in the cylinder and are hinged on the firm edge of the shell, while on the other side of the grooves are arranged sheet-holding pins *b''*. The cylinder B is also provided with a groove *b'''* (see Fig. 4) running around its exterior surface and arranged midway between the ends, and a similar groove *d'* is cut in the surface of the cylinder A.

A series of tapes C are arranged upon rollers *c* and *d*, set in the supporting-frame around the cylinder B, so that the upper line of tapes will run in contact with this cylinder, as shown, throughout the greater part of its circumference. A guard or guide D for the paper is arranged above and extends over the upper front tape-roller *d*, as shown in Fig. 3 of the drawings.

A revolving sheet-carrier E is mounted in the supporting-frame just in the rear of the cylinder B, to which it is geared, and in connection with which it runs. This cylinder is two-thirds the size of the cylinder B and is provided with one set of grippers *e*. These are ordinary nipping-grippers arranged upon a single rock-shaft *e'* and are held down in a closed position upon the cylinder by means of a coiled spring on one end of said shaft, and are opened by a crank-arm *e''* on the other end of the shaft, which at the proper time for seizing the sheet is for this purpose brought into contact with a cam F and at the proper time for releasing the sheet is brought into contact with another crank F'. The cylinder is also provided with a cam projection *f*, Fig. 2, on its surface just over the gripper-shaft, which presses in the hinged sections on the cylinder B at the proper moment for taking off the sheets.

A paste-fountain G is mounted upon a rock-shaft *g* and arranged centrally in relation

to the length of the cylinder B in the space between the three cylinders A, B, and E. A shaft G' extends into the lower end of the paste-fountain and carries upon its inner end a paste-wheel g' and upon its outer end a pinion that meshes with the gear-wheel on the cylinder B, this shaft being mounted in the fountain and a hanger depending from the rock-shaft g . The paste-wheel is arranged in line with the central groove b^3 , extending around the cylinder B. On the opposite end of the rock-shaft g is an arm g^2 , which extends backward, and its free end is operated upon by a cam H, mounted upon the shaft of the cylinder E, the arm being held down upon the cam by a spring h . Tapes I run around the cylinder E and a shaft i , arranged in the space just back of the cylinders A and B, the tapes being thus caused to run in contact with the latter cylinder upon the rear thereof. Carrying-tapes J are arranged upon rollers j , the forward portions of which tapes are just below the cylinder E. A series of guide-rods K are arranged just above the front portion of these tapes, the forward ends of the rods extending into grooves in the cylinders E, which rods extend back only a short distance, their rear ends being bent up to coincide with the surface of roller s' and fitted in grooves in a companion roller t' . Just back of these guide-rods is a series of rods K', arranged slightly above the tapes J, below which are folding-rollers L, operating in connection with a rotary folding device or with a vibrating folder l , as shown in the drawings.

At the extreme end of the machine is a rock-shaft m , arranged just below the rear tape-roller j , and on this shaft are fixed a series of rods M, which are bent up and extend forward underneath the rods K' nearly the whole length of the folding-rollers, their forward ends being left free. On one end of this rock-shaft is a crank-arm m' , to the outer end of which a connecting-rod m^2 , Fig. 2, is attached and extended forward until it rests against a cam M' on the extreme end of the shaft of cylinder E. A retracting-spring m^3 at the side of the frame operates to hold the crank-arm m' forward, so as to maintain the rods M in a depressed position; but at the proper interval this arm is thrust back by means of the cam M', thereby throwing up the rods M.

The cylinder A is constructed so as to be heated by the introduction of steam or hot air, thereby adapting it to operate as a calendering and drying roll. In the drawings the shaft A³, Fig. 1, of this cylinder is represented as hollow, and the steam or hot air may be introduced into the interior at one end thereof through the tubular shaft and exhausted through the shaft at the other end. This shaft may be extended through the cylinder and provided with openings inside the cylinder and a cut-off at its central portion, or there may be a short journal-shaft at each end, extending just within the cylinder. The cylinder B may be heated in the same way,

so as to operate as a drying-cylinder instead of the knife-cylinder, or both may be constructed to operate as drying and calendering cylinders. As these cylinders act upon paper just printed, there is some danger of fresh ink adhering to their surfaces if heated. I therefore provide a knife or scraper A³, Figs. 2 and 4, arranged in front of the cylinder A and in contact therewith, so as to remove any adhering ink. This knife is arranged at an angle to the shaft of the cylinder to prevent it from catching in the groove of the cutter.

Over the cylinder A are arranged two cleaning-rollers N, which are provided with suitable brushes, and between them is another roller N' of smaller diameter and covered with cloth or any substance which will readily take ink. This last roller is geared by a pinion n' to the cylinder A, and the other two are driven from it by pinions n , gearing into the pinion n' , so that the rollers N will revolve in an opposite direction to the cylinder A, and the latter will be cleaned by the brushes coming in contact therewith; but on account of the difference in size the surface of the rollers N will move somewhat faster than the roller N', and consequently the brushes will in turn be cleaned by being brought in contact with and drawn upon the covering of the roller N'.

A rock-shaft O is mounted above the cylinder E, upon which are two arms o , adapted to receive a spool or roller o' , which is mounted in their outer end in such a way as to be removable when filled. On the rock-shaft O is a loose gear-wheel O', which engages with the gear-wheel on the cylinder E. The spool o' is also provided with a pinion o^2 , between which and the wheel O' is a pair of gear-wheels O², Fig. 6, arranged upon the same shaft with their faces in contact. The shaft on which these wheels are mounted is hollow and upon the inner end is a loose nut o^3 , which is held from turning on the shaft by a spline and groove. A set-screw o^4 passes through the hollow shaft and enters the nut o^3 , and by this device the nut may be drawn with greater or less force against the face of the inner wheel, thereby regulating the friction between the two. The outer one of these wheels gears into the wheel O' and the inner one into the pinion on the spool.

On one end of the shaft O is a segment P, above which is a shoe p and a set-screw p' , the shoe being attached directly to the screw or connected by a yielding support to the main frame. It is evident that this device constitutes a friction-tension which will hold the frame which carries the spool or rollers o' with greater or less resistance in any position to which it may be adjusted, or regulate the pressure of the spool against the cylinder A when the spool-frame is adjusted to cause them to run in contact.

In the rear end of the supporting-frame a cylinder Q is mounted, the circumference of which is equal to that of the cylinder E, and

it is geared with the latter by means of the shaft Q' and suitable pinions, so as to revolve at half the speed of the cylinder E. This cylinder Q has one or two longitudinal grooves q , which are simply for the purpose of marking the starting-point of the sheet, as will be further described, and if two grooves are used they should be arranged opposite to each other. Below this cylinder Q is a roller R, geared to the cylinder and arranged to operate as a feed-roller for the purpose of conducting the sheet between the two. The roller R may have a plain surface or may be provided with bands r , Fig. 5, made adjustable, so as to be arranged to run on the margins of the printed sheet.

A series of tapes S are arranged on rollers s and s' , two of the former being located one above the other just below the cylinder Q and the other s' just in front of the forward end of the folding-rollers and above the carrying-tapes J. The three rollers of this set of tapes are arranged at the three corners of a triangle, so that at their lowest part the tapes are carried along just above the tapes J and parallel thereto. Another set of tapes T is arranged on rollers t t' , the former located just below and a little in front of the cylinder Q and the latter in rear of the cylinder E, to which it is geared by a pinion t^2 , which also meshes with a pinion s^3 on the roller s' .

A rock-shaft U is mounted just above the cylinder Q, to which are attached arms u , carrying at their outer ends a roller U', which operates as a drop-roller. On the shaft and opposite to the drop-roller is a counter-balance u' , adjustable to regulate the bearing-weight of the roller, and the latter may be swung over, so as to operate on either side of its shaft, as may be desired.

A stop or gage bar V is arranged at the rear end of the machine, just over the rear end of the folding-rollers, which operates in the usual manner.

The operation of this machine is as follows: The paper after being printed runs in from the printing-cylinders over the guard D, between cutting-cylinders A and B, which are so geared and arranged in connection with the printing-cylinders as to sever the printed sheets from the web at the proper margin. During the operation of cutting the paper is pressed down upon the pins b^2 on the cylinder B, so that the leading end of each sheet is carried around on the cylinder, the sheets being held to the cylinder for a time after passing the cutter by the tapes I. Now it is evident from the description above of the relative size and arrangement of the cylinders B and E that the latter will take off from the cylinder B each alternate sheet or set of sheets by means of the grippers on the cylinder E, which at the proper moment are moved into the opening in the cylinder B, the hinged sections on the latter being pressed in before the grippers by the projection f on

the cylinder E; but as the gripper-cylinder E takes out every alternate sheet it is evident that each succeeding sheet will be carried entirely around the cylinder B, being held thereon by the pins and the tapes C. The arrangement of the mechanism is such that when these sheets are brought around again so as to enter under the cylinder A they will be brought, respectively, directly underneath the printed matter in the web, which should be above them when properly arranged in the completed paper, so that the two together, one lying over the other, will be carried in between the cutting-cylinders. The top one will be severed, and when the two are now brought into contact with the carrier E the grippers thereon will take off the sheets together. The pasting apparatus is so regulated by means of the rock-shaft and cam described above that the paste-wheel is brought down upon the central margin of the first sheet as it passes underneath the fountain, but is held up out of contact with the second sheet, which is laid over the first, and passes the paster, so that while the two will be pasted together no paste will be laid upon the upper sheet. If by any chance the paste-wheel should be lowered when no paper is passing under it, the groove b^3 in the cylinder B, which runs directly underneath the paste-wheel, will prevent any paste being applied by the latter to the surface of the cylinder, which would cause the sheets afterward taken by the cylinder to adhere thereto. The sheets taken by the gripper-cylinder are carried around until brought in contact with or over the tapes J. When the grippers are opened by the cam F' , the sheets are taken by the tapes and carried back over the folding-rollers, the guide-rods K preventing the sheets from being carried around upon the cylinder. Just as the leading end of the sheets reaches the stop V the rods M are quickly thrown up underneath the entire length of the sheet, or nearly so, catching them bodily between the rods M and the rods K', arranged just above. The sheets are thereby stopped, the rods M are instantly depressed, and the sheets are creased and folded in the usual manner. The paper is dried and calendered, if desired, by reason of the cylinders A and B, either or both, being heated, as above described, though this is not an indispensable feature of the operation of the machine. When it is desired to insert a supplement, it is printed first and delivered to the cutting-cylinders A and B; but the cutters in the former are removed and perforating-knives are substituted, so that the supplement-sheets will not be severed from the web, but will be perforated in a well-known way. The perforated web, instead of being carried around the cylinder B to the gripper-cylinder E, is led up on the cylinder A to the spool o' , which may be dropped down so as to run in contact with the cylinder A or held up out of contact therewith as it is driven positively from the gearing on the cylinder E, as here-

tofore described. The friction-fastening *Pp* serves to fix the spool-frame in any desired position or to regulate the pressure of the spool upon the cylinder A, so that it will yield under the proper tension as the perforated supplement-web is wound thereon. The tension device by means of which the two gear-wheels *O*² are held together also permits the friction between them to be regulated so that the outer one, which is driven at a regular speed, will slip by the inner one as the size of the roll on the inner spool increases, thereby preventing an undue tension upon the web. When the supplement-spool is filled to a convenient size, it is removed from the vibrating frame and rolled up upon the upper bars of the main supporting-frame and seated in notches 1 therein, which serve as journal-bearings for the spool-shaft. There may be any number of these recesses in the bars, so that any desired number of supplement-spools may be imposed upon the rack. If the supplement is to be a quarter-sheet only, a slit is arranged back of the cylinder A to work in the central groove around the latter, and thus divide the web as it is led up to the spool. When the supplement is printed and it is desired to print and fold the paper proper, the perforating-knives must of course be removed from the cylinder A and be replaced by cutters. The leading end of the first supplement-roll on the rack is then brought down and arranged directly along the registering-groove in the cylinder Q, the drop-roller *U'* being turned backward to the rear of the machine, so as to feed the web upon the cylinder Q at starting. As the machine is put into operation and the printed sheets are collected and delivered, as heretofore described, the end of the supplement-web will be fed between the cylinder Q and roller R, as shown in Fig. 3, and will be delivered to the upper end of the tapes S and T, by which it will be taken and carried down to the rollers *s'* and *t'*. Now, it is evident that the supplement-web is fed into and carried inward by the tapes with the same speed as that at which the cylinder Q turns, which is half that of the gripper-sheet carrier E, so that one sheet of supplement will be delivered to the rollers *s' t'* for every set of sheets taken off by the gripper-sheet carrier from the collecting-cylinder. The mechanism for delivering the supplements is so geared and moved that the leading end of the supplement-sheet is delivered by the tapes from the rollers *s'* and *t'* just as the leading end of a set of sheets from the carrier E reaches a point beneath the said rollers, and as these rollers are so geared that they run faster than the roller Q as soon as the leading end of the supplement-sheet is brought into the bite between the upper tapes and roller *s'* its speed will be accelerated and it will be broken away from the web along the line of perforations. The leading end of the supplement-sheet being now delivered to the leading end

of the regular sheets, all will be carried in together by the tapes J and S over the folding rollers, the supplement-sheet superimposed upon the regular sheets, in which position they are folded, as above described. After the feeding of the supplement-web is once started the drop-roll U is turned over forward and rests upon the web, as shown in dotted lines in Fig. 3 of the drawings, in which position it tends to equalize the tension on the web. The feed-roller R, running in contact with the roller Q, prevents any slipping of the web upon the latter and causes the feed of the web to be regular. The supplement-web may be wound up without perforating, if desired, and perforated while being unwound, the necessary devices being applied to the feed-rollers for this purpose. The spools of supplements are used one after the other in the same manner. When the supplement is a quarter-sheet, the roll is run off only one-half at a time, and when a supplement is to be inset the pasting apparatus must be regulated so as to operate upon each of the collected sheets in order that the supplement may be united thereto as it is delivered onto the pair of sheets in the manner described above, in which case the cylinder E and roller *s'* should be provided with central grooves, so as not to take the paste on the upper sheet. It is not absolutely necessary that the collecting-cylinder should be provided with holding-pins, as described, for the cylinder without them, in connection with the tapes, will collect the sheets in the same way, as described above, though I prefer to use the pins, as thereby the proper registering of the sheets is secured with certainty. The collecting-cylinder may also be made of such size as to take but one sheet upon its circumference or a number of sheets greater than three, though the number must always be an odd one, or, in other words, the sections on the cylinder must always be increased two at a time; but if it is desired to take off a greater number of sheets than two at a time the relative size and speed of the cylinders B and E should be regulated accordingly. If, for instance, it is desired to collect and take off three sheets at a time, the number of sections on the collecting-cylinder should be even, and the gripper-cylinder should be of such size and have such speed as to take off every third sheet only, the number of sections in the collecting-cylinder being increased correspondingly. The cylinder A may also be made of such size and run at such speed as to require but one cutter operating in connection with each cutting-groove in the cylinder B, and this cylinder may be made the collecting-cylinder instead of the cylinder B, the general construction of the latter being transferred to the former and the position of the second arrangement in relation to cylinder E being changed, so as to adapt it to this purpose. It is not absolutely necessary to sever the sheets from the web, as described. The

web may be perforated instead, in which case the sheets will be separated, as set forth in my prior patent referred to above. The rods for stopping the sheets at the folder, it will be noticed, act upon the whole length of the sheets, engaging them bodily and stopping every part at once, thereby preventing all wrinkling. These rods may be moved bodily in parallel planes, instead of oscillated about a center, as described and shown.

The mechanical construction and arrangement of many other devices herein described and shown may be changed without departing from the principle on which the machine is constructed and operates or materially modify its functions.

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

1. The combination, with a web-printing press, of a cylinder adapted both for cutting and for cutting and collecting the sheets and of a rerolling-roll, whereby either the main or supplement sheets may be printed and collected or rerolled, substantially as described.

2. The sheet collecting or superimposing carrier, the shell of which is divided into sections of the same length as the sheets and arranged immediately adjacent to each other, each section having a narrow portion at one edge made movable and yielding, substantially as described.

3. The cutting and collecting cylinder B, composed of equal sections, the edges *b* of which are yielding and provided with cutting-grooves *b*³ and holding-pins *b*², substantially as described.

4. A cutting and collecting cylinder composed of an odd number of equal sections, each the length of a sheet, in combination with a cutter and with a gripper-cylinder operating to take off alternate sets of sheets from the collecting-cylinder, substantially as described.

5. The vibrating rod M, constructed and arranged in combination with the rods K', which clamp the sheets bodily along their length at the moment they are delivered in position to be folded, substantially as described.

6. The vibrating rod M, projecting forward from the rear of the machine, in combination with the rods K' and stop-bar V, substantially as described.

7. The carrying-tapes J, in combination with the vibrating rods M and rods K', arranged to clamp the sheets bodily, and the stop-bar V, substantially as described.

8. The spool-frame, in combination with a spool *o*', the gear-wheels O' and O², and the gear-wheel of the cylinder E, substantially as set forth.

9. The feed-cylinder Q, in combination with a drop-roll U', arranged to swing back and forth, so as to operate on either side of the cylinder, substantially as described.

10. The drop-roll U', arranged to drop upon

the cylinder Q to act as a feed-roll in starting the supplement-web and to be turned back upon the web to act as a tension-equalizer, substantially as set forth.

11. The drop-roll U', in combination with an adjustable counter-balance *u*', substantially as described.

12. The cylinder A, in combination with the brush-rollers N and intermediate cleaning-roller N', constructed and operating substantially as described.

13. The brush-rollers N, provided with pinions, in combination with the intermediate cleaning-roller N' of smaller size and provided with a gear-pinion meshing into and driving the former, substantially as described.

14. The combination, with means for collecting or superimposing two or more sheets and a pasting mechanism operating to impart a line of paste to said collected or superimposed sheets, of a supplement mechanism delivering a supplement-sheet, and means for associating said supplement-sheet with the collected or superimposed sheets, whereby all of said sheets are united together upon the pasted lines, substantially as described.

15. The combination, with means for collecting or superimposing two or more sheets and a pasting mechanism operating to impart a line of paste to said collected or superimposed sheets, of a supplement mechanism delivering a supplement-sheet and means for associating said supplement-sheet with the collected or superimposed sheets, whereby all of said sheets are united together upon the pasted lines, and means for folding said sheets upon the pasted lines, substantially as described.

16. The combination of a rotating carrier B, provided with means for collecting or associating sheets and with one member of a cutting device, of the cutting-cylinder A and the transferring-cylinder E, the latter being provided with sheet seizing, carrying, and releasing grippers *e*, substantially as described.

17. The combination, with a pasting device consisting of a fountain provided with a paste-wheel having a driving-pinion adapted to mesh with the wheel of a paper-carrying cylinder, said fountain and paste-wheel being constructed to oscillate, of a cam H for producing the oscillations, substantially as described, and for the purpose set forth.

18. The combination, with the spool, of the combined gear-wheel O², substantially as described.

19. The combination of a supplement-feeding apparatus with a main-sheet collecting or superimposing apparatus, substantially as described.

20. The combination of the supplement-feeding cylinder Q with the sheet collecting or superimposing cylinder B, a driving mechanism for rotating said cylinders at such relative speeds that the former will feed forward onesupplement-sheet for association with each

complete product delivered from the latter cylinder, substantially as described.

21. The combination, with a cutting mechanism for severing a web into sheets, of a
5 carrier provided with means for collecting or superimposing two or more sheets, a pasting mechanism for applying a line of paste to secure said sheets together, a transferring-

cylinder for removing the collected or superimposed sheets, a folding mechanism for doubling or folding said sheets, and a supplement
10 mechanism, substantially as described.

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