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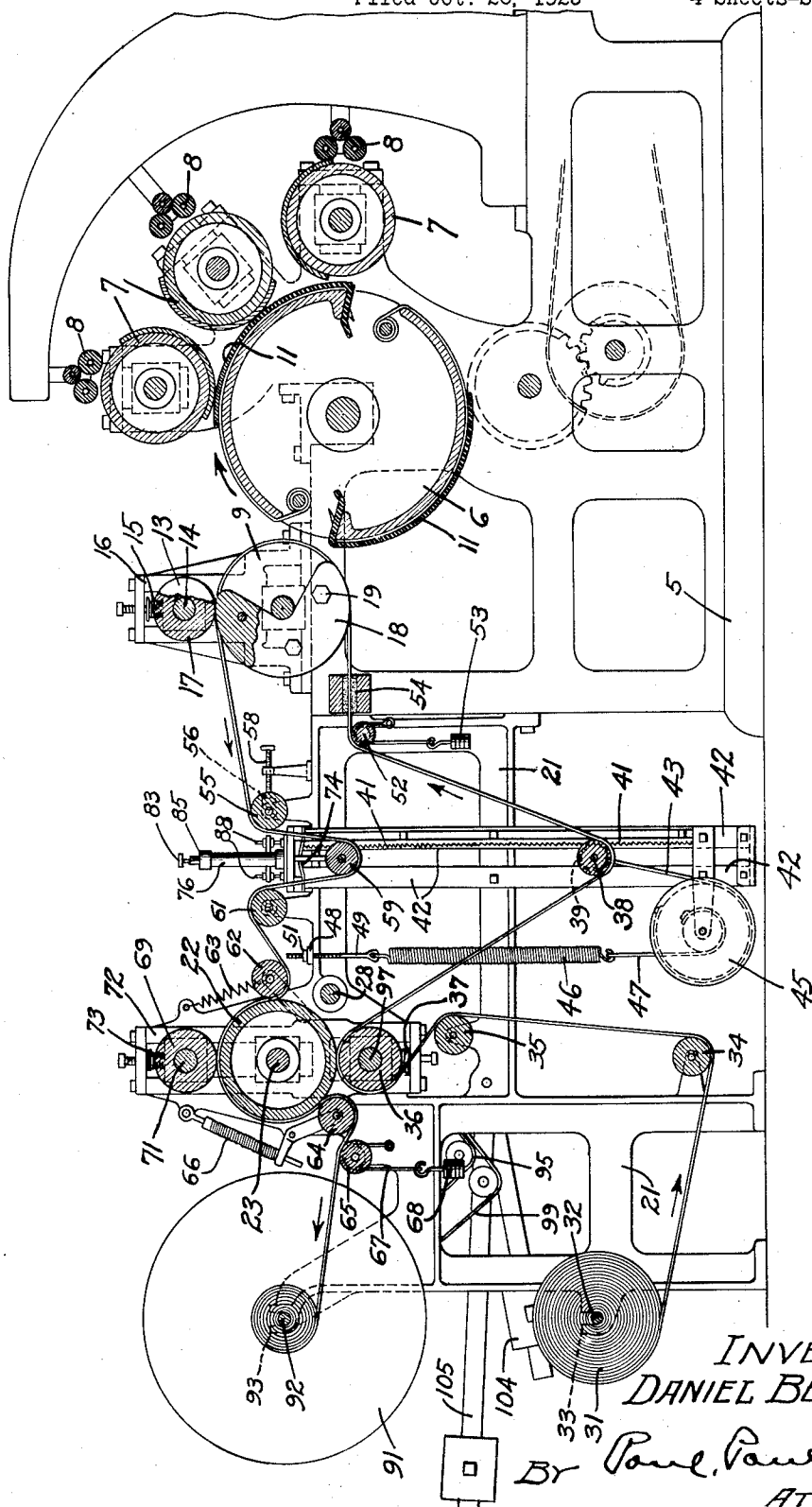
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D. BELCHER

FEEDING ATTACHMENT FOR PRINTING PRESSES

Filed Oct. 26, 1925

4 Sheets-Sheet 1



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FEEDING ATTACHMENT FOR PRINTING PRESSES

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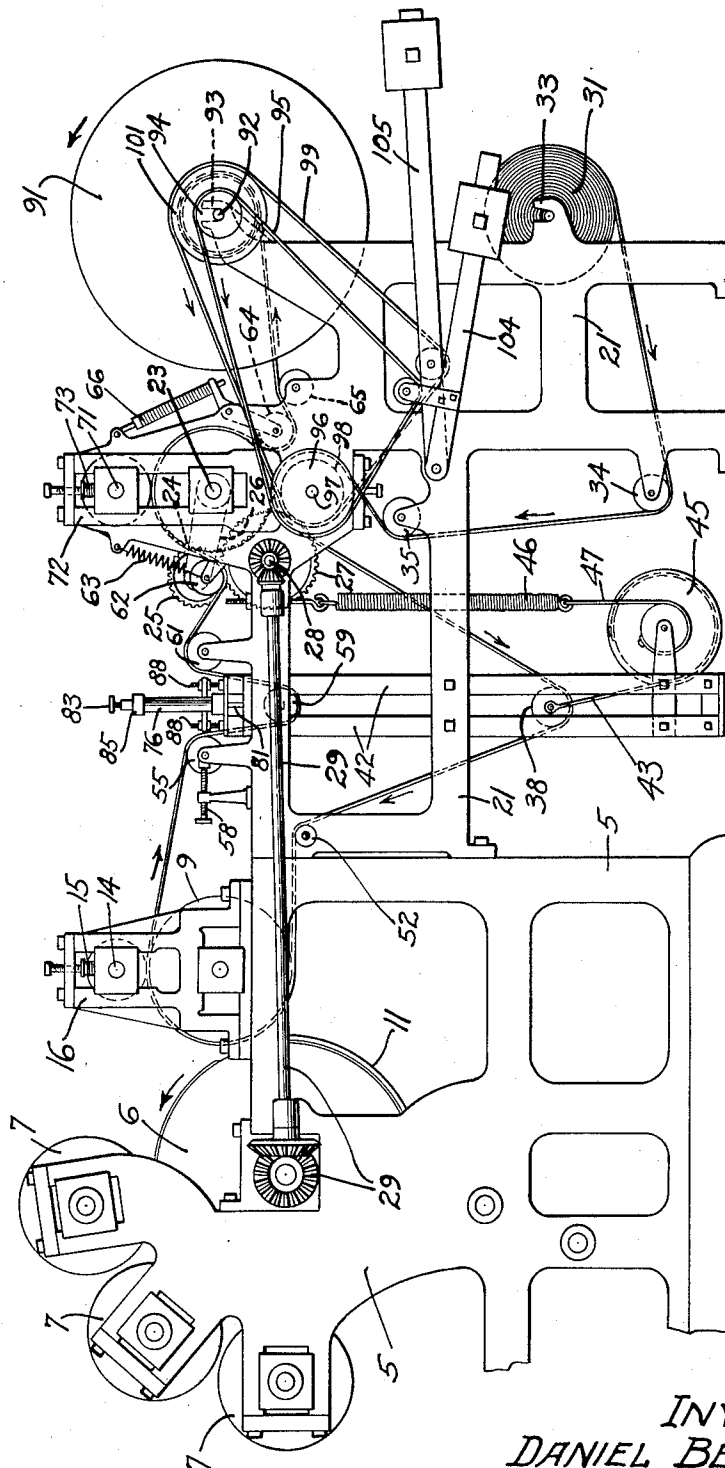


FIG. 2

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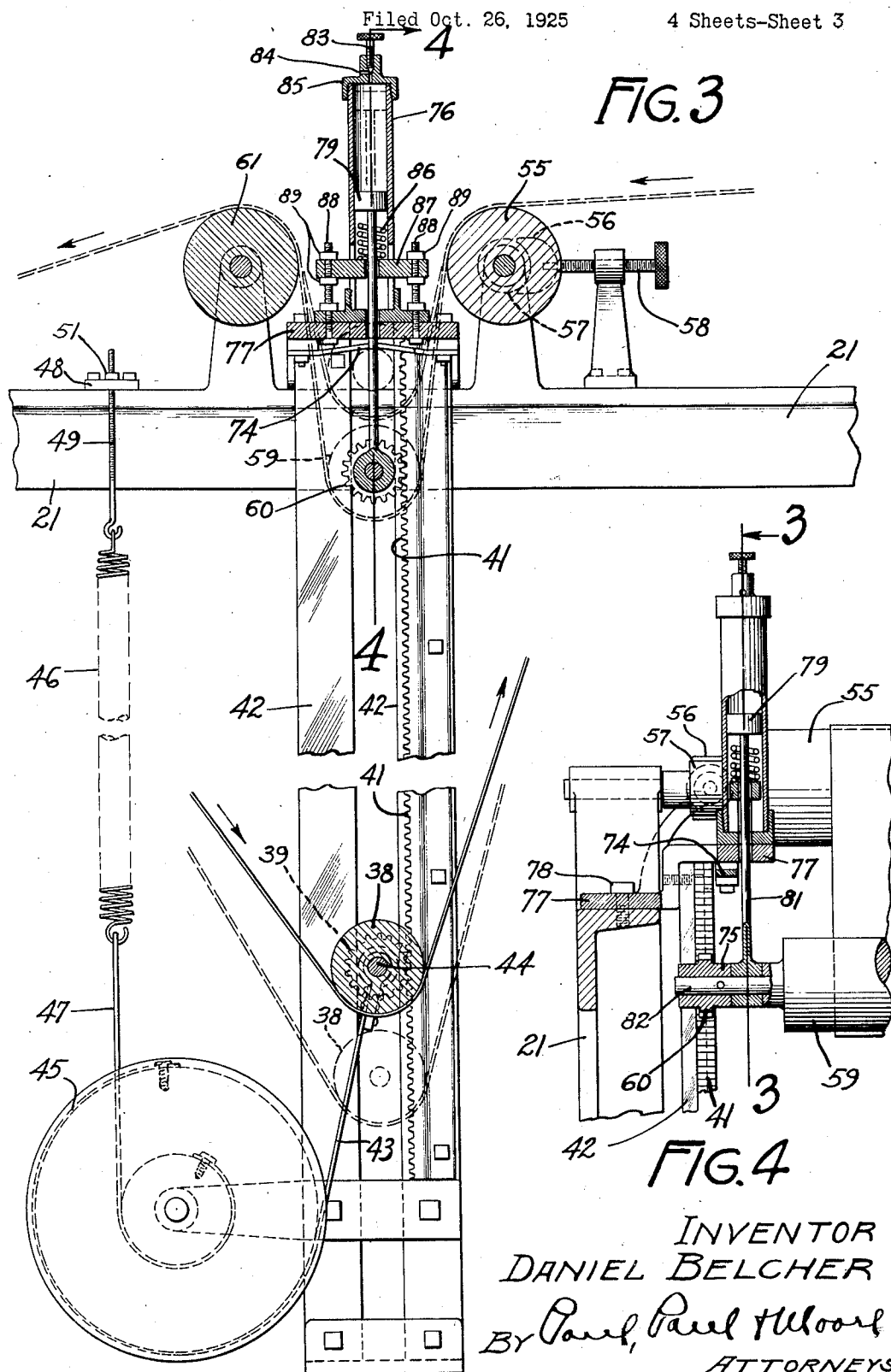
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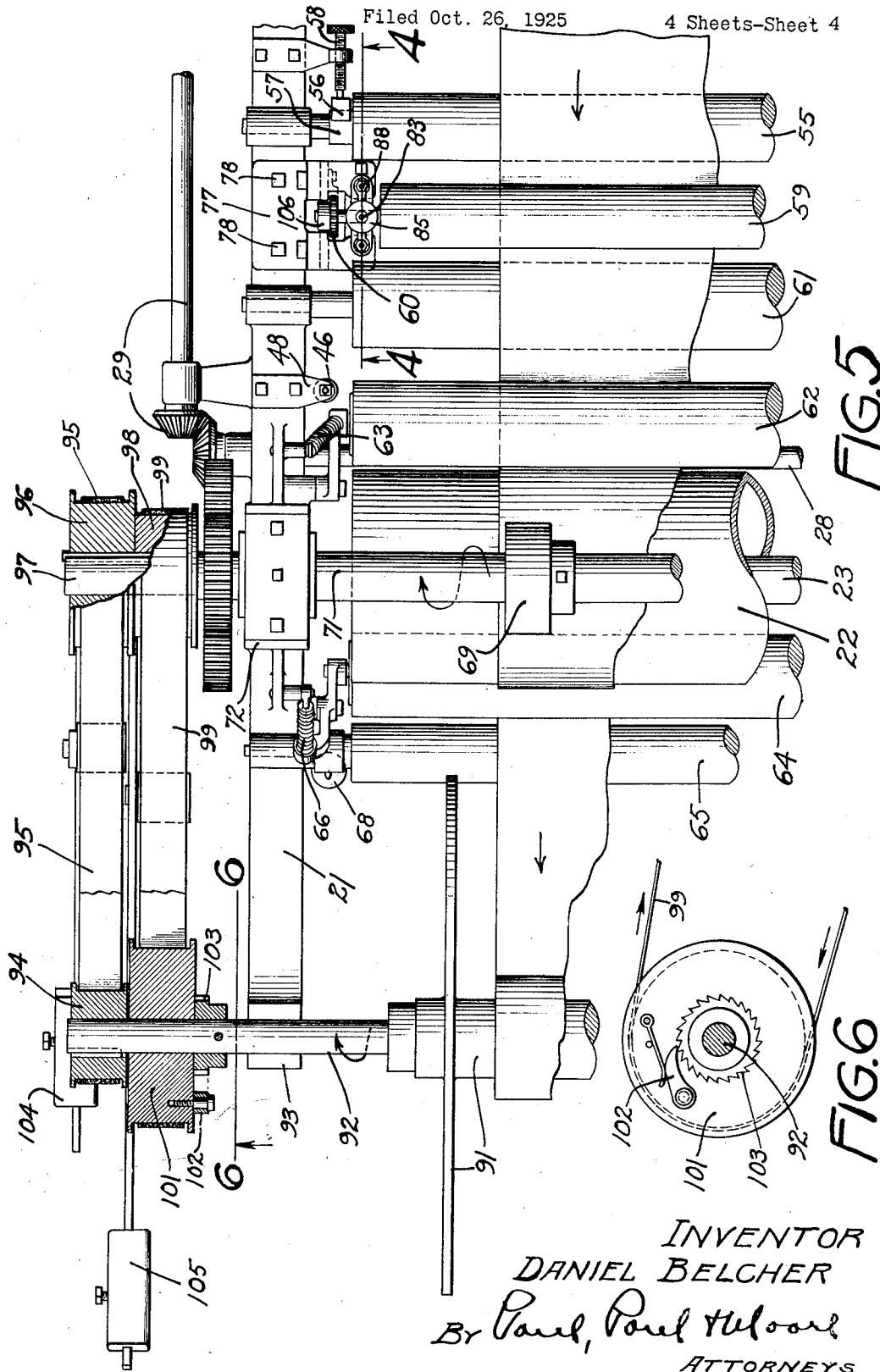
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FEEDING ATTACHMENT FOR PRINTING PRESSES

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4 Sheets-Sheet 4



UNITED STATES PATENT OFFICE.

DANIEL BELCHER, OF MINNEAPOLIS, MINNESOTA, ASSIGNOR TO BEMIS BRO. BAG CO.,
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FEEDING ATTACHMENT FOR PRINTING PRESSES.

Application filed October 26, 1925. Serial No. 64,924.

This invention relates to an improved feeding attachment for printing presses and more particularly relates to an improvement over the form shown in my prior pending application Serial No. 706,917, filed April 16, 1924.

An object of this invention is to provide a feeding attachment for printing presses, particularly of the rotary type, whereby the material to be printed on may be taken directly from a roll and delivered to the printing surface in a continuous sheet and having means for varying the distance between impressions, after which the printed material is re-rolled or may be converted into any form or shape desired for future manufacture or use.

A further object of the invention is to provide such an attachment particularly adapted for use in connection with printing presses employed for printing or making impressions on a web of material, either paper or cloth, before such material is made into sacks or bags for various purposes, and which mechanism is provided with means for positively varying, to a predetermined degree, the distance between impressions depending upon the particular size of the bag or sack into which the web of material may subsequently be manufactured.

The particular object of the invention, therefore, is to provide an improved feeding attachment for printing presses.

Other objects of the invention will appear from the following description and the accompanying drawings and will be pointed out in the annexed claims.

In the drawings there has been disclosed a structure designed to carry out the various objects of the invention, but it is to be understood that the invention is not confined to the exact features shown, as various changes may be made within the scope of the claims which follow.

In the accompanying drawings forming part of this specification,

Figure 1 is a vertical sectional view of a printing press showing my improved feeding attachment connected thereto;

Figure 2 is a side elevation of Figure 1;

Figure 3 is an enlarged detail sectional view on the line 3—3 of Figure 4 showing the means for taking up slack in the web of material;

Figure 4 is a detail sectional view on the lines 4—4 of Figures 3 and 5;

Figure 5 is a detail plan view of a portion of the feeding attachment showing the means provided for re-rolling the printed web; and

Figure 6 is a detail sectional view on the line 6—6 of Figure 5.

In the selected embodiment of the invention here shown, there is illustrated a printing press of ordinary construction, comprising the usual frame 5 upon which the usual impression cylinder 6 and complementary printing rolls 7 are mounted. The usual inking rolls 8 are also shown to provide means for inking the surfaces of the printing rolls 7, as is customary in structures of this kind. A printing cylinder 9 is also mounted upon the frame 5 and cooperates with the printing surfaces or blankets 11 of the cylinder 6 to transfer the impressions from the blankets onto the web of material being fed between the printing cylinder 9 and the cylinder 6 as shown in Figure 1.

A plurality of gripper wheels 13 are mounted upon a shaft 14 arranged over the printing cylinder 9 adapted to be yieldably held in contact with the surface thereof by means of compression springs 15 mounted in the bearing brackets 16 at each end of the roll 9. These gripper wheels function to positively start the feeding of the material between the cylinders 9 and 6 when moved into contact with the sheet or web of material passing over the printing cylinder 9. A cam wheel 17 is mounted adjacent each end of the roll 9 adapted to be engaged by cams 18 secured to the ends of the printing cylinder 9 by means of bolts 19, shown in Figure 1. These cams and cam rollers function to periodically move the gripper wheels 13 out of feeding contact with the periphery of the printing cylinder 9 to permit the web of material to slip or relatively move thereon for the purpose of varying the distance between impressions. The shape or length of the cams 18 is preferably as shown in Figure 1 so that the gripper wheels 13 will be out of contact with the paper the major portion of each revolution. The cams are also so arranged upon the cylinder 9 as to cause the gripper wheels 13 to move into feeding contact with the cylinder 9 in timed relation with the contacting

of the leading portion of each blanket 11 with the cylinder 9, so that the instant one of the blankets is moved into contact with the web of material the gripper wheels will also
5 contact with the web of material to positively start the feeding of it between the printing cylinder 9 and the usual cylinder 6. By thus timing the contacting of the gripper wheels 13 with relation to the contacting of
10 the blankets with the periphery of the cylinder 9, there will be no danger of the material slipping during the period of operation when the blanket is in printing contact with the web of material.

15 The feeding mechanism is preferably mounted upon an auxiliary frame 21 having one end suitably secured to the press frame 5 as shown in Figures 1 and 2. A feed cylinder 22 is mounted upon a shaft 23 ro-
20 tatively mounted in suitable bearings provided in the side frames 21. This feed cylinder is adapted to be rotated or driven at various speeds by means of a set of speed change gears mounted adjacent one end
25 thereof and shown in dotted lines in Figure 2. As here shown, a gear 24 is terminally mounted upon the shaft 23 adapted to mesh with a relatively wider faced intermediate pinion 25 carried by an adjustably mounted
30 change gear arm 26, preferably pivotally mounted on the shaft 23 adjacent the gear 24. A change gear 27 is demountably mounted upon one end of a counter-shaft 28 which is rotatively mounted in suitable bear-
35 ings provided in the auxiliary side frame 21. A bevel gear drive 29 is provided at the opposite side of the machine to constantly transmit power to the feed cylinder 22 from the shaft of the transfer cylinder 6 as par-
40 ticularly shown in Figure 2. By the employment of the above described mechanism the feed of the material may be increased or decreased by simply removing the change
45 gear 27 and substituting therefor a relatively larger or smaller gear, depending upon the size of the impressions and also the distance required between the impressions. The feeding of the material into the machine and
50 drawing it therefrom is therefore constant, and is also at a lower speed than the speed of the material when being printed, thereby causing the section of the material between the feed cylinder 22 and the printing cylinder 9 to alternately increase and decrease in
55 length while the machine is in operation.

The unprinted material is preferably delivered to the feed cylinder 22 from a roll 31 mounted upon a shaft 32 in brackets 33 provided on the side frames 21 as shown in
60 Figures 1 and 2. From the roll 31 the web is fed over a pair of idler rolls 34 and 35, thence over a roll 36, which is forcibly held against the periphery of the feed cylinder 22 by means of springs 37, thereby providing
65 means for positively feeding the web of ma-

terial between the two rolls 36 and 22 as shown.

An important feature of this invention resides in the novel means provided for taking
up slack in the sections of the material be- 70
tween the feed cylinder 22 and the printing cylinder 9. As shown in Figures 1 and 3, the take-up means for the lower web section comprises a roll 38 having a pinion 39 pro-
75 vided on each end adapted to roll in racks 41 secured to one of the upright guide bars 42 at each side of the machine as shown particularly in Figure 3. By means of the pin-
80 ions 39 and the racks 41 it will be impossible for one end of the roll 38 to relatively raise or lower with reference to the other end thereof, thereby constantly maintaining the
web of material at substantially a uniform tension. A pair of straps or bands 43 are
85 provided at each side of the machine, each having one end secured to the shaft 44 of the roll 38 and their other ends secured to the peripheries of the flanged wheels 45 which have tension springs 46 operatively connect-
90 ed thereto by means of connections 47 so that the wheels 45 tend normally to rotate in a direction to exert a downward pull upon the straps 43, clearly shown in Figure 3. The upper ends of the tension springs 46
95 are adjustably connected to brackets 48 by means of threaded stems 49 and nuts 51. By varying the positions of the nuts 51 upon the stems 49 the downward pull exerted upon the roll 38 may be varied to suit the particu-
100 lar type or grade of material being printed.

From the roll 38 the web upwardly passes over a small friction roll 52 having a friction device such as a weight 53 operatively connected therewith to tend to retard the
105 rotation of the roll 52. It then passes through a friction block 54 which also is provided with means, not shown, for varying its frictional contact with the web of material as it is fed therethrough. From the
110 friction block 54 the web passes around the printing cylinder 9 from which it is fed over a second friction roll 55 having a friction shoe 56 frictionally held against the hub 57 thereof by means of an adjusting screw 58. The web then passes under a take-up roll 59,
115 thence over an idler roll 61, and under a pressure roll 62 which is tensionably held against the periphery of the feed roll 22 by a pair of springs 63, shown in Figures 1 and 2. The upper take-up roll 59 is also provided
120 with a pinion 60 at each end thereof adapted to travel in the rack bars 41 in a manner similar to the lower roll 38. From the roll 62, the web passes over the feed cylinder 22 and between a pair of rolls 64 and 65, the
125 former being tensionably held against the periphery of the feed cylinder 22 by means of compression springs 66 and the latter having a friction device operatively connected therewith tending to retard its rotation. 130

This friction device preferably consists of a band 67 having one end secured to the frame and passing over a hub on the roll and having a weight 68 suspended from the other end thereof, thereby constantly acting as a drag on the roll 65 to tend to retard the speed of the web being fed thereover.

A series of draw rolls or wheels 69 are mounted upon a shaft 71 journaled in suitable bearings provided in the upright portions 72 of the two side frames 21 as shown in Figure 1. These draw rolls are constantly held in driving contact with the periphery of the feed cylinder 22 or with the surface of the web of material being fed therebetween by compression springs 73 as shown particularly in Figure 1. Thus it will be noted that the web of material after being printed, will be fed from the machine onto a re-rolling device or other suitable receiving means at approximately the same speed as it is being fed into the press to receive the impressions. This will readily be noted as a result of the web being fed into and out of the press by the feed cylinder 22 and the roll 36 and draw-rolls 69.

Means are provided in the construction of this novel feeding attachment whereby the distance between impressions may be varied depending upon the size of the bag to be made from the web, and which spacing will be accurate and constant for each setting of the machine. Such means preferably consists in mounting the take-up roll 59 in such a manner that between each impression it will be moved upwardly to the position shown in dotted lines in Figure 3 against a fixed stop 74. This stop is preferably constructed of a flexible material to act as a bumper when the hub 75 of the pinion 60 engages therewith. An air cushion is also provided to retard the upward movement of the roll 59 and to break the force of the impact against the stop 74 each time it is brought into engagement therewith. This cushion preferably consists of a cylinder 76 mounted upon a bracket 77 secured to the side frame 21 by suitable bolts 78. A piston 79 is operatively mounted in the cylinder 76 and has a rod 81 connecting it with the shaft 82 of the take-up roll 59. An air valve 83 is provided at the upper end of the cylinder 76 for controlling the flow of air through a port 84 in the cap 85 of the cylinder, as clearly shown in Figure 3. By manipulation of the valve 83 the flow of air through the port 84 may be controlled to retard the upward movement of the roll 59, thereby breaking the force of the impact of the hub 85 with the stop 74. A cushion spring 86 is also provided in the cylinder 76 and is supported upon an adjustable cross-head 87 so as to engage the piston to limit the downward movement of the roll 59. The cross-head 87 is adjustable by means of the thread-

ed studs 88 and adjusting nuts 89. Such an air cushion and stop is preferably provided at each end of the roll 59 so that the up and down movement of the roll 59 will be free and unrestricted.

Means are also provided for automatically re-winding the printed web of material after having passed through the machine. Such means preferably consists of demountably securing a reel 91 upon a shaft 92 supported preferably in open bearings 93 as shown in Figures 1, 2 and 6. A flanged pulley 94 is keyed to the end of the shaft 92 and has a belt 95 connecting it with a relatively larger pulley 96 secured to the shaft 97 of the lower pressure roll 36 (see Figure 1). A relatively smaller pulley 98 is also secured to the shaft 97 and has a belt connection 99 with a relatively larger pulley 101 loosely mounted upon the shaft 92 and having a pawl 102 mounted thereon to engage a ratchet wheel 103 secured to the shaft 92, see Figures 5 and 6. The belts 95 and 99 are also provided with weighted belt tighteners 104 and 105, respectively, which function to automatically maintain the belts under the proper tension. The tension of the belts 95 and 99 is such that one of the belts will always be slipping while the other is pulling the load. Such slippage usually occurs on either the pulley 96 or the pulley 98.

When the machine is first started the end of the web will be suitably secured to the reel 91 after which it will be wound thereon by power being transmitted to the shaft 92 through the outer belt 95. The relative sizes of the pulleys 96 and 94 are such that when the reel 91 is first started the peripheral speed thereof will be equal to or greater than the travel of the web through the machine, thereby constantly maintaining the web portion between the reel and the friction roll 65 under tension. As the diameter of the re-wound roll increases, the speed of the shaft 92 and therefore the reel 91 will decrease controlled by the peripheral speed of the web being wound upon the reel, thereby causing the pulley 96 to slip on the belt 95 or the belt to slip on the pulley 94. During the initial starting of the reel 91, the ratchet pulley 101 will idle upon the shaft 92 at a relatively slower speed until the speed of the shaft 92 is reduced to that of the pulley 101, after which the belt 99 will take the load and the ratchet 102 of the pulley 101 will engage the ratchet 103 and cause the reel 91 to be driven by the belt 99 through the ratchet pulley 101. As soon as the belt 99 thus assumes control of the reel 91, the outer belt 95 will have no further function, the belt 99 continuing to operate the reel until the reel has been filled and is replaced by an empty reel after which the outer belt 95 will again assume control. The relative sizes of the pulleys 98 and 101

are also such that the belt 99 will constantly slip on one or the other of two pulleys, so that as the diameter of the roll on the reel 91 increases, the degree of belt slippage increases correspondingly. This novel re-winding mechanism is therefore so arranged that the web, in being wound upon the reel, will always be under a constant tension which tension may be varied by means of the weighted belt tighteners 104 and 105 to cause the web to be uniformly wound upon the reel. It will also be noted that the re-winding mechanism, while substantially positive in action, operates upon the friction principle. The shaft 97 is driven from the feed roll shaft 23 by suitable gears, shown in Figure 5.

Operation.

In the operation of this novel feeding attachment the web of material is mounted, in the form of a roll, upon the shaft 32 as shown in Figure 1. This shaft is preferably provided with a suitable friction device (not shown) to prevent the roll from overrunning while the machine is in operation. From the roll 31 the web passes under the guide roll 34, thence upwardly over a similar roll 35 and between the pressure roll 36 and the feed cylinder 22. The idler roll 35 functions to increase the arc of contact of the web with the roll 36, it being understood that the roll 36 is suitably geared to the shaft 23 so that the peripheral speed thereof will be equal to the peripheral speed of the feed cylinder 22. From the pressure roll 36 the web extends downwardly and passes under the take-up roll 38, after which it passes upwardly over the friction roll 52, through the friction block 54 and around the printing cylinder 9. From the printing cylinder 9 it extends rearwardly and passes over the friction roll 55, thence downwardly under the take-up roll 59 and over the idler roll 61, from which it passes under the pressure roll 62 and partially around the feed cylinder 22 to the second pressure roll 64. The rolls 62 and 64 function to increase the arc of contact of the web with the periphery of the feed cylinder 22 to prevent relative slippage therebetween. From the pressure roll 64 the web passes over the friction roll 65 and around the reel 91, as hereinbefore described.

As the web of material is thus fed through the machine, each time the leading edge of the impression blanket 11 moves into contact with the surface of the web passing over the printing cylinder 9, the ends of the cams 18 will move out of engagement with the cam wheels 17, thereby allowing the gripper rolls 13 to move into feeding contact with the web to positively start the feeding of the material simultaneously as the impression blanket contacts therewith to

make the imprint. As soon as one of the impression blankets 11 has thus been moved into printing contact with the surface of the web, the travel of the web will be equal to the peripheral speed of the blanket 11 and of the periphery of the printing cylinder 9, thereby positively preventing the web from relatively moving upon the printing cylinder 9 during the period when the impression is being made upon the web. The cams 18 may be constructed so that as soon as the web has been initially started, as above described, the gripper wheels 13 may again be moved out of feeding contact with the web as the pressure of the blanket 11 against the web, during the period when the impression is being made, will be sufficient to cause the web to continue feeding at the peripheral speed of the printing cylinder 9 without any danger of slippage. As soon, however, as the lagging end of the impression blanket moves out of contact with the web, the movement of that portion of the web extending from the friction block 54 to the friction roll 55 adjacent the take-up roll 59 will be interrupted, caused by the increased tension in the lower section of the web as a result of the tension springs 46 cooperating with the friction device 53 and the friction block 54 to interrupt the movement of the web. As a result of the feeding of the web from the feed cylinder 22 onto the reel 91 being constant, the take-up roll 59 will immediately begin to move upwardly until the hubs 75 engage the stops 74, as shown in the dotted lines in Figure 3. When the roll 59 thus reaches the limit of its upward movement the web will be drawn around the printing cylinder 9 at a relatively slower speed than the peripheral speed of the cylinder until the gripper wheels 13 on the blankets 11 are again brought into feeding contact with the web, after which the movement of the web around the printing cylinder 9 will be increased to the peripheral speed of the cylinder, thereby causing the web to be fed from the printing cylinder 9 at a relatively faster speed than the web is being wound upon the reel 9, thereby causing the take-up roll 59 to function to take up the slack in the upper section of the web. The action of the lower take-up roll 38 will be similar to that of the upper take-up roll 59 with the exception that no limit stop need be provided.

When an impression has been completed and the movement of the web around the printing cylinder 9 is interrupted, the take-up roll 38 will move from the full to the dotted line position shown in Figure 3, caused by the material being constantly fed into the machine by the feed cylinder 22. As soon, however, as one of the blankets 11 and the gripper wheels 13 are again moved into feeding contact with the printing cylinder 9

the feeding of the web around the cylinder will again be started at a relatively faster speed than the web is being fed to the take-up roll 38, thereby causing the roll 38 to be moved upwardly to the full line position in Figure 3, with a resultant increasing of the tension in the web as a result of the tension springs 46 being elongated by the upward movement of the roll 38.

Thus, it will be noted that by the employment of this novel take-up means the web will always be maintained under constant tension. It will also be noted that the feed into and out of the machine will be constant while the movement of the web around the printing cylinder 9 will be intermittent. To vary the distance between the impressions it is only necessary to substitute a larger or smaller gear in place of the change gear 27 mounted upon the shaft 28. When it is desired to increase the distance between impressions the speed of the feed cylinder 22 is relatively increased, such speed, however, always being relatively lower than the speed of the printing cylinder 9. Conversely, when it is desired to decrease the distance between impressions the speed of the feed cylinder 22 will be relatively decreased, thereby causing the web to be fed into the machine at a relatively slower speed. The maximum distance between impressions will be governed by the length of the transfer blankets 11, as it will readily be understood that the length of the impressions plus the clearance between the impressions cannot exceed one-half the circumference of the transfer cylinder 6. Therefore, the loops formed in the upper and lower sections of the web by the take-up rolls 59 and 38 will vary, depending upon the distance between impressions, because of the fact that when the distance between impressions is increased a relatively longer portion of the web must be fed into the machine for each impression, while when the distance between the impressions is decreased less material is fed thereinto.

As a result of the take-up rolls 38 and 59 being arranged to travel in true parallel relation regardless of their relative positions with relation to each other, the web of material will be maintained under constant tension, thereby preventing it from creeping from one side to the other of the machine as a result of the material varying in thickness. The pinions 39 and 60, traveling in the racks 41, are provided with outwardly extending hubs 106 adapted to travel between the edges of the guide-bars 42, thereby causing the rolls 38 and 39 to travel in vertical alignment therebetween.

I claim as my invention:

1. The combination with impression and printing cylinders adapted to intermittently print a web fed intermittently between them,

of pneumatic stop means for tensioning the web leaving said cylinders, and independently spring actuated means for tensioning the web entering said cylinders.

2. The combination with impression and printing cylinders adapted to intermittently print a web fed intermittently between them, of spring actuated, and pneumatic stop means having a vertical movement for applying tension to the web, respectively before entering and leaving said printing and after impression cylinders, said tension-applying means being adapted for relative independent movement.

3. The combination with impression and printing cylinders adapted to intermittently print a web fed intermittently between them, of successively operable, pneumatic and gravity means for applying tension to said web on one side of said printing and impression cylinders, and spring controlled means yieldingly drawn against the web on the other side of said cylinders for applying a tension thereto.

4. An apparatus of the class described comprising printing and impression cylinders and feed rolls adapted to make impressions upon a web of material at predetermined intervals, means having a limited vertical movement for applying tension to the web after printing, and an independently movable spring pressed means for applying tension to said web before the printing operation, said tension means being arranged at a point intermediate the feed rolls and printing cylinder.

5. An apparatus of the class described comprising printing and impression cylinders adapted to print at predetermined intervals upon a web fed between them, a gravity held roller having a limited vertical movement adapted to apply tension to the web after the printing operation, and a similar spring actuated roller for applying tension to the web before the printing operation.

6. An apparatus of the class described comprising impression and printing cylinders whereto the web is fed to be intermittently printed thereon, rolls adapted to contact respectively with said web before and after the printing operation and apply tension thereto, said rolls having rack bars and pinions therefor and adapted for independent vertical movement, and said rolls operating to tension the web to a predetermined degree upon opposite sides of said cylinders.

7. An apparatus of the class described comprising printing and impression cylinders and means for feeding a web of material to be printed thereto, said printing and impression cylinders being adapted to make impressions upon the web at predetermined intervals, a roll movable vertically in guides and adapted to bear on said web after the

printing operation, said roll having a limited vertical movement, a second roll also vertically movable in guides arranged to bear on the web before it enters said cylinders, said rolls
5 being mounted for independent movement and a tension device for normally exerting a pull upon said second roll to draw it against the web and apply tension therefo.

8. An apparatus of the class described
10 comprising printing and impression cylinders and means for feeding a web of material to be printed thereto, said printing and impression cylinders being adapted to make impressions upon the web at predetermined intervals, vertical guideways, a rack bar there-
15 in, a roll having a pinion engaging said rack bar, said roll resting by gravity upon the upper run of the web after the printing operation, and means for limiting the upward
20 movement of said roll, a second lower roll having a pinion connection with said rack and adapted to engage the lower run of said web before the printing operation, and a
spring device for exerting a downward pull
25 on said second roll, said rolls being adapted

to tension the web and compensate for variations in the thickness thereof.

9. A printing press including a printing cylinder and feed rolls, and a web carried by
said rolls, and tension rolls arranged to en- 30
gage different runs of the web and to apply tension thereto at points intermediately of
said cylinder and feed rolls, the rolls having
a common support and yieldable means con- 35
nected to and operating said rolls in the same direction to tension the runs of the web.

10. The combination with impression and printing cylinders, and feed rolls, said cylinders adapted to intermittently print a web
fed intermittently between them, of a roll 40
for applying tension to the web after the printing operation, and a similar roll for
applying tension to the web before the printing operation, said tension applying rolls being
arranged intermediate of the feed rolls 45
and printing cylinder.

In witness whereof, I have hereunto set my hand this twenty third day of October, 1925.

DANIEL BELCHER.