June 25, 1929. N. E. FUNK 1,718,225

FRICTION CLUTCH FEEDING MEANS FOR PRINTING PRESSES AND THE LIKE

Filed Aug. 4, 1927 2 Sheets-Sheet 1

Fig. 1.

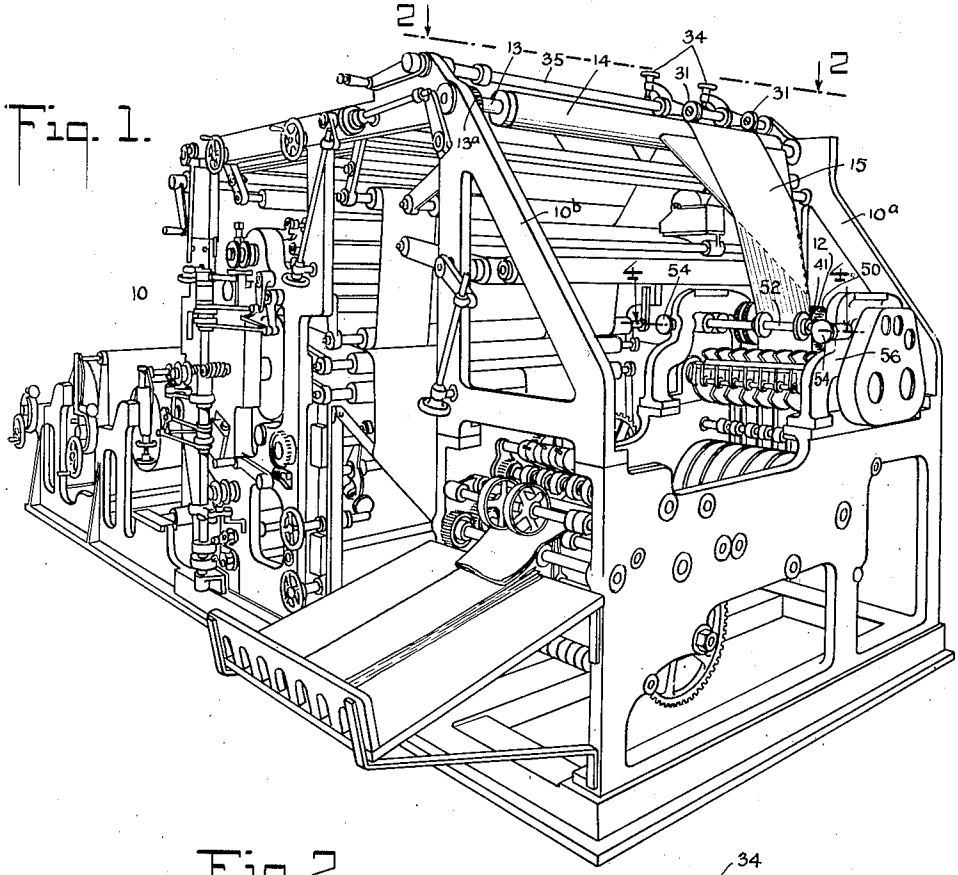


Fig. 2.

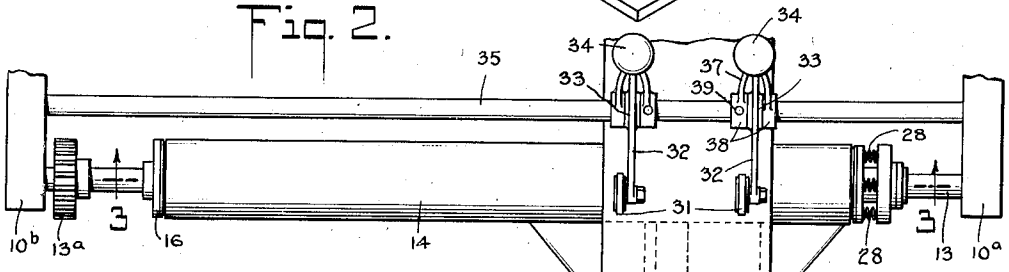


Fig. 5.

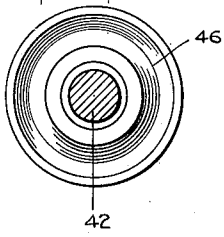
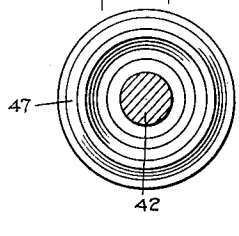
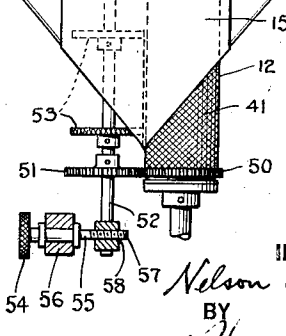


Fig. 6.





INVENTOR,
Nelson E. Funk,
BY
Henry J. Lucke,
his ATTORNEY.

June 25, 1929. N. E. FUNK 1,718,225

FRICTION CLUTCH FEEDING MEANS FOR PRINTING PRESSES AND THE LIKE

Filed Aug. 4, 1927 2 Sheets-Sheet 2

Fig. 3.

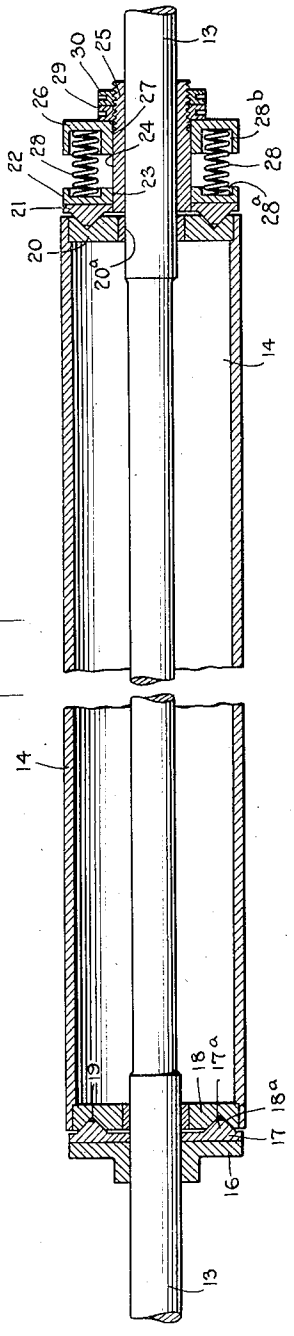
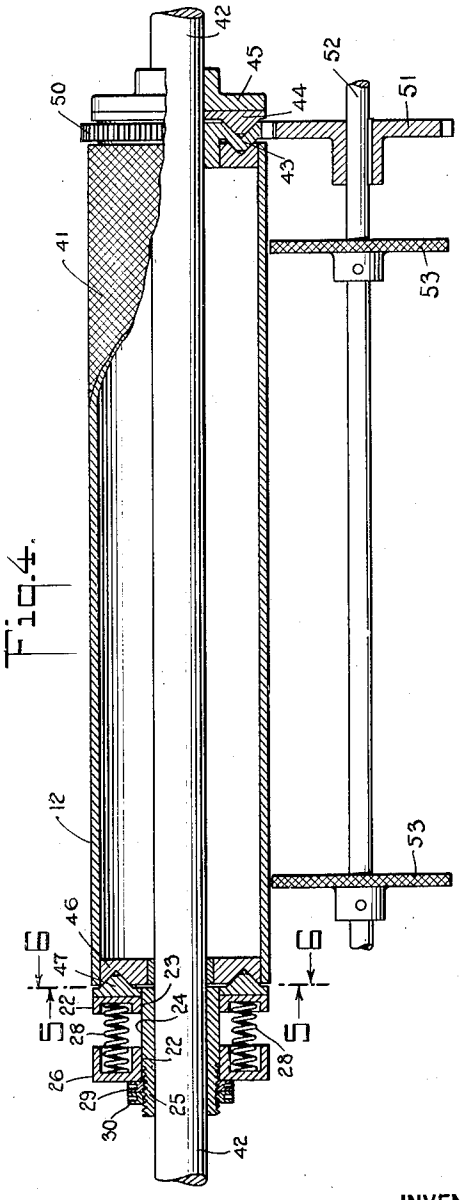


Fig. 4.



INVENTOR,
Nelson E. Funk,
BY
Henry J. Lucke,
His ATTORNEY.

Patented June 25, 1929. 1,718,225

UNITED STATES PATENT OFFICE.

NELSON E. FUNK, OF MONTCLAIR, NEW JERSEY.

FRICTION-CLUTCH FEEDING MEANS FOR PRINTING PRESSES AND THE LIKE.

Application filed August 4, 1927. Serial No. 210,501.

This invention relates to friction means for feeding paper web in printing presses and the like.

It is the usual practice to effect the feeding of the paper web through the printing press by feeding means disposed at the posterior or delivery end of the printing machine, whereby the web is pulled or drawn through the printing machine while in contact with the printing and other impression rolls.

A primary object of the present invention is the provision of co-operating sets of oppositely disposed rotated members arranged to engage opposite faces of the web and frictionally driven at corresponding rates of travel to impart a regulatable frictional "drag" on the web on its opposite faces.

A further feature of my invention is the provision of pairs of corresponding recessed and projecting members disposed at and engaging the opposite ends of a positively rotated feed roll and adjustable resilient means whereby the friction between the feed roll and the paper web is regulated for maximum "drag" upon the paper, thereby preventing the web from being torn.

Such feed roll may be associated with idler rolls to provide a frictional or propelling "drag" upon the paper web, or may be associated with positively driven rolls or disks, preferably knurled, to provide a nipping "drag" on the paper web.

Further features and objects of the invention will be more fully understood from the following detail description and the accompanying drawings in which

Fig. 1 is a side elevation of a printing press provided with web drive means embodying my invention;

Fig. 2 is a detail top plan view of Fig. 1 illustrating primarily an embodiment of my so-called friction propelling web feeder as seen from line 2—2 of Fig. 1;

Fig. 3 is a sectional elevation on line 3—3 of Fig. 2;

Fig. 4 is a sectional elevation on line 4—4 of Fig. 1 illustrating in general sectional view an embodiment of my so-called nipping or positive web feeder;

Fig. 5 is a sectional elevation on line 5—5 of Fig. 3;

Fig. 6 is a sectional elevation on line 6—6 of Fig. 4.

I have illustrated a printing machine 10 in Fig. 1 of conventional form to indicate one form of press to which my invention is applicable; however, it will be understood that my invention is not limited to such or any other particular form of printing machine. My invention is particularly useful in high speed printing presses, and particularly for two or other multi-color work, and for such high speed operations, it is desirable to employ two forms of web drive devices, one, of the friction propelling type and, the other, of the positive pull or nipping type.

My friction propelling type is illustrated generally at 11 in Fig. 1 and my positive pull or nipping roller feeding type is illustrated generally at 12, the same being disposed substantially at the delivery end of the printing machine, the nipping roller type 12 being preferably disposed posteriorly of my friction propelling type 11, as illustrated.

Referring to Figs. 2 and 3, relating to my friction propelling type of web feeding means, the preferred form comprises a shaft 13 which is positively rotated by its gear 13^a from any suitable rotating drive (not shown). On the shaft 13 is mounted the hollow roll 14 serving as a friction engaging member for contact with one face of the web 15. The drive between the shaft 13 and the roller 14 is effected by friction means which is adjustable to regulate the degree of friction exerted on the web. Such friction means comprises a disk 16 splined or keyed to the shaft 13, and carrying a friction member 17 disposed laterally of one end face of the roller 14. Such friction member 17 coacts with and directly frictionally engages the disk member 18, which is secured to such end face of the roller 14.

The coacting friction disk members 17, 18 are of corresponding relief and depressed formation, each of general annular contour. For example, the disk 14 is shown of relief formation in the form of an annular projection 17^a having a transverse cross-section of general triangular outline and arranged to be received within and frictionally engage the faces of the annular depression 18^a of the disk member 18.

At the opposite end of the roll 14 I similarly provide a friction disk 20 which in this instance corresponds to the friction disk 18 and as shown is of the annular

depressed type. Cooperating with such friction disk 20 I provide the friction disk 21 of the annular projection type. Engaging the disk 21 I provide the anulus 22, the inner face 23 of which is machined to make a close sliding fit with the cylindrical face 24 of the bushing 25, keyed to the shaft 13. Coating with the annulus 22 is an annulus 26, having its inner face 27 also machined to close sliding fit with the cylindrical face 24 of the bushing 25. Between the annulus 22 and the annulus 24 I dispose two or more expansile springs 28, having their respective opposite ends freely seated within cylindrical depressions 28^a, 28^b. The outer end of the bushing 25 is screw-threaded to receive a tightening nut 29 and a lock nut 30, whereby the tension of the springs 28 is regulated to thereby adjust the frictional engagement between the respective sets of coacting friction members 17, 18 and 20, 21.

The inner face 18^a of the disk 18 and the inner face 20^a of the disk 20 are machined smooth to provide a sliding clearance relative to the periphery of the shaft 13.

Associated with such friction-regulated feeding cylinder 14, I provide two or more friction idle rollers 31, see Fig. 2, for engagement with the opposite face of the paper web 15. The rollers 31 are loosely carried at the forward ends of the respective rocking lever arms 32, the hubs 33 of which are loosely mounted on the positioning rod 35, which extends, see Fig. 1, toward the front of the machine to receive a manually operated crank handle 36.

At the rearward ends of each rocking arm 32 I provide an adjusting screw 34, which meshes at its lower threaded end in a threaded tapped opening in the converging arm 37 of each hub 38, secured in adjusted fixed position on the position shaft 35 by set screws 39. Between the rearward or fall ends of each rocking arm 32 and its converging bows 37, I interpose an expansile spring, such as a coiled expansile spring (not shown) to tension the forward end of the arm 32 and therewith its idler roller 31 against the paper web 15, when the shaft 35 and its crank 36 are in set position, as is indicated in Fig. 1. Upon turning the crank 36 in counter-clockwise direction as viewed in Fig. 1, the idler rollers 31 are elevated relative to their mutually associated feed roll 14, to lift the rollers 31 free of the roll 14, and thereby facilitate the "threading" of the paper web 15 through the feeding device 11.

As appears in Fig. 2, the shaft 13 of the feeding roll 14 is mounted at its opposite ends in the end frame members 10^a, 10^b of the printing machine 10.

One form of my positive pull or nipping type of web feeding means 12 is shown in detail in Figs. 4, 5 and 6, and comprises the feeding roll 41 which is mounted on its shaft 42 similar to the aforesaid feed roll 14 relative to its shaft 13. At one end of the feed roll 14, in this instance appearing at the right-hand side of Fig. 4, is an annularly recessed friction member 43 secured at one end of the roll 41 and a co-operating annularly projecting friction member 44 engaged by the disk 45 which is keyed or otherwise fixed to the shaft 42. At the opposite end of the feed roll 41, I provide the annularly recessed friction member 46 co-operating with a correspondingly projecting friction member 47, which is adjusted in tension similar to the aforesaid friction member 21, and corresponding parts are designated by like reference members.

However, to obtain a positive or nipping pull on the paper web 15, I secure the annular gear 50 to the circular periphery of the friction member 43, and meet therewith a gear 51 splined or otherwise secured to the counter-shaft 52. On the counter-shaft 52, I provide the two or more knurled friction disks 53, whereby said friction feed disks 53 are positively rotated in a direction counter to the direction of drive of the co-operating friction feed roll 41.

As is illustrated in Fig. 1, the friction propelling device 11 is disposed anteriorly of the gripping device 12; however, the order of disposition of the same, or the use of either or both types is optional.

In the use of the aforesaid various embodiments of my invention, it is common practice in printing presses to feed the paper web by drawing the web through the printing units and appurtenant parts by pressure applied posteriorly of the printing units. It is often desirable and necessary in certain instances to sever the paper web after certain printed matter has been impressed upon the web.

In Fig. 1, I have illustrated a printing press in which the paper web is drawn through the printing units and appurtenant parts by pressure applied to the web posteriorly of the printing units and appurtenant parts. In this instance, the primary feeding of the paper web is effected by the cylinder 14 rotated by any suitable driving means under the power of the press, the spring pressed rollers 32 co-operating therewith, and whereby the maximum pressure to be thus frictionally applied to the paper web is regulated by the adjustment of the resilient friction applying means of the cylinder 14. In the particular press shown in Fig. 1, I have also illustrated a web severing device in the form of the horizontally reciprocating slitter 60, where upon the severing of the web, the web is positively advanced and fed through the folding and stacking mechanism of the press, disposed at the delivery end of the press.

In order to facilitate the threading of the paper web 15 between the disk gripping wheels 53 and the cooperating feed roll 41, I provide, see Fig. 2, the hand drive device comprising the manually operated head 54 fixed to the shaft 55, which passes through a suitable opening in the upright or frame portion 56, see Fig. 1; the inner end of the shaft 55 carries a worm 57 which meshes with the worm gear 58, mounted on the shaft 52 of the disk rolls 53. Accordingly, upon manual turning of the head 54, the shaft 52 and the respective disk rolls 53 and the feed roll 41 are rotated co-operatively for threading or feeding the paper web 15 therebetween.

As appears from Figs. 2 and 4, the pitch line between the driving gear and the driven gear of the frictionally-adjusted roll is on a circumference the radius of which is less than the radius of the shell 14, 41 which engages the paper web, thereby enabling the desired degree of tension to be exerted in the paper web without causing tearing or rupture.

Whereas I have described my invention by reference to specific forms thereof, it will be understood that many changes and modifications may be made without departing from the spirit of the invention.

I claim.

1. In a machine for feeding paper web, the combination of a cylinder for engaging one face of the paper web, a shaft for said cylinder, a gear carried by said shaft, a set of disks carried by said shaft and engaging the opposite end faces of said cylinder, adjustable means exerting pressure on said disks and web feeding means engaging the opposite face of the paper web and driven by said gear.

2. In a machine for feeding paper web, the combination of a cylinder for engaging a face of the paper web, a shaft for said cylinder, a gear carried by said shaft, a set of disks carried by said shaft and engaging the opposite end faces of said cylinder, adjustable resilient means exerting pressure on said disks, and web feeding means engaging the opposite face of the paper web and driven by said gear.

3. In a machine for feeding paper web, the combination of a cylinder for engaging a face of the paper web, a shaft for said cylinder, a gear carried by said shaft, a set of disks carried by said shaft and respectively having smooth faces engaging the opposite ends of said cylinder, adjustable means exerting pressure on said disks, and web feeding means engaging the opposite face of the paper web and driven by said gear.

4. In a machine for feeding paper web, the combination of a cylinder for engaging a face of the paper web, a shaft for said cylinder, a gear carried by said shaft, a set of disks carried by said shaft and respectively having smooth faces engaging the opposite end faces of said cylinder, adjustable resilient means exerting pressure on said disks and web feeding means engaging the opposite face of the paper web and driven by said gear.

5. In a machine for feeding paper web, driving means, and tension exerting means driven by said driving means for feeding the paper web, said tension exerting means comprising a substantially cylindrical member arranged to frictionally engage a face of the paper web, said cylindrical member having at its one end an annular groove, the axis of which is substantially concentric with the axis of said cylindrical member, a shaft driven by said driving means and passing through the interior of said cylindrical member, an element having an annular portion arranged to be received within and engage said annular groove, a sleeve surrounding and secured to said shaft adjacent said one end of said cylindrical member, and means carried by said sleeve for exerting pressure upon said annular element and therewith upon said cylindrical member and said paper web.

6. In a machine for feeding paper web, driving means, and tension exerting means driven by said driving means for feeding the paper web, said tension exerting means comprising a substantially cylindrical member arranged to frictionally engage a face of the paper web, said cylindrical member having at its one end an annular groove, the axis of which is substantially concentric with the axis of said cylindrical member, a shaft driven by said driving means and passing through the interior of said cylindrical member, an element having an annular portion arranged to be received within and engage said annular groove, a sleeve surrounding and secured to said shaft adjacent said one end of said cylindrical member, said sleeve being provided with threading, and threaded means meshing with said threading and carried by said sleeve for exerting pressure upon said annular element and therewith upon said cylindrical member and said paper web.

7. In a machine for feeding paper web, driving means, and tension exerting means driven by said driving means for feeding the paper web, said tension exerting means comprising a substantially cylindrical member arranged to frictionally engage a face of the paper web, said cylindrical member having at its one end an annular groove, the axis of which is substantially concentric with the axis of said cylindrical member, a shaft driven by said driving means and passing through the interior of said cylindrical member, an element having an annular por-

tion arranged to be received within and engage said annular groove, a sleeve surrounding and secured to said shaft adjacent said one end of said cylindrical member, and resilient means carried by said sleeve for exerting pressure upon said annular element and therewith upon said cylindrical member and said paper web.

8. In a machine for feeding paper web, driving means, and tension exerting means driven by said driving means for feeding the paper web, said tension exerting means comprising a substantially cylindrical member arranged to frictionally engage a face of the paper web, said cylindrical member having at its one end an annular groove, the axis of which is substantially concentric with the axis of said cylindrical member, a shaft driven by said driving means and passing through the interior of said cylindrical member, an element having an annular portion arranged to be received within and engage said annular groove, a sleeve surrounding and secured to said shaft adjacent said one end of said cylindrical member, and adjustable resilient means carried by said sleeve for exerting pressure upon said annular element and therewith upon said cylindrical member and said paper web.

9. In a machine for feeding paper web, driving means, and tension exerting means driven by said driving means for feeding the paper web, said tension exerting means comprising a substantially cylindrical member arranged to frictionally engage a face of the paper web, said cylindrical member having at its one end an annular groove, the axis of which is substantially concentric with the axis of said cylindrical member, a shaft driven by said driving means and passing through the interior of said cylindrical member, an element having an annular portion arranged to be received within and engage said annular groove, a sleeve surrounding and secured to said shaft adjacent said one end of said cylindrical member, an annularly recessed member mounted on said sleeve, resilient means disposed between said annularly recessed member and said annular element, and a nut having threading meshing with said threading and adjustably secured to said sleeve.

In testimony whereof I have signed this specification this 7th day of July 1927.

NELSON E. FUNK.