June 9, 1959 J. P. THOMAS 2,890,002

DOUBLE ROLL MANDREL

Filed Jan. 24, 1956 2 Sheets-Sheet 1

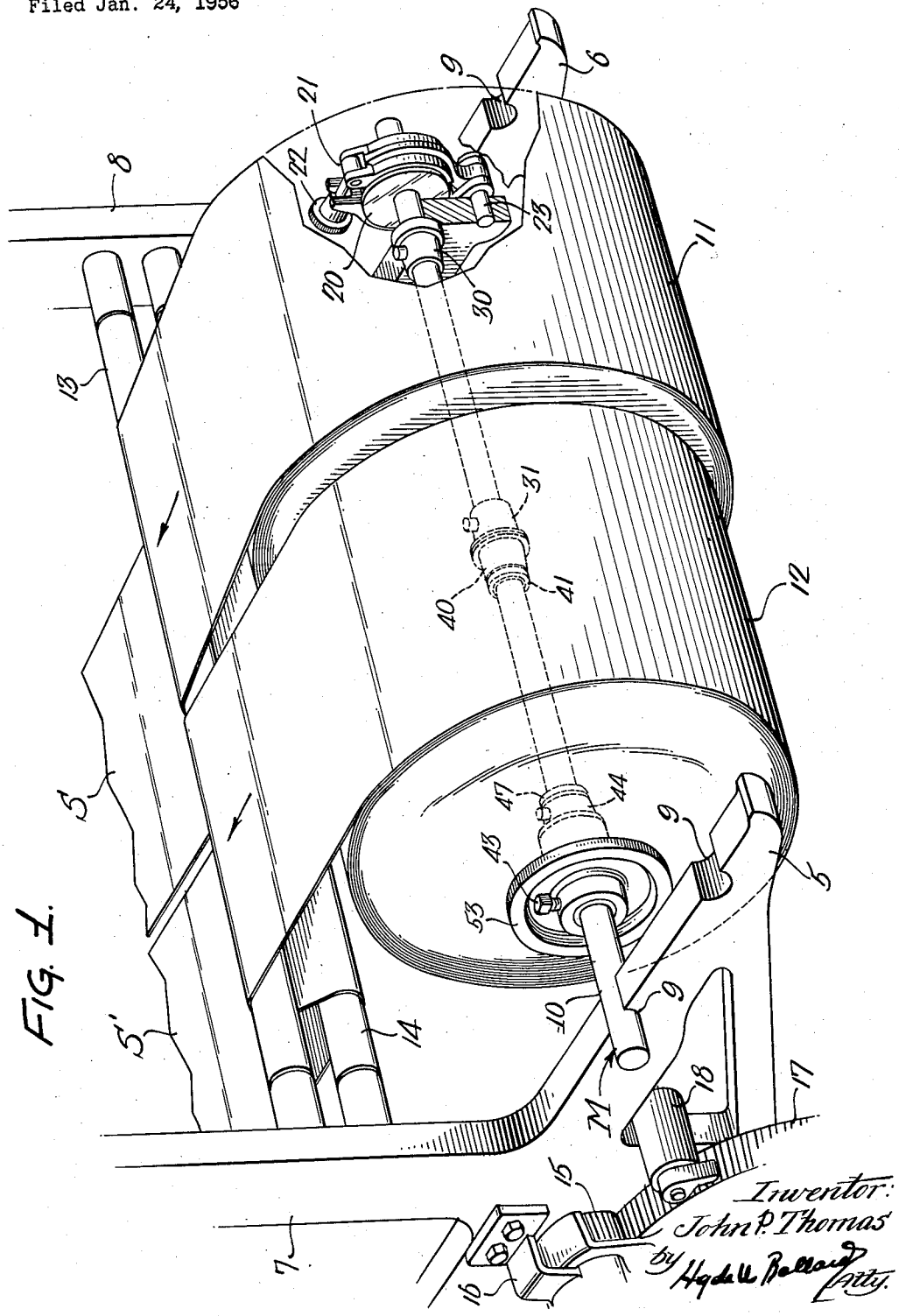


FIG. 1.

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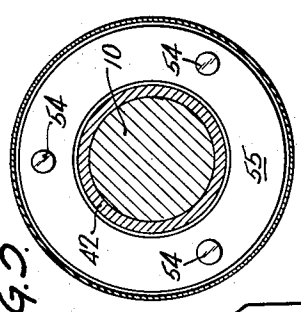


FIG. 3.

FIG. 2.

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DOUBLE ROLL MANDREL

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1 Claim. (Cl. 242—75.4)

This invention relates to roll support mandrels and more particularly to a printing press feed roll mandrel equipped to support two narrow rolls of paper without overrunning.

In recent times, publishers of papers having smaller circulation have encountered considerable inconvenience and annoyance because the suppliers of the newspaper stock require that the newspaper publisher accept a certain number of "narrow rolls." These rolls can be used to make single fill-in sheets for the paper, but the supply of the narrow 17-inch rolls far exceeds their need, with the result that the publisher is over-stocked on 17-inch rolls or he is unable to obtain the necessary supply of the wide 34-inch rolls. In times of newsprint scarcity, this creates a most serious condition for a publisher who cannot use all of the 17-inch rolls which he is required to take. This not only presents a cost burden, but also is a source of considerable annoyance from a storage standpoint. However, in accordance with the present invention, it has been found that if two of the narrow 17-inch rolls can be fed to the press simultaneously, it is possible to avoid some of the above objections.

The customary mandrel on which the 34-inch stock of newsprint is mounted is supplied with a friction brake to prevent overrunning. This mandrel is equipped, however, to handle only the wide rolls. The present invention provides an improved mandrel on which two narrow 17-inch rolls of newsprint may be mounted for feeding simultaneously into a printing press in such a way that the feed from each roll is equalized. With the use of the invention, it is possible to print a multi-page newspaper in which only the outside sheet is double width and all of the inserts or inner-sheets are single width. Publishers are thus enabled to control the ratio of single width and double width rolls to their best advantage. Obviously, the revolutions of the mandrel with which the newsprint feeds off the roll depends upon the diameter of the roll, so that unless the diameter of the two rolls is exactly the same there will be excessive tension or overrunning in one of the webs when the other is fed to the press at a constant linear speed. Rolls of newsprint are invoiced to the customer by weight rather than by linear feet in each roll. Neither of these items is necessarily proportional to diameter so that it is a practical impossibility to feed two rolls side by side from the same non-compensating mandrel and obtain the exact linear feed from each roll to the press.

A primary object of the present invention therefore, is to provide a self-compensating mandrel on which two rolls of sheet material such as newsprint or the like can be mounted to feed simultaneously at constant and identical peripheral speeds.

A further object of the invention is to provide a dual mandrel for rolls of newsprint and the like, in which the supports for one roll are secured to the mandrel and the supports for the other roll are frictionally mounted on the mandrel to prevent overrunning.

A further object of the invention is to provide a multiple mandrel assembly for feeding rolls of sheet material in which the smaller of the two rolls in diameter is non-rotatably mounted on the mandrel and the larger of the two rolls is frictionally mounted with respect to the mandrel.

A still further object of the invention is to provide an improved dual mandrel having means for adjusting one of a plurality of roll supports with respect to the center shaft of the mandrel.

Further objects will be apparent from the specification and drawings in which

Figure 1 is a perspective of a part of a printing press showing the operation of an improved mandrel constructed in accordance with the present invention,

Figure 2 is an enlarged elevation partly sectioned, of my improved mandrel, and

Figure 3 is a sectional view as seen at 3—3 of Figure 2.

The invention comprises essentially the provision of a pair of detachable roll supporting collars adapted to be keyed to the core of a roll of sheet material such as newsprint, and means for locking one of the collars to a central shaft which comprises the mandrel proper. An additional pair of collars is mounted axially on the shaft, one of such collars being free to turn with respect to the shaft and the other one having means for frictionally connecting it to the shaft and means is provided for simultaneously locking the last named collar in the core of a second roll of sheet material. A hand wheel may be used to adjust the frictional engagement between the second roll and the shaft and also to manually limit the speed of the mandrel assembly as may be required.

Referring now more particularly to the drawings, the mandrel assembly M is rotatably supported on a pair of horizontal brackets 5 and 6 which are part of the main printing press side frames 7 and 8. The brackets 5 and 6 are suitably notched at 9 to rotatably support and retain the shaft 10 of the mandrel assembly. The sheets S and S' of web material such as newsprint are drawn by the printing press from the rolls 11 and 12 respectively over an upper spring-loaded roller 13 and under a lower spring-loaded roller 14. Rolls 13 and 14 are adjustably mounted between side frame members 7 and 8 as shown in Figure 1. The printing press or similar apparatus for using the sheet material may be desirably equipped with a hoist mechanism for loading the mandrel and rolls onto brackets 5 and 6. Such mechanism is shown partially in Figure 1 and comprises a pinion 15 journaled in a bracket 16 mounted on side frame 8. A large bull gear 17 is equipped with a latch 18 and operates a drum and cable (not shown) to raise and lower a yoke which can be detachably secured to the mandrel M. Pinion 15 may be connected for rotation to either a handcrank or motor as may be desired. The construction and operation of the hoist are well known in the art and form no part of the present invention. Therefore, further description of this apparatus is believed to be unnecessary.

The right hand end of shaft 10 is equipped with a brake drum 20, to which there is attached a hand brake assembly 21 having a pair of shoes which can be clamped around the drum by means of a hand wheel 22. Either or both

of the brake shoes are non-rotatably secured to the printing press framework or to the bracket 6 as shown at 23. In this way, there is an adjustable but constant frictional force applied to the shaft 10 to retard and prevent overrunning of the shaft as the paper sheets S and S' are unwound from rolls 11 and 12.

Referring now to Figure 2, the roll 11 is mounted on a pair of collars 30 and 31 which have conical innerfaces to receive the ends of core 32 of this roll. The cores on which rolls of newsprint are supplied to publishers are notched or slotted as shown at 33 and 34 to receive a key or pin 35 in order to prevent relative rotation of the roll with respect to the mandrel and collars 30 and 31. In the case of roll 11, the collar 30 is clamped or detachably secured to shaft 10 by means of a brass headed set-screw 36. Collar 31 is non-rotatably secured to shaft 10 as by welding or a shrink fit. When it is necessary to replace the roll 11, collar 30 is removed by loosening set-screw 36 whereby the empty core 32 can be readily slipped off of the collar 31 and the shaft and a new full roll installed. It will thus be seen that this mounting for roll 11 permits no relative rotation between the roll and shaft 10.

Roll 12 on the other hand is permitted to have limited and controlled relative rotation with respect to roll 11 and the shaft 10. To this effect the opposite face of collar 31 is provided with a tapered insert or bushing 40 which is retained on the collar by means of a ring 41 welded or pressed onto the collar. Bushing 40 is free to turn with respect to the collar and has limited clearance between the ring 41 to provide a slight amount of end play. An elongated detachable sleeve 42 is secured to the opposite portion of shaft 10 by means of a brass headed set-screw 43 so that there is no relative rotation between the collar 42 and the shaft. The inner end of sleeve 42 carries a tapered flanged bushing 44 having a pin or key 45 secured thereon. Bushing 44 is free to turn on the sleeve 42 and is retained on the collar between shoulder 46 and fixed ring 47 with slight end play. Ring 47 is welded or otherwise securely fastened to bushing 42 since this ring carries the major portion of the thrust incident to the slip adjustment to be described more fully hereinafter. Bushings 40 and 44 support core 48 of roll 12 and the pin 45 seats in slot or keyway 49 of the core to prevent turning of the core and roll on bushing 44.

Referring to Figure 1, it will be understood that if the rolls 11 and 12 are of exactly the same diameter, the peripheral speeds of sheets S and S' will of course be exactly the same and therefore there will be no necessity for relative rotation between either of the rolls and the mandrel. However, this condition as a practical matter never occurs. The larger of the two rolls should be keyed directly to the shaft 10 so that roll 11 in Figure 1 is of slightly larger diameter than roll 12. The constant pull on sheet S therefore tends to turn roll 11 and the mandrel at a given r.p.m. which may be indicated as x. The diameter of roll 12 then being smaller than that of roll 11 requires that the smaller diameter roll 12 turn at a faster speed which may be represented as x plus y. In order to maintain equal peripheral feed of sheets S and S' the provision of a friction clutch between the core of roll 12 and the mandrel permits the roll 12 or the smaller of the two rolls to turn at a higher angular velocity than the larger roll, by means of controlled slip so that there will be no overrunning and the tension in both sheets can be maintained substantially equal.

The outer end of bushing 44 is provided with a friction face flange 50 against which a composition lining of frictional material 51 may be compressed by means of a pressure plate 52 and a hand wheel 53. The lining 51 and pressure plate 52 are free to turn around the outer periphery of shoulder 46. Three pressure pins 54, 54 (Figure 3) are mounted 120 degrees apart and are axially slidable in an aligning collar 55. The hub 56 of hand wheel 53 is internally threaded so that it can be moved axially on the external threads 57 on the outer portion 58 of sleeve 42. A hardened thrust plate 59 is positioned between the outer ends of pressure pins 54 and the hub 56 of hand wheel 53.

In operation the smaller of the two rolls is always mounted on the end of mandrel M which is supplied with the hand wheel and friction element described just above. The entire hand wheel assembly is readily removed from the end of shaft 10 by loosening set-screw 43 whereupon the full roll 12 is slipped over the end of the shaft and the hand wheel assembly put in place with key 45 in slot 49. Shoulder 50 is pressed axially against the end of core 48 to provide a tight fit without substantial end play for the core. Set screw 43 is then tightened to lock the assembly in place.

As the press is started the constant feeding tension for both webs tends to turn shaft 10 at a fixed angular velocity and the pressure of brake elements 22 and 23 controls the tension in sheet S. The same linear feeding speed is of course applied to sheet S' but since it is feeding from a smaller diameter roll 12 the rotational velocity of the smaller roll must be greater than the rotational velocity of the larger roll 12 in order to provide the same linear speed of sheet travel in both sheets. This increased rotational velocity causes the sleeves 40 and 44 to overrun slightly with regard to shaft 10. The tension in sheet S' is therefore dependent upon the thrust or braking pressure applied between the brake element 51 and the flanged brake surface 50. As the rolls become unwound, it may be desirable to increase the braking pressure applied to sleeve 44 to maintain the desired tension in sheet S'. This can be readily accomplished by the operator while the press is running simply by giving hand wheel 53 a partial turn in the direction necessary to increase the braking pressure. Whether or not the operator turns hand wheel 53 against the direction of rotation depends upon whether or not threads 57 are right or left hand.

The invention has been described primarily with use in conjunction with a printing press having at least one mandrel assembly adapted to hold the full size rolls of newsprint which are approximately 34 inches in width. It will be apparent that the invention is equally applicable to other machines in which it is desired to have relative rotation between rolls being fed from a single shaft. Furthermore, it is possible to supply both sides of the shaft with friction clutches. In this way it is not necessary to be concerned on which end of the mandrel the larger roll may be mounted. It is only necessary to be certain that the larger roll is keyed or locked to the shaft because if the smaller roll is keyed to the shaft, the larger one would feed off at a faster peripheral speed and therefore there would be no tension on the feed from the larger roll.

The invention is comparatively simple to manufacture and permits publishers of newspapers to use the narrow rolls of newsprint as may be required by the circumstances of any particular edition. This has not heretofore been possible.

Having thus described my invention, I claim:

A differential mandrel assembly for printing presses comprising a horizontal shaft, support means on which said shaft is journaled, a frictional brake operatively connected between the support means and the shaft, a pair of oppositely facing conical roll supports adjacent one end of the shaft, means for detachably and non-rotatably mounting one of said supports to the shaft, a key on one of said supports for engaging the core of a roll of sheet material mounted across said supports whereby there is no relative rotation between the shaft and said roll, a tapered bushing rotatably mounted on one of said supports and positioned to support one end of a core of a second roll of sheet material, a sleeve

detachably and non-rotatably mounted on the shaft adjacent the other end of the core of said second roll of sheet material, a second tapered support rotatably journaled on said sleeve, a flanged friction face on said last named tapered support, a pressure plate axially spaced from said flanged face, an annular ring of friction material mounted between the pressure plate and the flanged support, means for urging the pressure plate against the friction material, and means for adjusting the pressure applied by said last named means.

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