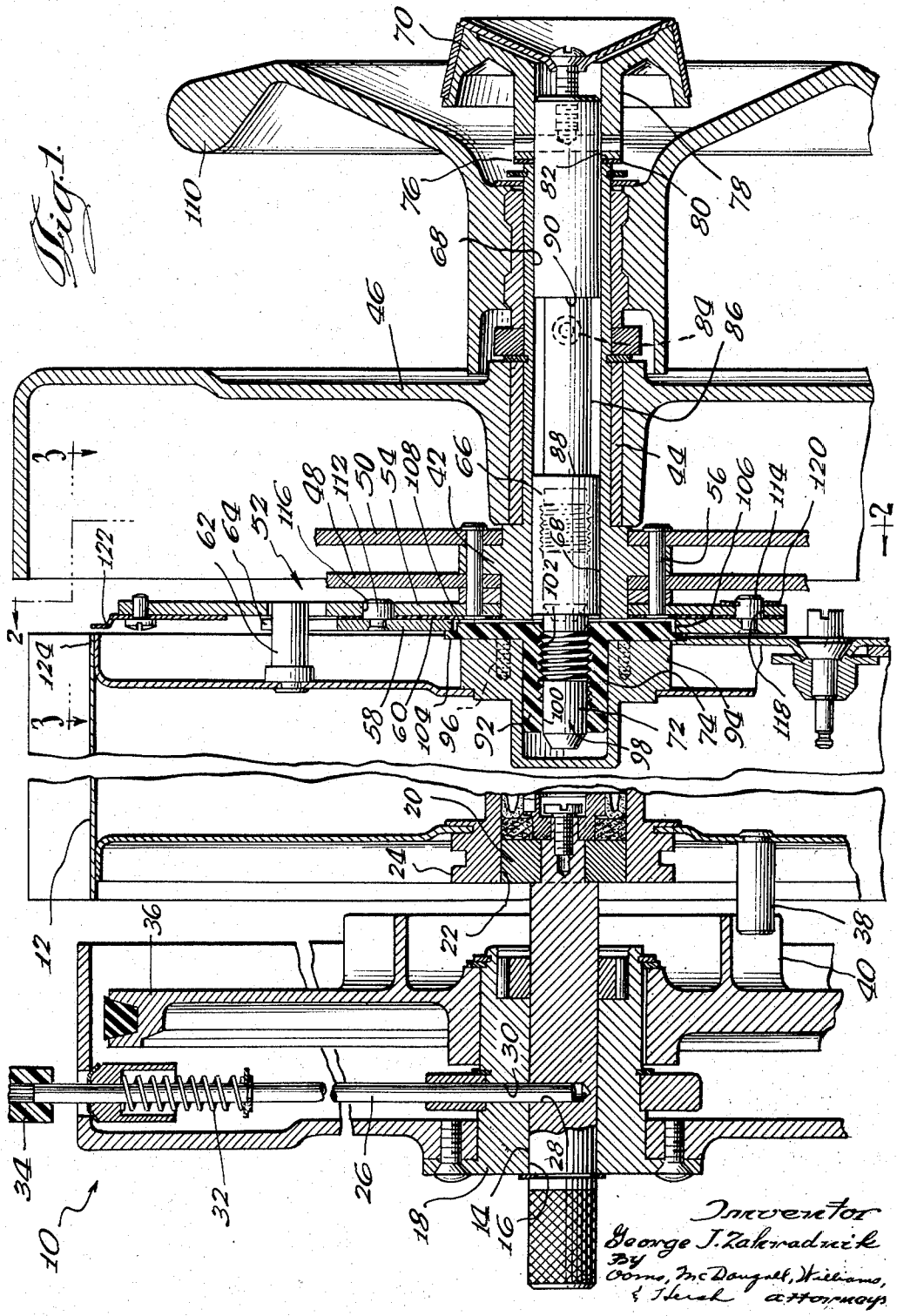
Sept. 22, 1959 G. J. ZAHRADNIK 2,905,086

MECHANISM FOR ADJUSTING HEAD REGISTRATION IN A PRINTING MACHINE

Filed Sept. 16, 1957 2 Sheets-Sheet 1

Fig. 1.



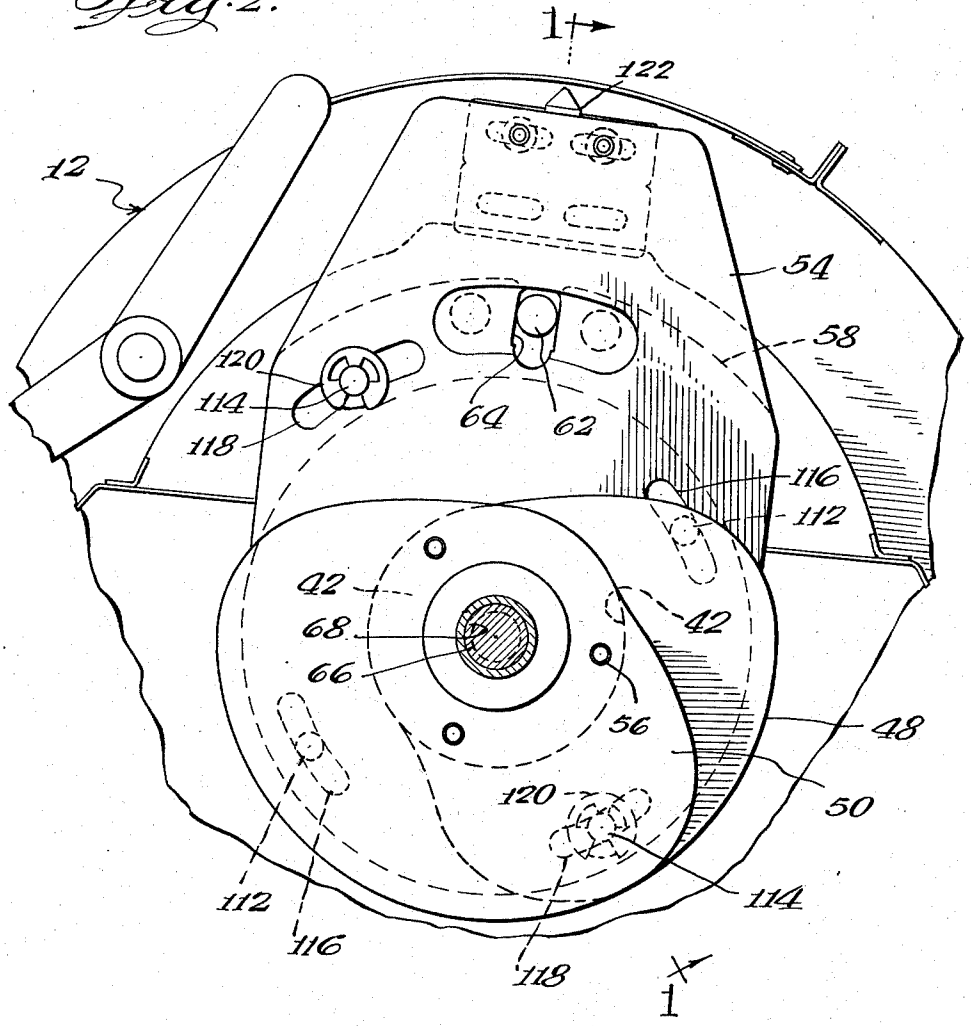
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MECHANISM FOR ADJUSTING HEAD REGISTRATION IN A PRINTING MACHINE

Filed Sept. 16, 1957 2 Sheets-Sheet 2

Fig. 2.



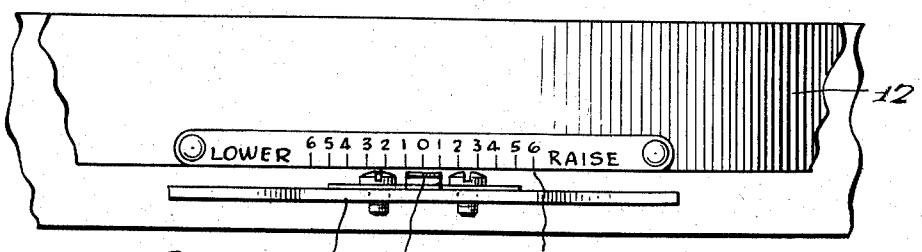


Fig. 3.

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United States Patent Office 2,905,086 Patented Sept. 22, 1959

2,905,086

MECHANISM FOR ADJUSTING HEAD REGISTRATION IN A PRINTING MACHINE

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Application September 16, 1957, Serial No. 684,331

4 Claims. (Cl. 101—248)

This invention relates to duplicators or other printing machines and pertains particularly to means whereby the position of the printed matter may be adjusted relative to the heads of the copy sheets.

One object of the present invention is to provide a new and improved mechanism for adjusting the angular position of a printing cylinder relative to its supporting shaft, so as to change the position of the printed matter with respect to the heads of the copy sheets.

A further object is to provide a new and improved registration adjusting mechanism which is arranged so as to make it easier to disconnect and remove the cylinder from its supporting shaft.

Another object is to provide a new and improved mechanism whereby the position of the cylinder may be adjusted with speed and facility, and whereby the cylinder may be securely locked in its adjusted position.

It is a further object to provide a registration adjustment mechanism which is easy to manufacture and low in cost.

Further objects and advantages of the present invention will appear from the following description, taken with the accompanying drawings, in which:

Fig. 1 is a fragmentary longitudinal sectional view taken through the printing cylinder of a duplicator or the like to show a registration adjusting mechanism that will be described as an illustrative embodiment of the present invention, a view being taken generally along a line 1—1 in Fig. 2.

Fig. 2 is a fragmentary transverse sectional view taken generally along along a line 2—2 in Fig. 1.

Fig. 3 is a plan view taken generally as indicated by the line 3—3 of Fig. 1.

It will be seen that the drawings illustrate portions of a printing machine 10, which may be a stencil type duplicator or any other suitable type of duplicator. The illustrated duplicator 10 comprises a printing cylinder or drum 12, adapted to support a stencil or any other type of printing master or plate (not shown). As will be seen, the printing cylinder 12 is adapted to be rotated to perform the desired printing operations, and is arranged so that it may readily be removed from and replaced on the printing machine 10. In this way, various drums may be interchanged to change the color of the ink being used in the printing operation, or for any other purpose.

Thus, the left-hand end of printing cylinder 12, as shown in Fig. 1, is adapted to be supported by a pilot shaft or trunnion 14 which is slidably received in a bore 16 formed in a stationary supporting member 18. A ring-shaped bearing or bushing 20 is rotatably mounted on the right-hand or inner end of the shaft 14 and is adapted to be received in a bore 22 formed in a hub 24 which is secured to the left-hand end of printing cylinder 12. The shaft 14 may be slid to the left to withdraw the bushing 20 from the hub 24 when the cylinder 12 is to be disconnected from the duplicator 10. Normally, however, the shaft 14 is locked in its operating position by a pin 26 which is adapted to be received in a radially

extending opening 28 formed in the shaft 14. The pin 26 is movable through an opening 30 formed in the stationary supporting member 18 and is normally urged in the direction of the shaft 14 by a spring 32. A knob or handle 34 is mounted on the outer end of the pin 30 so that it may readily be withdrawn from the opening 28 in the shaft 14.

Various means may be employed for establishing a rotary driving connection to the cylinder 12. In the illustrated construction, a drive pulley 36 is rotatably mounted on the outside of the stationary supporting member 18. A disengageable pin-and-slot driving connection is provided between the pulley 36 and the cylinder 12. As shown, the left-hand end of the cylinder 12 is fitted with a longitudinally extending pin 38 which is adapted to be received in a slot 40 formed in the pulley 36. The slot 40 opens both radially in an outward direction and endwise toward the cylinder 12, so that the pin 38 may readily be disengaged from the slot when the bearing 20 has been withdrawn from the hub 24.

The opposite, or right-hand end of cylinder 12, as shown in Fig. 1, is adapted to be connected to and supported by a hollow shaft 42, which, in turn, is rotatably supported by a sleeve bearing 44 mounted in a frame plate or other stationary support 46. The shaft 42 is adapted to operate the feed mechanism which feeds copy sheets to the printing cylinder 12. Various feed mechanisms are well known and the present feed mechanism need not be shown or described in detail. It will suffice to note that the feed mechanism comprises a pair of operating cams 48 and 50 which are secured to the hollow shaft 42. The cams 48 and 50 operate various instrumentalities (not shown) which bring about the feeding of the copy sheets to the printing cylinder 12.

Normally the hollow shaft 42 rotates with the printing cylinder 12, by virtue of a frictional clutch 52 adapted to be connected therebetween. As will be seen, the frictional clutch 52 is arranged so that the angular position of the cylinder 12 may be adjusted with respect to the shaft 42, so as to change the position of the printed matter with respect to the head of each copy sheet.

The illustrated clutch 52 comprises a first or outer clutch plate 54 which is permanently secured to the hollow shaft 42 as by a plurality of rivets 56. A second or inner clutch plate 58 is provided adjacent and parallel to the first clutch plate 54. While the clutch plates 54 and 58 might be arranged to bear directly against each other in frictional engagement, it is preferred to provide one or more thin linings or facings 60 of frictional material between the clutch plates. The frictional material is made softer than the metal of the clutch plates 54 and 58 so that relatively modest pressure between the plates will provide a firm frictional connection, and so that any wearing in the clutch will be on the frictional material and not on the clutch plates.

In this case, a disengageable pin-and-slot connection is provided between the cylinder 12 and the second clutch plate 58. Thus, the right-hand end of cylinder 12 is fitted with a longitudinally projecting pin 62 which is adapted to be received in a slot or opening 64 formed in the plate 58. From Fig. 2 it will be seen that the slot 64 opens radially so that the pin 62 may readily be withdrawn from the slot when the cylinder 12 is to be removed from the duplicator 10.

A screw member or rod 66 is employed to draw the cylinder 12 against the clutch plate 58 and thereby apply clamping pressure between the clutch plates 54 and 58. It will be seen that the rod 66 is slidably and rotatably received within the hollow shaft 42, the shaft 42 being formed with an axial bore 68 to receive the rod. A knob 70 or the like is secured to the outer end of the rod 66 to provide for manual rotation thereof. At its inner

end, the rod 66 has a reduced, cylindrical pilot portion 72, with a threaded portion 74 adjacent thereto. The rod 66 is adapted to be slid longitudinally through the bore 68 but the inward sliding movement is limited by engagement of the knob 70 with the end of the shaft 42, the washer 76 actually being interposed between the knob and the shaft. More specifically, the knob 70 has a hub portion 78 which is formed with an end face or shoulder 80. The shaft 42 has an end surface or shoulder 82. It will be seen that the washer 76 is interposed between the shoulders 80 and 82 and is adapted to be engaged on its opposite sides by the shoulders.

Outward sliding movement of the rod 66 may be limited by a suitable stop 84 projecting into the bore 68 along a reduced portion 86 of the rod 66. Shoulders 88 and 90 are formed on the rod 66 at the opposite ends of the reduced portion 86. The outward movement of the rod 66 is limited by the engagement of the shoulder 88 with the stop 84.

In order to receive the screw member of the rod 66, the cylinder 12 is fitted with an axial bushing 92, which may be mounted in a hub 94 secured to the right-hand end of the cylinder 12. Screws 96 or the like may be employed to secure the bushing 92 to the hub 94. It will be seen that the bushing has a bore 98 with a cylindrical left-hand or inner portion 100 for receiving the pilot end portion 72 of the screw member 66. Adjacent to cylindrical portion 100, the bore 98 has an internally threaded portion 102 adapted to receive the threaded portion 74 of the rod 66. Thus, the pilot portion 72 of the rod 66 may be inserted into the bore 100 to center the cylinder 12 with respect to the shaft 42, and then the threaded portion 74 may be screwed into the threaded bore 102 to draw the cylinder endwise toward the shaft 42. The bushing 92 may be made of plastic or any other suitable material. A plastic such as nylon has the advantage of being strong and wear resistant while affording low friction without any lubrication.

As already indicated, the cylinder 12 has a member which is adapted to be drawn against the second clutch plate 58. In this case, such member takes the form of a radial flange 104 formed on the outer end of bushing 92. The flange 104 is adapted to engage the clutch plate 58 on the side thereof opposite from the clutch plate 54. In this case, the clutch plate 58 has an axial opening 105, and the flange 104 is formed with a reduced portion 108 which fits within the opening 106, to aid in centering the cylinder 12 relative to the shaft 42.

When the screw member of the rod 66 is screwed into the bushing 92 and tightened, the flange 104 is drawn against the clutch plate 58 and pressure is applied between the clutch plates 54 and 58. The clutch plates 54 and 58 are thus frictionally secured together, so that the shaft 42 will rotate with the cylinder 12 in fixed relation thereto. When the rod 66 is loosened or unscrewed slightly out of the bushing 92, the clamping pressure is relieved, and the cylinder 12 can be rotated through a limited angle relative to the shaft 42. A handwheel 110 is secured to shaft 42 so that the operator may easily effect relative rotation between the shaft 42 and the cylinder 12. It will be noted that the operating knob 70 for the rod 66 is arranged coaxially with respect to the handwheel 110.

The range of relative angular adjustment between the clutch plates 54 and 58 is limited by 2 pairs of pins 112 and 114 which are shown as being fixed to the clutch plate 58 and extending through arcuate slots 116 and 118 in the clutch plate 54. The two pins 114 are arranged diametrically opposite each other and are fitted with spring retaining washers or clips 120 which hold the clutch plates 54 and 58 together with light pressure therebetween, even when the screw member 66 is loosened.

In order to indicate the position of the cylinder 12, the clutch plate 54 may be fitted with a pointer 122 adapted to cooperate with a scale 124 on the cylinder 12. Marks or other indicia may be provided on the scale 124 to indicate the extent to which the print will be raised or lowered by movement of the pointer relative to the cylinder. It will be apparent that the registration may readily be adjusted by rotating the knob 70 so as to loosen the screw member 66 and relieve the clamping pressure between the clutch plates 54 and 58. The handwheel 110 may then be rotated while the cylinder 12 is held stationary. This will change the relative angular positioning of the cylinder 12 and the shaft 42. The shaft 42 may be locked to the cylinder 12 by rotating the knob 70 so as to tighten the screw member 66. This will draw the cylinder against the clutch plate 58 so as to apply clamping pressure between the clutch plates 54 and 58.

The cylinder 12 may readily be removed by unscrewing the screw member 66 until it can be withdrawn from the bushing 92. The pin 34 is then pulled outwardly so that the trunnion shaft 14 may be withdrawn from the hub 24 on the other end of the cylinder. The cylinder may then be lifted free of the duplicator 10. In withdrawing the cylinder, the pins 38 and 62 are readily disengaged from the slots 40 and 64, and the projecting portion 108 of the bushing 92 is easily withdrawn from the opening 106 in the clutch plate 58. It will be apparent that the cylinder 12 may be readily remounted on the duplicator 10 by a reversal of these operations.

The registration adjusting mechanism may be operated with convenience and speed. When the adjustment has been made, the cylinder and the shaft may be securely locked together to maintain the adjustment. The mechanism may be easily manufactured at low cost.

Various modifications, alternative constructions and equivalents may be employed without departing from the true spirit and scope of the invention, as exemplified in the foregoing description and defined in the following claims.

I claim:

1. In a printing machine, the combination comprising a printing cylinder, a hollow shaft adapted to be adjustably connected to one end of said cylinder, means operable by said shaft for feeding sheets to said cylinder in timed relation to the rotation thereof, a first clutch plate secured to said shaft, a second clutch plate adjacent said first clutch plate and connected thereto for rotation through a limited angle with respect thereto, friction material interposed between said clutch plates, a disengageable pin-and-slot connection between said cylinder and said second clutch plate to secure said second clutch plate to said cylinder for rotation therewith, a generally cylindrical rod slidably received within said hollow shaft and having an outer end member thereon for manually rotating and sliding said rod, said rod having a cylindrical inner pilot end portion, with a threaded portion adjacent thereto, said cylinder having an axial bushing therein with a bore having a cylindrical portion for receiving said pilot end portion, said bore having an internally threaded portion for receiving said threaded portion of said rod, interengageable shoulders on said rod and said hollow shaft for limiting movement of said rod into said bushing, a member on said cylinder for engaging said second clutch plate on the opposite side thereof from said first clutch plate, said second clutch plate having an axial opening therein, said member having a portion for projecting into said opening for centering said cylinder relative to said hollow shaft, said rod being adapted to be screwed into said bushing to apply clamping pressure between said first and second clutch plates and thereby frictionally secure said cylinder to said shaft for rotation therewith, said rod being adapted to be loosened to provide for adjustment of the position of said cylinder relative to said hollow shaft.

2. In a printing machine the combination comprising a printing cylinder having an axial bushing in one end thereof, a hollow shaft adapted to be secured to said

cylinder adjacent said bushing, a first clutch plate secured to said shaft, a second clutch plate adjacent said first clutch plate with friction material therebetween, said second clutch plate having a slot therein, a pin on said cylinder for reception in said slot to disengageably connect said cylinder to said second clutch plate for rotation therewith, said second clutch plate having an axial opening therein, said bushing having a flange for engaging said second clutch plate around said opening and on the opposite side of said second clutch plate from said first clutch plate, said flange having a reduced portion projecting into said opening for centering said cylinder with respect to said shaft, a rod rotatably and slidably received within said hollow shaft and having a cylindrical inner pilot end portion with a threaded portion adjacent thereto, said bushing having a bore therein and an inner cylindrical portion for receiving said pilot end portion, said bore having an outer internally threaded portion for receiving said threaded portion of said rod, interengageable means on said rod and said shaft for limiting movement of said rod into said bushing, and a knob on the outer end of said rod for manually screwing said rod into said bushing to draw said flange against said second clutch plate and thereby apply clamping pressure between said clutch plates for adjustably securing said cylinder to said shaft for rotation therewith.

3. In a printing machine, the combination comprising a printing cylinder, a hollow shaft adapted to be adjustably connected to one end of said cylinder, a first clutch plate secured to said shaft, a second clutch plate adjacent said first clutch plate and frictionally engageable therewith, a disengageable connection between said cylinder and said second clutch plate to connect said second clutch plate to said cylinder for rotation therewith, a rod slidably received within said hollow shaft and having an outer end member thereon for manually rotating and sliding said rod, said rod having a threaded portion thereon, said cylinder having an internally threaded bore for receiving said threaded portion of said rod, interengageable means on said rod and said hollow shaft for limiting movement of said rod into said bore, a member on said cylinder for

engaging said second clutch plate on the opposite side thereof from said first clutch plate, said second clutch plate having an axial opening therein, said member having a portion for projecting into said opening for centering said cylinder relative to said hollow shaft, said rod being adapted to be screwed into said bore to apply clamping pressure between said first and second clutch plates and thereby frictionally secure said cylinder to said shaft for rotation therewith, said rod being adapted to be loosened to provide for adjustment of the position of said cylinder relative to said hollow shaft.

4. In a printing machine, the combination comprising a printing cylinder, a hollow shaft adapted to be adjustably connected to one end of said cylinder, a first clutch plate secured to said shaft, a second clutch plate adjacent said first clutch plate and frictionally engageable therewith, a disengageable connection between said cylinder and said second clutch plate to connect said second clutch plate to said cylinder for rotation therewith, a rod slidably received within said hollow shaft and having an outer end member thereon for manually rotating and sliding said rod, said rod having a threaded portion thereon, said cylinder having an internally threaded bore for receiving said threaded portion of said rod, interengageable means on said rod and said hollow shaft for limiting movement of said rod into said bore, a member on said cylinder for engaging said second clutch plate on the opposite side thereof from said first clutch plate, said rod being adapted to be screwed into said bore to apply clamping pressure between said first and second clutch plates and thereby frictionally secure said cylinder to said shaft for rotation therewith, said rod being adapted to be loosened to provide for adjustment of the position of said cylinder relative to said hollow shaft.

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