

Jan. 5, 1937.

A. MARCHEV

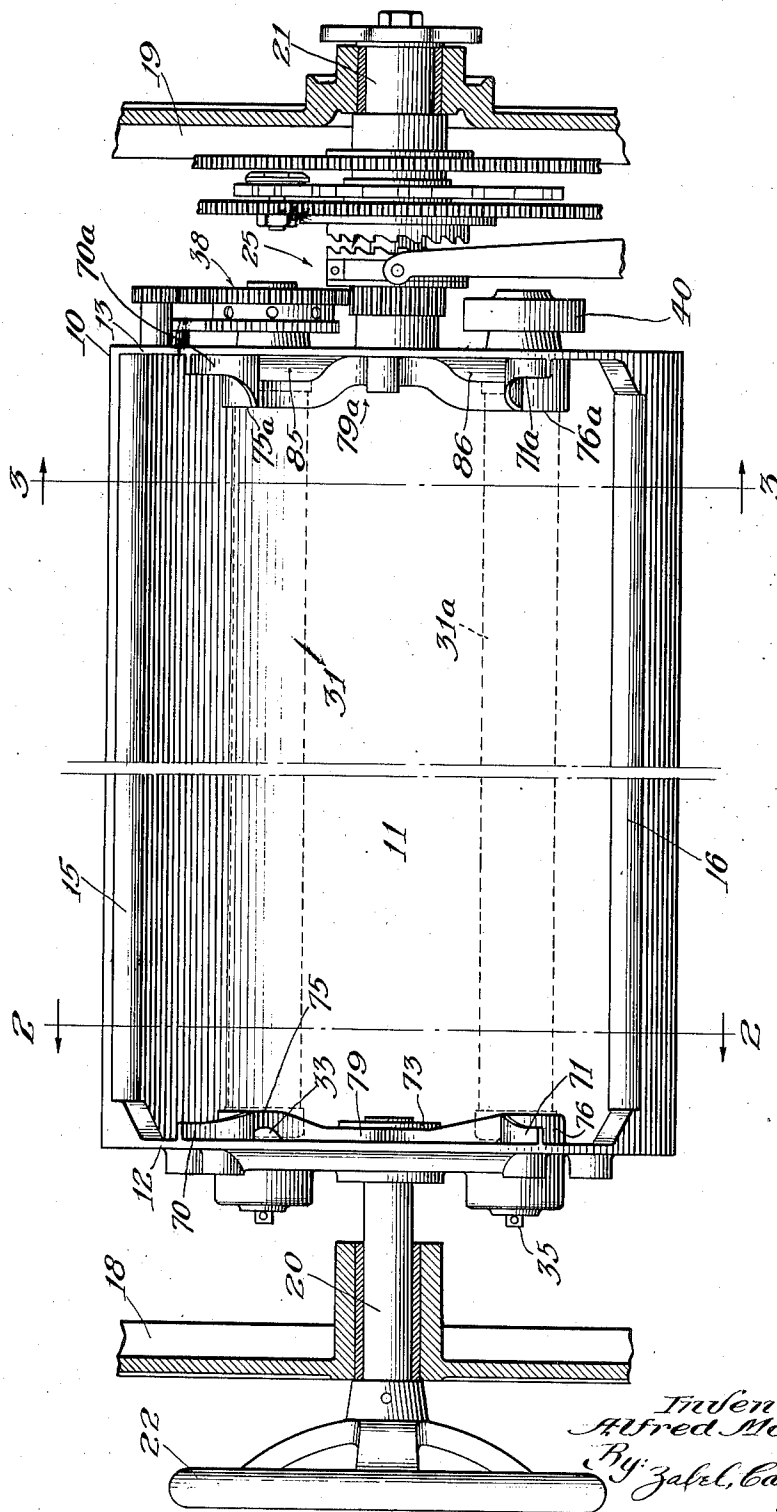
2,066,637

SPINDLE AND MEANS FOR HOLDING SAME

Filed July 26, 1935

4 Sheets-Sheet 1

Fig. 1.



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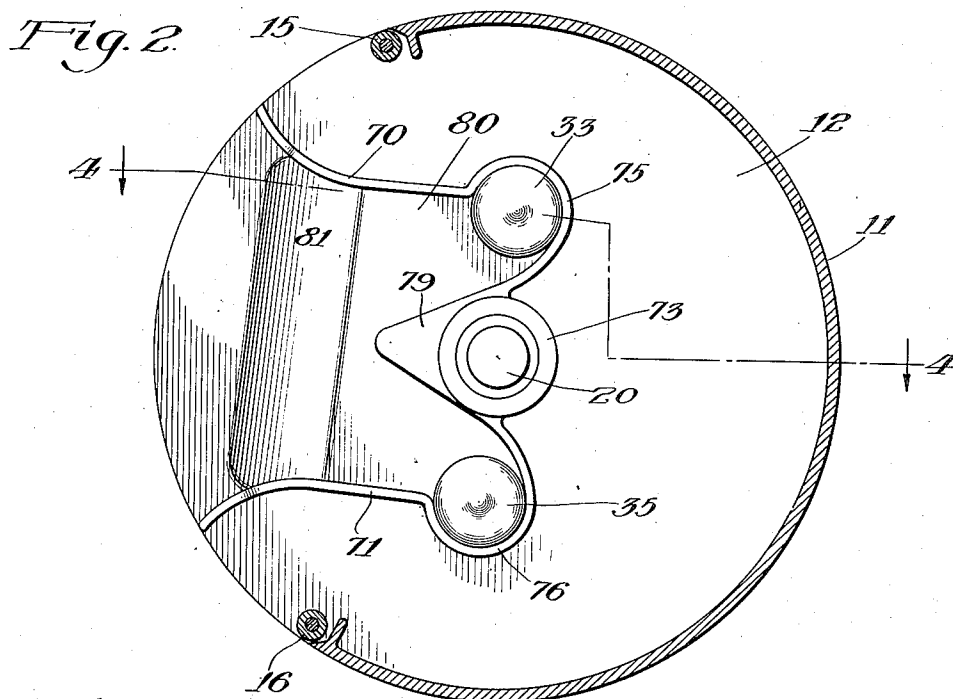
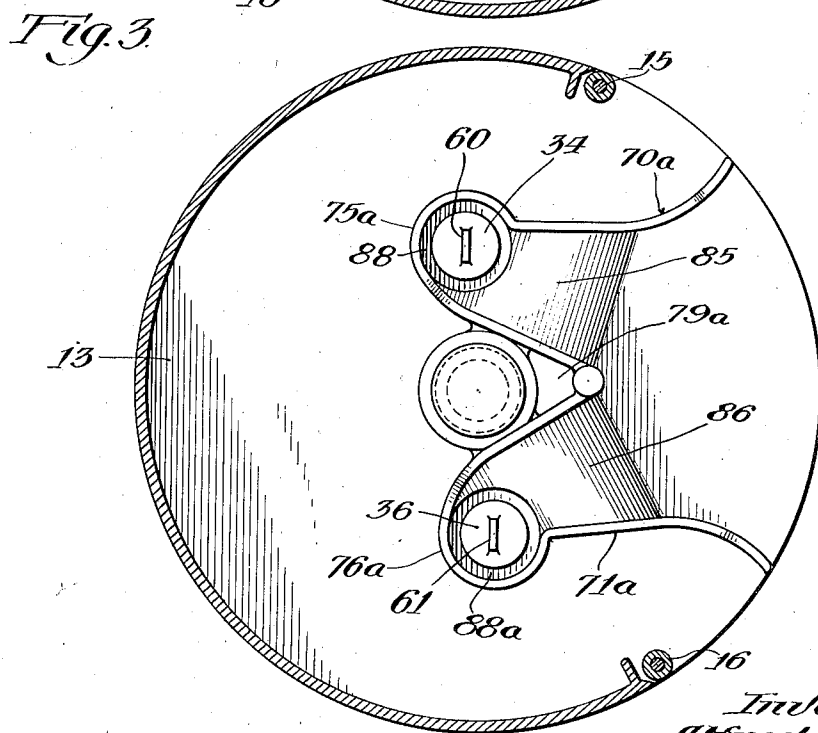
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4 Sheets-Sheet 2



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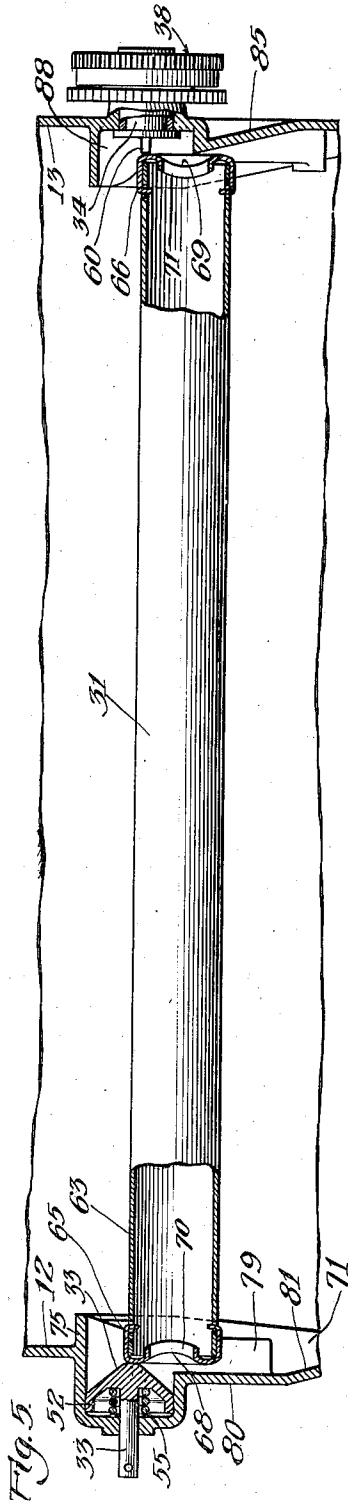
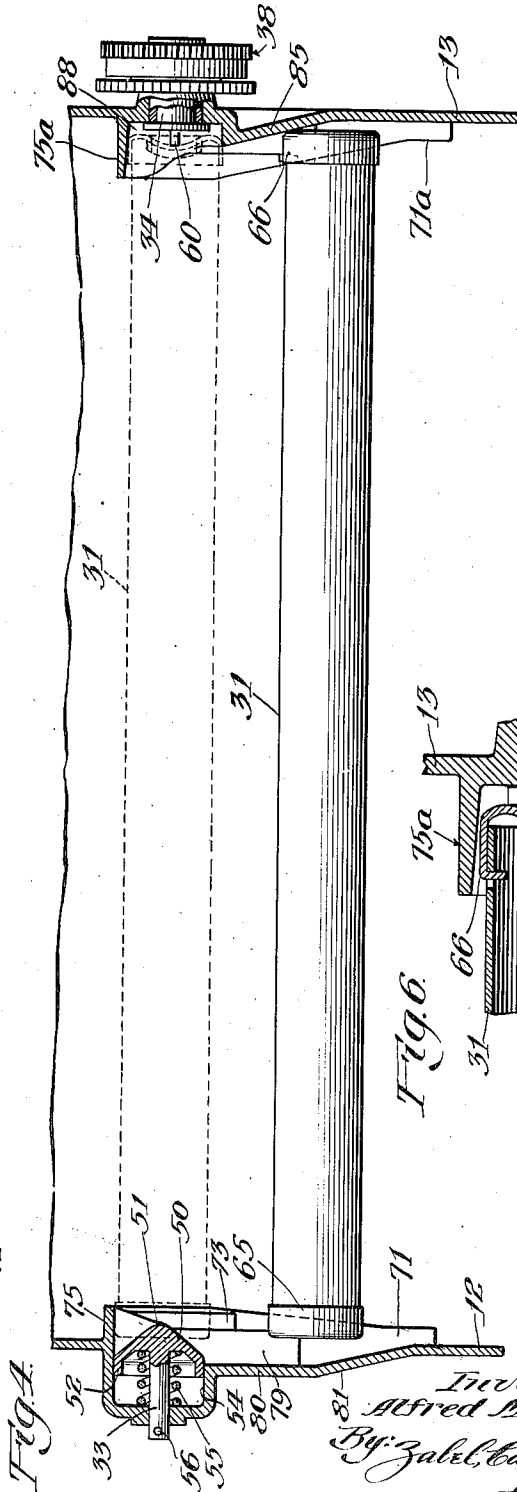
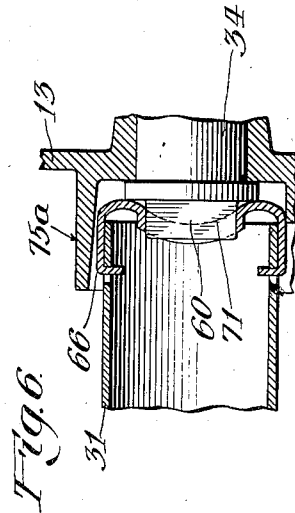
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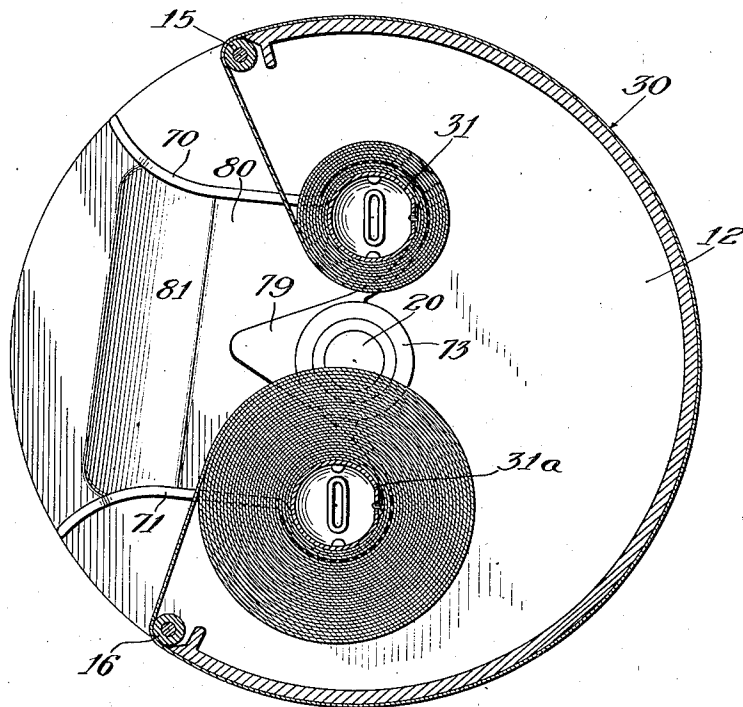
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4 Sheets-Sheet 4

Fig. 7



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UNITED STATES PATENT OFFICE

2,066,637

SPINDLE AND MEANS FOR HOLDING SAME

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Application July 26, 1935, Serial No. 33,360

6 Claims. (Cl. 242—68)

The invention relates to spindles and means for holding the same and is particularly adapted to be embodied in duplicating machines of the type shown and described in the co-pending application Serial No. 713,590 filed March 1, 1934 by Hernlund et al., now Patent 2,034,903 dated March 24, 1936 but the invention is limited to such use only to the extent indicated in the appended claims.

In the accompanying drawings, the invention has been illustrated as it is embodied in a duplicating machine of the type illustrated in the co-pending application Serial No. 713,590. Duplicating machines of this type comprise a duplicating drum on which a hectograph band is provided. The drum comprises means for detachably journaling two spindles to which the ends of the hectograph band are detachably secured. Means is provided whereby the duplicating band may be unwound from one of the spindles and rewound upon the other so that the band may be advanced step by step to provide fresh duplicating surfaces as required. When a fresh hectograph band is to be loaded in the duplicating drum, it is first loaded or wound around one of the spindles and the loaded spindle is introduced into the drum and disposed between the journaling means. The loaded spindles are relatively heavy. The present invention contemplates improved means for handling the wound hectograph band so that the operator may introduce a loaded spindle into the duplicating drum with little effort.

Some features of the present invention are improvements upon the construction shown in U. S. Letters Patent 2,009,972 granted July 30, 1935 to Marchev et al. In each instance, the spindles are similar in appearance and construction but the lengths of the spindles are different so that they will co-operate with the improved means for journaling them and for bringing them into alinement with the journaling means. In the present instance, the spindles may be introduced into the duplicating drum by moving them with their longitudinal axes parallel to the axes of the journaling means. In U. S. Letters Patent 2,009,972 it was contemplated that the spindles would be handled in such manner that one end of a spindle would be alined with means for journaling it before the other end of the spindle would be brought into alinement with the means for journaling it. Both constructions have their advantages, but the present invention is particularly advantageous when it is embodied in duplicating machines of the rotary type.

Other advantages and objects will become apparent as the following detailed description progresses, reference being had to the accompanying drawings, wherein—

Fig. 1 is a fragmentary section taken through a duplicating machine which embodies the invention, a duplicating drum forming part of the machine being shown in elevation.

Fig. 2 is a section taken on line 2—2 of Fig. 1.

Fig. 3 is a section taken on line 3—3 of Fig. 1.

Fig. 4 is a fragmentary section taken on line 4—4 of Fig. 2, a spindle being shown in connection with the apparatus.

Fig. 5 is a section taken on the same line as Fig. 4 but showing the spindle in a changed position.

Fig. 6 is a fragmentary section taken on the same line as Fig. 4 but showing the spindle in still another changed position, and

Fig. 7 is a fragmentary section taken on the same line as Fig. 2 but showing the spindles in position in the drum and showing a hectograph band extending between the spindles and over the duplicating surface of the drum.

Referring to the drawings wherein a preferred embodiment of the invention is illustrated, the reference character 10 designates a duplicating drum of a hectograph machine of the type shown in the co-pending application, Serial No. 713,590, the drum 10 being provided with an arcuate platen surface or wall 11 which is preferably formed integral with end walls or discs 12 and 13. At the longitudinally extending edges of the arcuate platen wall 11, rollers 15 and 16 are provided.

The drum 10 is rotatably journaled between side frames 18 and 19 by means including stub shafts 20 and 21, the stub shaft 20 being provided with a hand wheel 22 whereby the drum 10 may be rotated manually. Driving mechanism designated generally by the reference character 25 is provided to drive the duplicating drum and mechanism (not shown) associated with it, the driving mechanism 25 being driven by an electric motor (not shown).

The driving mechanism 25 is of such construction that each time the duplicating drum 10 stops, it stops in the position illustrated in Figs. 1, 2, 3 and 7 so that the interior of the drum is accessible to the operator for the purpose of changing duplicating bands. Also, when the duplicating drum 10 stops in the position illustrated, it is at the end of a cycle of operations and is in position to begin a new cycle of operations.

As illustrated in Fig. 7, a hectograph band 30 is normally associated with the drum and has its ends detachably secured to spindles 31 and 31a, the spindles 31 and 31a being preferably identical in construction with each other and being preferably identical in construction with the spindles illustrated in U. S. Letters Patent 2,009,972. The spindle 31 is detachably mounted between a pin 33 and a stub shaft 34, the spindle 31a being detachably mounted between a pin 35 and a stub shaft 36 (Figs. 2 and 3).

It will be noted that the hectograph band 30 has a few turns around the spindle 31 and that it extends over the roller 15 and the arcuate platen wall 11 to the roller 16 and thence to the spindle 31a which is provided with a relatively large number of turns. This is a condition when a fresh duplicating band 30 has been mounted on the duplicating drum. The driving mechanism 25 includes driving mechanism 38 for rotating the stub shaft 34 and the spindle 31 in a counter-clockwise direction (Fig. 7) so that the hectograph band 30 will be unwound from the spindle 31a, and advanced over the arcuate platen wall 11 and wound upon the spindle 31. The driving means 38 is described in detail in the co-pending application Serial No. 713,590. The driving means 38 is adapted to co-operate with a brake 40 associated with the stub shaft 36 to stretch the hectograph band 30 taut over the arcuate platen 11 when the hectograph band has been advanced the desired distance. The braking mechanism which includes the brake 40 is described in detail in the co-pending application Serial No. 713,590.

The manner in which the spindles 31 and 31a and the hectograph band 30 are mounted on the duplicating drum 10 is explained in detail in the co-pending application Serial No. 713,590. Briefly, a support (not shown) is provided adjacent the drum 10 on the frames 18 and 19 and when a duplicating band 30 is to be mounted on the drum, the spindle 31a with the band 30 wound around it, is positioned in the support. The spindle 31 is positioned between the pin 33 and the stub shaft 34. Then the outer end of the band 30 is attached to the spindle 31 and the spindle 31 is rotated a few times so that a few turns of the band 30 are wound thereon. The drum 10 is then rotated through a complete revolution so that a layer of the band 30 is disposed over the arcuate platen 11. The operator then takes the loaded spindle 31a and inserts it between the pin 35 and the stub shaft 36. The band is then drawn taut over the arcuate platen 11. Whenever it is necessary to provide a fresh duplicating surface, the stub shaft 34 is rotated to drive the spindle 31 so that the desired number of turns of the band 30 will be wound around the spindle 31, the band being withdrawn from the spindle 31a.

As shown in Figs. 2, 3 and 4, the pin 33 is disposed in opposed relation to the stub shaft 34 and the pin 35 is disposed in opposed relation to the stub shaft 36. The pins 33 and 35 are slidably and preferably rotatably journaled in the end plate or disc 12, the stub shafts 34 and 36 being rotatably journaled in the end plate or disc 13. The pins 33 and 35 are preferably identical in construction, the construction of the pin 33 being illustrated in Figs. 4 and 5. It will be noted that the pin 33 comprises a conical head 50 with a rounded end 51, the base of the conical portion 50 being provided with an annular flange 52 slidably journaled in a pocket 54 formed in an end plate or disc 12. A spring 55 disposed around the

pin 33 and interposed between the bottom wall of the pocket 54 and the conical head 50 yieldingly urges the conical head 50 to the right (Figs. 4 and 5). The distance the conical head 50 may be displaced to the right (Figs. 4 and 5) is limited by a pin 56 which extends through the pin 33 and is engageable with the bottom wall of the pocket 54.

It is understood, of course, that the pin 35 is also yieldingly urged in the same direction by a spring (not shown) similar to the spring 55.

The stub shaft 34 is provided at its inner end with a lug or tongue 60 of elongated rectangular cross section. The stub shaft 36 is provided with a lug or tongue 61 which is identical in dimensions with the lug 60.

As best illustrated in Figs. 4, 5 and 6, the spindle 31 comprises a tubular body portion 63 which is preferably formed from sheet metal, the ends of the body portion 63 being closed by cap members 65 and 66 which are also identical in construction. The cap members 65 and 66 are provided with concave depressions 68 and 69 in their ends and at the bottom of these depressions 68 and 69 are elongated rectangular slots 70 and 71, respectively, which are identical in dimensions. The spindle 31 is reversible end for end as far as the pins 33 and 35 and the stub shafts 34 and 36 are concerned, the cap members 65 and 66 being given different reference characters to facilitate the following description of the manner in which the spindle 31 and the spindle 31a are mounted in the duplicating drum 10.

The slots 70 and 71 are adapted to receive the tongues or lugs 60 and 61, the slot 71 being shown in engagement with the lug 60 in Fig. 6. Obviously, the stub shaft 34 is then in driving engagement with the spindle 31 and the left hand end (Fig. 5) of the spindle 31 is journaled upon the conical head 50 of the pin 33.

As best shown in Figs. 1, 2, 4 and 5, the end plate or disc 12 is provided with flanges 70 and 71 which extend from the periphery of the end plate or disc 12 to a boss 73 which has its longitudinal axis coincident with the axis of rotation of the drum 10. Intermediate their ends, the flanges 70 and 71 have arcuate portions 75 and 76, respectively, adapted to receive and partly encircle the cap members 65 of the spindles 31 and 31a, respectively. It is, of course, understood that the spindle 31a has a cap member 65 identical in construction with the cap member 65 shown in connection with the spindle 31. Projecting from the boss 73 between the flanges 70 and 71 is a substantially triangular lug 79 which co-operates with the flanges 70 and 71 to guide the ends of the spindles 31 and 31a into alignment with the pins 33 and 35, respectively.

As best illustrated in Figs. 2 and 4, that portion of the end plate or disc 12 disposed between the lug 79 and the flanges 70 and 71 is depressed with respect to the remainder of the end plate 12, the depressed portion of the end plate 12 being identified by the reference character 80 and being connected to the remaining portion of the end plate by an inclined portion 81. The depressed portion 80 and the inclined portion 81 are preferably formed integral with the remainder of the end plate or disc 12.

The end plate or disc 13 is provided with flanges 70a and 71a which are preferably identical in construction with the flanges 70 and 71 and therefore are provided with arcuate portions 75a and 76a, respectively, adapted to receive the right hand ends of the spindles 31 and 31a (Fig. 4).

The end plate or disc 13 is provided with a substantially triangular lug 79a corresponding to the lug 79 described above and having the same function.

The end plate 13 has two inclined portions 85 and 86. The inclined portion 85 is disposed between the flange 70a and the lug 79a, the inclined portion 86 being disposed between the flange 71a and the lug 79a. As best shown in Figs. 4 and 5, the inclined portion 85 co-operates with the arcuate portion 75a of the flange 70a to form a cylindrical recess 88 into which the lug 60 projects but it will be noted that the inner end of the lug 60 does not project beyond the open end of the cylindrical recess 88 in the preferred embodiment of the invention.

It will be readily understood that the inclined portion 86 co-operates with the arcuate portion 76a of the flange 71a to provide a cylindrical depression 88a into which the tongue 61 projects (Fig. 3).

The inner surfaces of the inclined portions 85 and 86 function as cam surfaces and will be referred to as cam surfaces below.

In Figs. 4, 5 and 6, the preferred manner in which the spindle 31 is inserted between the pin 33 and the stub shaft 34 is illustrated. It will be understood that the spindle 31a is inserted, preferably, between the pin 35 and the stub shaft 36 in the same manner.

In Fig. 4, the spindle 31 is shown in full lines between the end plates or discs 12 and 13 but spaced from the pin 33 and the stub shaft 34. It will be noted that the longitudinal axis of the spindle 31 is parallel to the common axis of the pin 33 and the stub shaft 34. It will be readily understood that as the operator continues to move the spindle 31 towards the pin 33 and the stub shaft 34 while holding the spindle substantially parallel to the common axis of the pin and the stub shaft, the cam surface 85 will guide the spindle 31 into the position wherein it is shown in full lines in Fig. 5 and that during the last part of the movement of the spindle 31 into the position wherein it is shown in Fig. 5, the cap 65 will cam the conical head 50 of the pin 33 to the left (Fig. 5) against the action of the spring 55. It will also be noted that when the spindle 31 is in the position wherein it is shown in Fig. 5, the cap 66 passes over the lug 60. Continued movement of the spindle 31 into alinement with the pin 33 and the stub shaft 34 will permit the conical head 50 of the pin 33 to enter the concave depression 68 in the cap 65 and will permit the lug 60 to enter the concave depression 69 in the cap 66. In most instances, the lug 60 will not be alined with the slot 71 so that it will not enter the slot and the spindle will remain in the position wherein it is shown in dotted lines in Fig. 4. The lug 60 then rests in the concave depression 69 and the conical head 50 is held slightly to the left (Fig. 4) of the position it assumes when the lug 60 engages the slot 71 in the cap 66. However, if the driving mechanism 38 is set in operation, the lug 60 will be rotated into alinement with the slot 71 and as soon as it does become alined with the slot 71 the spring 55 will function to displace the spindle 31 to the right (Fig. 4) so that the lug 60 will be received by the slot 71. This is the condition of the apparatus shown in Fig. 6.

The spindle 31 is shown unloaded in Figs. 4, 5 and 6 but it will be readily understood that when the spindle 31a is loaded and is inserted between the pin 35 and the stub shaft 36, the mechanism

adapted to journal it will function in substantially the same manner as the mechanism which journals the spindle 31 and the operator will be able to insert the loaded spindle 31a with little effort.

It will be noted that the spindles 31 and 31a must be of a predetermined length to function correctly with the means for journaling them if the advantages of the invention are to be obtained.

When the spindle 31 is to be removed from the drum 10, it is first displaced to the left (Fig. 6) against the action of the spring 55, whereupon the right hand end of the spindle 31 may be swung out of engagement with the lug 60 and the spindle may be removed bodily from the drum.

The spindle may also be inserted in the drum 10 by displacing it laterally toward the common axis of the pin 33 and the stub shaft 34 by having the spindle 31 inclined at an angle with respect to the common axis of the pin 33 and the stub shaft 34 so that the concavity 68 of the cap 65 is brought into alinement with and receives the conical head 50 of the pin 33 before the cap 66 is alined with the stub shaft 34. The operator may then urge the right hand end (Fig. 4) of the spindle 31 toward the stub shaft 34, whereupon the cap 66 will ride upon the cam surface 85. When the cap 66 rides upon the cam surface 85, the spindle 31 will be displaced bodily to the left (Fig. 4) and the pin 33 will be displaced in the same direction against the action of the spring 55. When the cap 66 slips off the inner end of the cam surface 85 and is alined with the stub shaft 34, the spring 55 will elongate to urge the right hand end of the spindle 31 against the lug 60 of the stub shaft 34. If it so happens that the slot 71 in the cap 66 is alined with the lug 60, the lug 60 will enter it, otherwise, the lug 60 will be brought into alinement with the slot 71 when the driving mechanism 38 is rotated. It is of course understood that when this occurs, the spring 55 causes the spindle 31 to move to the right (Fig. 4) so that the lug 60 is received by the slot 71.

It will be noted that the last described method of inserting the spindle 30 in the drum 10 is similar to the method whereby a spindle of similar construction is brought into engagement with journaling means as described in U. S. Letters Patent 2,009,972.

While I have shown and described certain embodiments of my invention, it is to be understood that it is capable of many modifications. Changes, therefore, in the construction and arrangement may be made without departing from the spirit and scope of the invention as disclosed in the appended claims, in which it is my intention to claim all novelty inherent in my invention as broadly as permissible, in view of the prior art.

I claim:

1. In a duplicating machine the combination of a plate, a driven pin rotatably journalled in said plate and having a lug projecting therefrom, a cam on said plate having one end thereof adjacent said pin, the free end of said lug being approximately flush with said adjacent end of said cam, a second plate, a second pin slidably journalled in said second plate and disposed in opposed relation to the first-mentioned pin, a spring yieldingly urging said second pin toward the first-mentioned pin, said second pin having a convex surface disposed in opposed relation to

said lug, and a spindle provided with concave ends, one of said concave ends being provided with a slot for driving engagement with said lug and the other concave end being adapted to journal on said convex surface, said spindle being of such length that when it is displaced laterally toward said pins with its longitudinal axis substantially parallel to the longitudinal axes of said pins, it will be displaced longitudinally by said cam whereby it displaces said second pin against the action of said spring during continued lateral movement of said spindle into alinement with said pins, said spring then displacing said spindle longitudinally to bring the concave end thereof into abutting relation with said lug.

2. In a duplicating machine the combination of a plate, a driven pin rotatably journaled in said plate and having a lug projecting therefrom, means positively holding said pin against longitudinal displacement relative to said plate, a cam on said plate having one end thereof adjacent said pin, the free end of said lug being approximately flush with said adjacent end of said cam, a second plate, a second pin slidably journaled in said second plate and disposed in opposed relation to the first-mentioned pin, a spring yieldingly urging said second pin toward the first-mentioned pin, said second pin having a convex surface disposed in opposed relation to said lug, and a spindle provided with concave ends, one of said concave ends being provided with a slot for driving engagement with said lug and the other concave end being adapted to journal on said convex surface, said spindle being of such length that when it is displaced laterally toward said pins with its longitudinal axis substantially parallel to the longitudinal axes of said pins, it will be displaced longitudinally by said cam whereby it displaces said second pin against the action of said spring during continued lateral movement of said spindle into alinement with said pins, said spring then displacing said spindle longitudinally to bring a concave end thereof into abutting relation with said lug.

3. In a duplicating machine the combination of a plate, a driven pin rotatably journaled in said plate and having a lug projecting therefrom, a cam on said plate having one end thereof adjacent said pin, the free end of said lug being approximately flush with said adjacent end of said cam, a second plate, a second pin slidably journaled in said second plate and disposed in opposed relation to the first-mentioned pin, a spring yieldingly urging said second pin toward the first-mentioned pin, said second pin having a convex surface disposed in opposed relation to said lug, and a spindle provided with concave ends, said concave ends being adapted to journal on said convex surface and being provided with slots for driving engagement with said lug, said spindle being of such length that when it is displaced laterally toward said pins with its longitudinal axis substantially parallel to the longitudinal axes of said pins, it will be displaced longitudinally by said cam whereby it displaces said second pin against the action of said spring during continued lateral movement of said spin-

dle into alinement with said pins, said spring then displacing said spindle longitudinally to bring a concave end thereof into abutting relation with said lug.

4. In a duplicating machine the combination of a plate, a driven pin rotatably journaled in said plate and having a lug projecting therefrom, a cam on said plate having one end thereof adjacent said pin, a second plate, a second pin slidably journaled in said second plate and disposed in opposed relation to the first-mentioned pin, a spring yieldingly urging said second pin toward the first-mentioned pin, said second pin having a bearing surface disposed in opposed relation to said lug, and a spindle provided with a slot in one end for driving engagement with said lug, said spindle being of such length that when it is displaced laterally toward said pins with its longitudinal axis substantially parallel to the longitudinal axes of said pins, it will be displaced longitudinally by said cam whereby it displaces said second pin against the action of said spring during similar continued lateral movement of said spindle into alinement with said pins, said spring then displacing said spindle longitudinally to bring the slotted end thereof into abutting relation with said lug.

5. Apparatus whereby a spindle adapted to be driven is quickly insertable and withdrawable from its mount, comprising a framework having oppositely mounted spindle carriers, means yieldingly urging one of said spindle carriers toward the other, said other carrier having driving means for engaging co-operative driven means provided upon said spindle, and a cam on said framework adjacent said other carrier whereby, when said spindle is displaced laterally with its longitudinal axis parallel to the axes of said carriers to bring it into alinement with said carriers, said cam displaces said spindle longitudinally and causes it to displace said yieldably mounted carrier, said yieldably mounted carrier then displacing said spindle longitudinally to bring said spindle into abutting relation with said other carrier.

6. The combination with a spindle adapted to be driven, of a frame-work having oppositely mounted spindle carriers, yielding means urging one of said spindle carriers toward the other, one of said carriers having driving means for engaging co-operative driven means provided upon said spindle, and a cam on said frame-work adjacent one of said carriers whereby, when said spindle is displaced laterally with its longitudinal axis parallel to the axes of said carriers to bring it into alinement with said carriers, said cam displaces said spindle longitudinally and causes it to displace said yieldably urged carrier, said yieldably urged carrier then displacing said spindle longitudinally to bring said spindle into abutting relation with both carriers whereby, when said carrier having said driving means is caused to rotate, said driving means will engage said driven means on said spindle.

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