Oct. 29, 1963 D. L. HARRISON 3,108,536

CYLINDER CHANGE MEANS FOR PRINTING MACHINE

Filed Nov. 15, 1961 3 Sheets-Sheet 1

FIG. 1

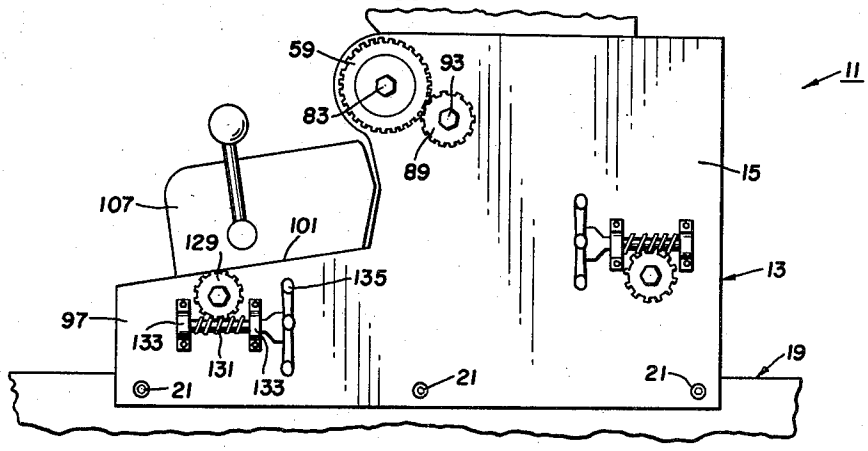
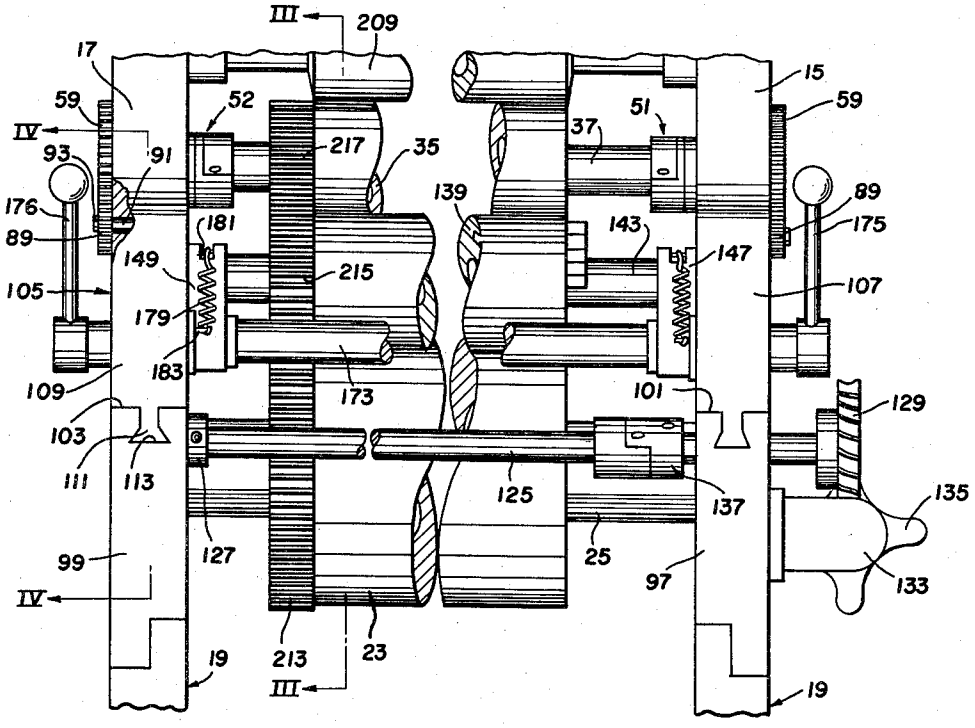


FIG. 2



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FIG. 3

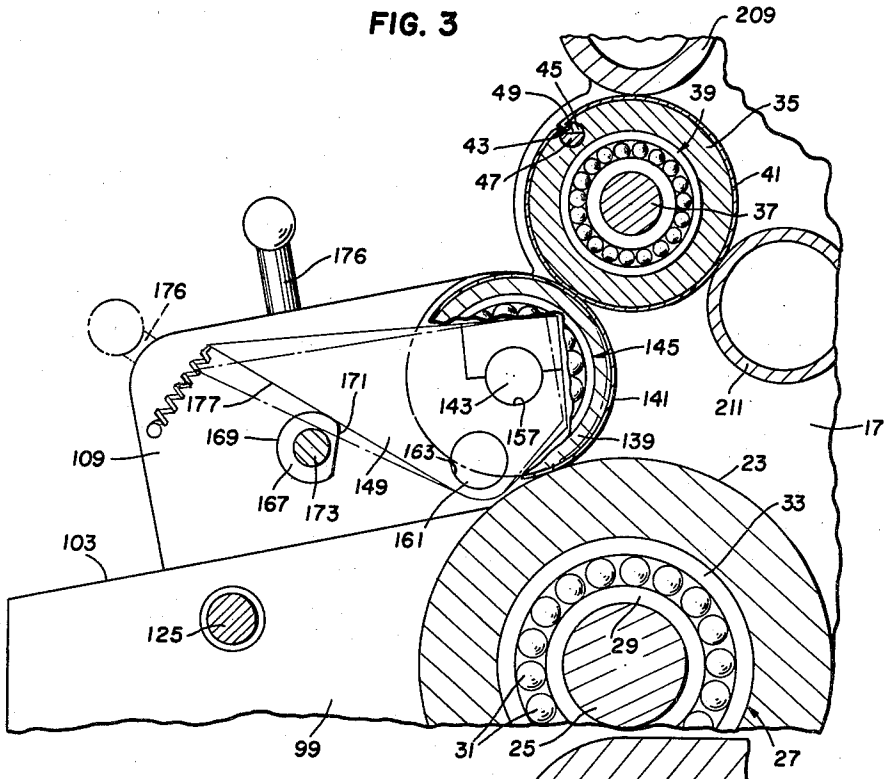
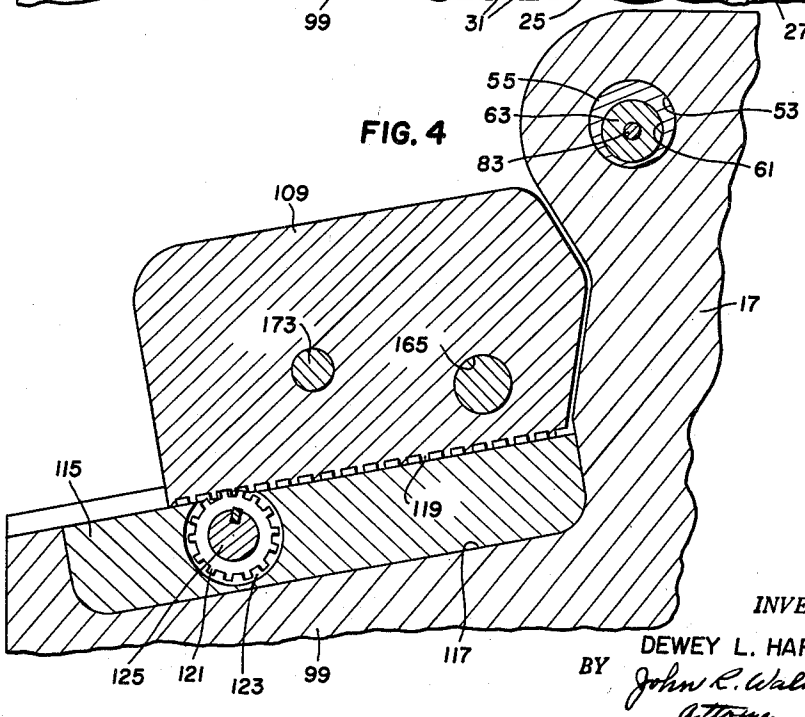


FIG. 4



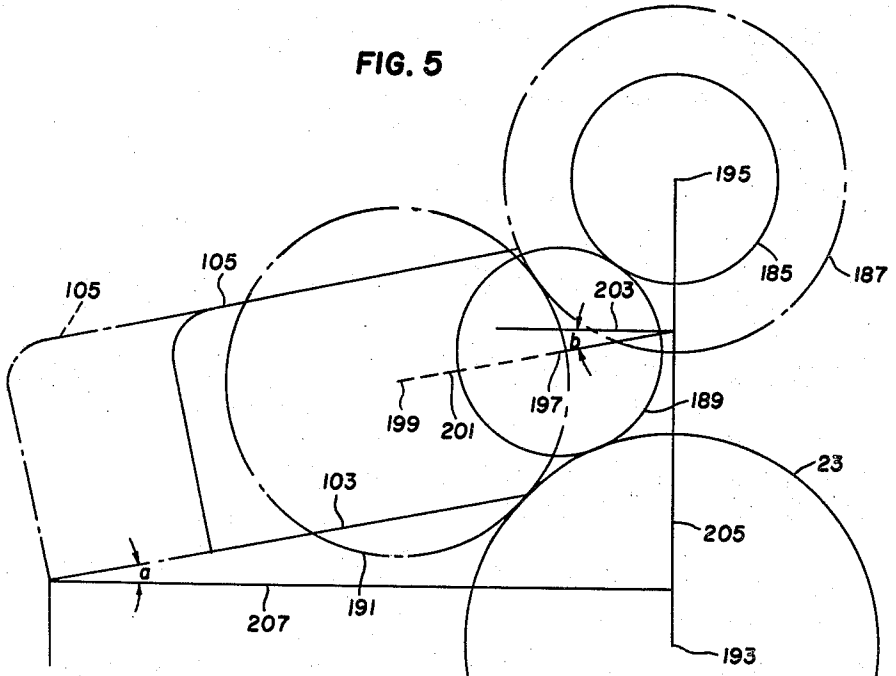
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FIG. 5



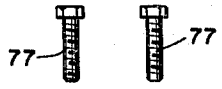


FIG. 6

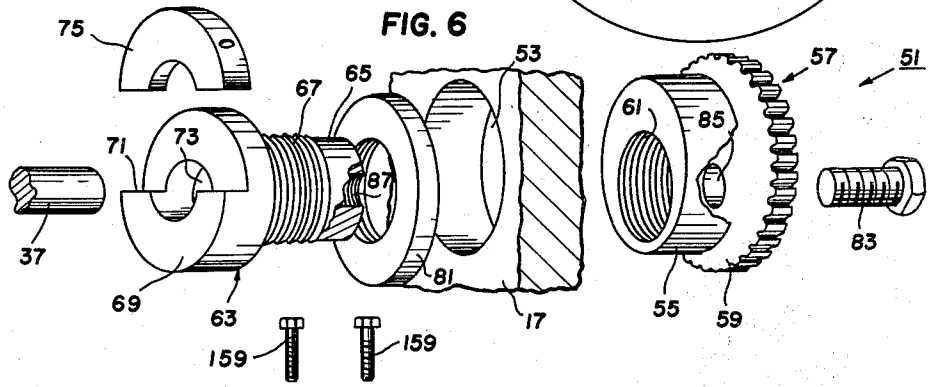
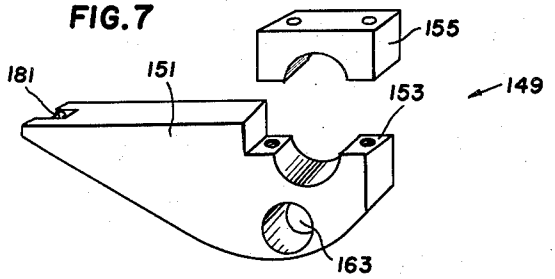


FIG. 7



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3,108,536

CYLINDER CHANGE MEANS FOR PRINTING MACHINE

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Filed Nov. 15, 1961, Ser. No. 152,414
7 Claims. (Cl. 101—218)

This invention relates to improvements in printing machines, particularly of the type known as off-set web fed printing machines.

As is known by those skilled in the art, printing machines of the above mentioned type employ a plate cylinder upon which the printing plate is mounted. Heretofore, the plate cylinder of a particular machine was of a fixed size which would only accommodate a plate of one given size so that for different sizes of printing it was necessary to use different machines. As is known, printing machines are very costly, and in order to be set up to take care of a variety of sizes of printing it was heretofore necessary for the printer to make quite a substantial investment in several machines.

The present invention is directed towards overcoming the above mentioned and other problems by providing a versatile printing machine in which the plate cylinders and blanket cylinders may be changed to accommodate different sizes of plates so that a printer need only invest in one machine and yet be set up to take care of many sizes of printing matter.

Thus, one of the objects of the present invention is to provide an off-set printing machine which can be quickly and conveniently changed from the accommodation of one size printing matter to another.

A further object is to provide such a machine which is simple in construction and economical to manufacture.

A further object is to provide such a machine which saves the printer considerable money since it is only necessary for him to have one machine to accommodate different sizes of printing matter.

A further object is to provide a printing machine having a carrier which removably holds the blanket cylinder with the carrier being mounted at a fixed predetermined angle and arranged so that the machine is set up for the exact accommodation of a minimum and a maximum size of the blanket and plate cylinders.

A further object is to provide means in such a printing machine to accommodate sizes of blanket and plate cylinders between the above mentioned minimum and maximum sizes.

A further object is generally to improve the design and construction of printing machines.

The means by which the foregoing and other objects of the present invention are accomplished and the manner of their accomplishment will be readily understood from the following specification upon reference to the accompanying drawings, in which:

FIG. 1 is a fragmentary side elevational view of the printing machine of the present invention.

FIG. 2 is an enlarged fragmentary front elevational view thereof.

FIG. 3 is an enlarged fragmentary sectional view taken as on the line III—III of FIG. 2.

FIG. 4 is an enlarged fragmentary sectional view taken as on the line IV—IV of FIG. 2.

FIG. 5 is a diagrammatic view illustrating how the angular relationship of the blanket cylinder carrier to the plate cylinder and impression cylinder is determined.

FIG. 6 is a fragmentary exploded view of one of the plate cylinder shaft holders, with portions thereof being broken away for purposes of illustration.

FIG. 7 is an exploded view of one of the holders for the blanket cylinder.

Referring now to the drawings in which the various parts are indicated by numerals, the printing machine 11 of the present invention includes a base 13, which preferably comprises a pair of spaced sides 15, 17 that are preferably fixedly attached to a supporting framework 19 by bolts 21.

A hollow impression cylinder 23 is rotatably supported on a transverse shaft 25 that extends through the center of the cylinder. Suitable bearings are provided in cylinder 23 adjacent opposite ends thereof, as for example, like the bearing 27 shown in FIG. 3 which is provided with the usual inner race 29 fitted to shaft 25, the usual ball bearings 31, and the usual outer race 33 fitted to the interior of cylinder 23. With shaft 25 stationarily supported adjacent opposite ends thereof from sides 15, 17, it will be understood that cylinder 23 is thus rotatably supported from base 13.

A hollow plate cylinder 35 is rotatably supported on a transverse shaft 37 extending through the plate cylinder. Adjacent opposite ends of plate cylinder 35 are provided bearing means, as for example, bearing 39 like bearing 27 and arranged similar thereto. A printing plate 41 of usual construction is removably attached by suitable means around the outside of plate cylinder 35, as for example, by the ends thereof extending through a transverse slot 43 and into a transverse bore 45 communicated with slot 43 and which has received therein a transverse rod 47 having one side thereof flattened as at 49 and arranged so that rod 47 may be turned to wedge the ends of the plate 41 between the flattened portion 49 and the portion of plate cylinder 35 which defines bore 45 to hold the ends in place.

The opposite ends of shaft 37 are respectively adjustably held by holder assemblies generally designated as at 51, 52. Each side 15 and 17 is provided with a cylindrical aperture 53 in which is mounted one of the holder assemblies 51, 52. Each holder assembly 51, 52 is preferably arranged as follows: The cylindrical portion 55 of a member 57 turnably extends through aperture 53. Member 57 also includes a gear 59 fixedly attached adjacent the outer end of cylindrical portion 55, for a purpose later to be described. Cylindrical portion 55 is provided with a threaded eccentric bore 61 which is offset from the center line of cylindrical portion 55 and gear 59. A retaining member 63 is provided with a cylindrical portion 65 having external threads 67 thereon starting at a distance spaced from the end thereof and which threads are threadedly engaged in internally threaded bore 61. Retaining member 63 includes an enlarged head 69 fixedly attached to cylindrical portion 65 adjacent the inner end thereof. Head 69 includes a stepped portion 71 adjacent the distal end of head 69 and adjacent a central bore 73 provided in the end of the head into which is adapted to fit one end of shaft 37. A cap 75 is adapted to fit over the end of shaft 37 in stepped portion 71 to retain the shaft. Screws 77 extend through aligned apertures in cap 75 and stepped portion 71 to retain the cap in place. An internally threaded lock nut 81 is preferably threadedly engaged on threads 67 between head 69 and its related side 15 or 17. Also, a screw 83 extends through an aperture 85 provided through gear 59 and threadedly engages a threaded socket 87 provided in the end of cylindrical portion 65 so that the parts are held in assembled relationship. A gear 89 is fixedly mounted on a shaft 91 having a squared end portion 93 extending outwardly from the gear and adapted to receive a wrench for the turning of gear 89. Shaft 91 is rotatably mounted on its related side 15 or 17 with gear 89 engaging gear 59. In order to adjust the ends of shaft 37, it will be understood that it is only necessary, on each of the assemblies 51, 52, to loosen screw 83 and turn gear 89 that in turn will turn gear 59 which due to the

eccentric relationship of bore 61 to cylindrical aperture 53 will cause movement of plate cylinder 35.

The lower parts of sides 15, 17 project forwardly to establish foot portions 97, 99 of base 13. The upper edges 101, 103 of foot portions 97, 99, respectively, are sloped downwardly and forwardly at an angle *a* for a particular reason which will be understood better in the description later in the specification regarding the determination of this angle.

A carrier 105, which includes spaced carrier sides 107, 109, is slidably mounted on upper edges 101, 103 with carrier side 107 being slidably mounted on upper edge 101 and carrier side 109 being slidably mounted on upper edge 103. Carrier sides 107, 109 and their related parts are substantially identical and the following description of carrier side 109 and its related parts should suffice for both. Carrier side 109 is slidably mounted on edge 103 as by means of a dovetail type of arrangement, i.e., the lower edge of carrier side 109 is provided with a tongue 111 slidably fitted into a dovetail groove 113 provided in upper edge 103. For simplicity of construction, foot portion 99 is of composite construction, i.e., it is provided with an elongated flat inset 115 fixedly mounted in an upwardly opening groove 117 in the foot portion. However, it should be pointed out that the foot portion may be made integral without departing from the spirit and scope of the present invention. The lower edge of carrier side 109, i.e., the portion along tongue 111 is provided with gears 119 which engage a pinion gear 121 in the manner of a rack and pinion type of gear arrangement. Pinion gear 121 is housed in a bore 123 provided through inset 115 and the gear is fixedly mounted on a transverse shaft 125.

Shaft 125 is supported adjacent one end by a bearing 127 carried by side 17, and the shaft rotatably extends through a bearing, not shown, in side 15 and therebeyond where a gear 129 is fixedly attached thereto and which gear is engaged by a worm gear 131 supported from side 15 by means of bearings 133 and provided with a handle 135 for turning the worm gear 131. It will be understood that turn of handle 135 will cause carrier 105 to move along upper edges 101, 103. It should be noted that shaft 125 is preferably provided with the usual well-known coupling 137 so that the shaft can be broken down for disassembly and for alignment of carrier sides 107, 109.

A hollow blanket cylinder 139 provided with the usual resilient material 141 therearound is rotatably mounted on a transverse shaft 143 by means of bearings 145 in opposite ends of the cylinder similar to bearings 27. Shaft 143 is removably and movably supported adjacent the opposite ends thereof from carrier sides 107, 109 by holders 147, 149, respectively. Holders 147, 149 are substantially identical and the following description of holder 149 and its related parts should suffice for both. Holder 149 includes a somewhat irregularly shaped body portion 151, best seen in FIGS. 3 and 7, which body portion includes a stepped portion 153 adapted to receive a cap 155 which mates with the stepped portion and forms a bore 157 through which shaft 143 extends and is clamped. A pair of screws 159 respectively extend through aligned apertures in cap 155 and body portion 151 to hold the cap in place. Holder 149 is rockably supported from carrier side 109 by means of a pin 161 extending through aligned apertures 163, 165 respectively provided in body portion 151 and carrier side 109. Aperture 163 is located downwardly and forwardly from bore 157 and in such a position that as holder 149 is rocked, the blanket cylinder 139 moves into and out of printing relationship with impression cylinder 23 and plate cylinder 35. This printing relationship, in which the cylinders are substantially tangent, is best shown in solid lines in FIG. 3, and the retracted position away from the cylinders is shown in broken lines in this figure. This retracted position is used when the printing machine 11 is not in operation, or when threading the paper to be printed, adjusting the machine, etc.

Means is provided for moving holders 147, 149 to move the blanket cylinder 139 into and out of said retracted and printing positions. This means preferably comprises a cam 167 preferably in the form of a ring having an arcuate surface 169 and a flattened side 171. Cam 167 is fixedly mounted on a shaft 173 that rotatably extends through apertures in carrier sides 107, 109. Levers 175, 176 are respectively fixedly attached to the portions of shaft 173 that extend on the outside of carrier sides 107, 109 so that either of the levers may be turned to rotate cams 167. As will be observed in FIG. 3, when lever 176 is in the position shown in solid lines in this figure, the arcuate surface 169 will ride against the lower edge 177 of holder 149 so that the blanket cylinder 139 is held in printing relationship with impression cylinder 23 and plate cylinder 35. Also, it will be noted that when the lever 176 is moved to the broken line position, cam 167 will be moved so that the flattened side 171 contacts lower edge 177 and under the influence of a spring 179 is moved to the broken line position in which the blanket cylinder is in said retracted position. Spring 179 is fixedly attached adjacent one end to holder 147 by suitable means as a pin 181 and the opposite end of the spring is fixedly attached to carrier side 107 as by another pin 183.

The determination of angle *a* in the construction of machine 11 forms an important part of the present invention, and from the following description this angle can be readily determined. The determination of angle *a* is calculated from the largest and smallest plate and blanket cylinders adapted to be used with machine 11. Thus, the first step is to select the largest and smallest plate and blanket cylinders that will be required for the jobs anticipated to be done by the machine. Referring now to FIG. 5, the following convention is established for purposes of clarity in describing the determination of angle *a*. The solid line circle at 185 represents the smallest plate cylinder which is adapted to be used in printing machine 11, and the broken line circle at 187 represents the largest plate cylinder adapted to be used in the printing machine. The solid line circle at 189 represents the smallest blanket cylinder, which as is the usual practice is the same size as the smallest plate cylinder 185, and the broken line circle at 191 represents the largest blanket cylinder which is adapted to be used in the printing machine and which is the same size as the largest plate cylinder 187. In the calculations, the impression cylinder 23 remains the same size and its fixed center is designated as at 193. Also, in the calculations the smallest plate cylinder 185 and the largest plate cylinder 187 have the same center which is designated as at 195. To perform the actual calculations, first the representations of the smallest and largest plate cylinders 185, 187 and impression cylinder 23 are drawn. Next, the smallest blanket cylinder 189 is drawn so that it is tangent to both the smallest plate cylinder 185 and impression cylinder 23. The center of this smallest blanket cylinder 189 is designated as at 197. Then, the largest blanket cylinder 191 is drawn tangent to the largest plate cylinder 187 and the impression cylinder 23. The center of blanket cylinder 191, which is designated as at 199, is connected to the center 197 by a first line which is designated 201 and is shown dotted in FIG. 5. The acute angle *b* which is formed between first line 201 and a second line 203 is the same size angle as angle *a*. The above mentioned second line 203 was established by extending first line 201 until it intersected a third line 205 connecting centers 193 and 195, and then drawing the second line 203 normal or perpendicular to line 205 at the intersection of line 201 and line 205. This angle *b* is the desired angle at which the upper edges 101, 103 should be sloped relative to a fourth line 207 which is normal or perpendicular to third line 205. Thus, it can be seen that first

line 201 and upper edges 101, 103 are parallel, and second line 203 and fourth line 207 are parallel so that the angles *a* and *b* are equal. From the foregoing it will be understood that when carrier 105 is moved on upper edges 101, 103, the center of any particular blanket cylinder that is held by the carrier 105 will move along a line which is coincident with first line 201. In addition, it will be understood that when the smallest blanket cylinder 189 is used with the smallest plate cylinder 185 and the cylinders are in a printing relationship, the carrier 105 will be in the solid line position shown in FIG. 5, and when the largest blanket cylinder 191 is used with the largest plate cylinder 187, the carrier will be in the broken line position shown in this figure. From the foregoing it will be understood that when the smallest cylinders are used or the largest cylinders are used, the center 195 will remain in a fixed position and the cylinders will be in an exact printing relationship, but for any sizes of cylinders between the largest and smallest it will be necessary to make a small adjustment in the center 195 by turning gears 89 in the manner heretofore described. Also, it is preferable that the exact location of center 195 when the angle *a* is calculated is preferably such that it is in a position substantially in the middle of the adjustment which may be made by rotation of gears 89.

The usual sizes employed in off-set printing machines are 8½ inches as a minimum for the plate and blanket cylinders and 14 inches as a maximum for these cylinders and 17 inches for the impression cylinder. Using these particular dimensions, the angle *a* has been calculated to be 9 degrees, but this is for illustration purposes only, and any other sizes of cylinders may be used without departing from the spirit and scope of the present invention.

The remaining parts of printing machine 11 other than those heretofore described are preferably of the usual construction well-known to those skilled in the art. Therefore, it should suffice to say that suitable inking mechanism, not shown, is provided which includes an inking roller 209 for transferring ink to plate 41, and a suitable mechanism, not shown, is provided which includes a roller 211 for transferring the usual fountain solution to plate 41. In the usual manner, the web of paper from a roll, not shown, is fed between blanket roller 139 and impression roller 23 for printing, with the printing being transferred to the paper from resilient material 141 that has received it from plate 41. Suitable means is provided for rotatably driving impression cylinder 23, blanket cylinder 139 and plate cylinder 35, as for example, by a gear 213 fixedly attached to one end of impression cylinder 23 that engages a gear 215 fixedly attached to one end of blanket cylinder 139. Gear 215 engages a gear 217 fixedly attached to one end of plate cylinder 35, which gear 215 is rotatably driven by suitable means, not shown.

From the foregoing description it will be understood that the present invention provides a very simple, quick and convenient means for changing the printing sizes of a printing machine. Thus, for example, to change from minimum size blanket and plate cylinders to maximum size it is only necessary to remove caps 75 and 155, remove the shaft and cylinder assembly of the blanket and plate cylinders, move the carrier 105 outwardly to the broken line position shown in FIG. 5, then replace the cylinders by the maximum plate and blanket cylinders, and finally replace the caps. This versatility of machine 11, it will be understood, represents a great savings to the printer who would otherwise have to have a number of entire printing machines to change the sizes of the printing.

Although the invention has been described and illustrated with respect to a preferred embodiment thereof, it is to be understood that it is not to be so limited since changes and modifications may be made therein which are within the full intended scope of this invention as hereinafter claimed.

I claim:

1. In a printing apparatus, a base, an impression cylinder rotatably mounted from said base, a plate cylinder, means removably and rotatably mounting said plate cylinder on said base in spaced relationship to said impression cylinder, a carrier movably mounted on said base, a blanket cylinder, means removably and rotatably mounting said blanket cylinder on said carrier, said carrier being movable in a substantially straight line at a predetermined angle relative to said impression cylinder and said plate cylinder to carry said blanket cylinder into and out of printing relationship tangent to said impression cylinder and said plate cylinder, said plate cylinder and said blanket cylinder being of substantially the same corresponding sizes, said predetermined angle being such that said blanket cylinder and said plate cylinder are respectively replaceable by at least one other size of corresponding blanket and plate cylinders in which said blanket cylinder is adapted to be moved into and out of printing relationship tangent to said impression cylinder and said plate cylinder and with the axes of rotation of said first mentioned plate cylinder and the replacement plate cylinder being substantially at the same place.

2. In a printing apparatus for use with selected one of a plurality of blanket cylinders of different sizes and for use with a selected one of a plurality of plate cylinders of the same corresponding sizes as said blanket cylinders and comprising a base, an impression cylinder rotatably mounted on said base, support means supported by said base for removably and rotatably holding one of said plate cylinders, a carrier movably mounted on said base for movement in a substantially straight line, means supported by said carrier for removably and rotatably holding one of said blanket cylinders, means connected to said carrier to move said carrier and carry said one of said blanket cylinders into printing relationship with said impression cylinder and said one of said plate cylinders and to carry the center of said one of said blanket cylinders along a substantially straight first line at a predetermined acute angle relative to a second line normal to a third line connecting the centers of said impression cylinder and said one of said plate cylinders, said first line being coincident with a line connecting the centers of the smallest and largest ones of said blanket cylinders with which said apparatus is adapted to be used when said smallest and largest blanket cylinders are substantially tangent to said impression cylinder and also respectively substantially tangent to said plate cylinders of corresponding size having centers at a fixed given point.

3. In a printing apparatus for use with a selected one of a plurality of blanket cylinders of different sizes and for use with a selected one of a plurality of plate cylinders of the same corresponding sizes as said blanket cylinders and comprising a base, an impression cylinder rotatably mounted on said base, support means supported by said base for removably and rotatably holding one of said plate cylinders, a carrier movably mounted on said base for movement in a substantially straight line, means supported by said carried for removably and rotatably holding one of said blanket cylinders, means connected to said carrier to move said carrier and carry said one of said blanket cylinders into printing relationship with said impression cylinder and said one of said plate cylinders and to carry the center of said one of said blanket cylinders along a substantially straight first line at a predetermined acute angle relative to a second line normal to a third line connecting the centers of said impression cylinder and said one of said plate cylinders, said first line being coincident with a line connecting the centers of the smallest and largest ones of said blanket cylinders with which said apparatus is adapted to be used when said smallest and largest blanket cylinders are substantially tangent to said impression cylinder and

also respectively substantially tangent to said plate cylinders of corresponding size having centers at a fixed given point, said support means for said plate cylinder including means for moving said one of said plate cylinders to make said one of said plate cylinders tangent to said one of said blanket cylinders when the size thereof is between said smallest and largest sizes.

4. In a printing apparatus, a base having a pair of apertures, an impression cylinder rotatably mounted from said base, a plate cylinder, a shaft, means rotatably mounting said plate cylinder on said shaft, a pair of holder assemblies respectively mounted in said apertures and holding opposite ends of said shaft to adjustably and removably support said plate cylinder from said base in spaced relationship to said impression cylinder, said holder assemblies respectively comprising adjustable eccentric means for selectively moving said shaft to carry said plate cylinder towards and away from said impression cylinder, a carrier movably mounted on said base, a blanket cylinder, means removably and rotatably mounting said blanket cylinder on said carrier, said carrier being movable in a substantially straight line at a predetermined angle relative to said impression cylinder and said plate cylinder to carry said blanket cylinder into and out of printing relationship tangent to said impression cylinder and said plate cylinder, said plate cylinder and said blanket cylinder being of substantially the same corresponding sizes, said predetermined angle being such that said blanket cylinder and said plate cylinder are respectively replaceable by at least one other size of corresponding blanket and plate cylinders in which said blanket cylinder is adapted to be moved into and out of printing relationship tangent to said impression cylinder and said plate cylinder and with the axes of rotation of said first mentioned plate cylinder and the replacement plate cylinder being substantially at the same place.

5. In a printing apparatus, a base having a pair of apertures, an impression cylinder rotatably mounted from said base, a plate cylinder, a shaft, means rotatably mounting said plate cylinder of said shaft, a pair of holder assemblies respectively mounted in said apertures and holding opposite ends of said shaft to adjustably and removably support said plate cylinder from said base in spaced relationship to said impression cylinder; each of said holder assemblies comprising a member including a cylindrical portion turnably mounted in one of said apertures and including a gear fixedly attached to said cylindrical portion, said cylindrical portion having an internally threaded eccentric bore therein, a retaining member including an enlarged head and an externally threaded portion threadedly engaged in said eccentric bore, said head including a stepped portion and a cap removably mounted in said stepped portion, said head being provided with a central bore receiving one end of said shaft, and means engaging said gear for turning said gear to rotate said cylindrical portion and move said retaining member to cause movement of said shaft and said plate cylinder; a carrier movably mounted on said base, a blanket cylinder, means removably and rotatably mounting said blanket cylinder on said carrier, said carrier being movable in a substantially straight line at a predetermined angle relative to said impression cylinder and said plate cylinder to carry said blanket cylinder into and out of printing relationship tangent to said impression cylinder and said plate cylinder, said plate cylinder and said blanket cylinder being of substantially the same corresponding sizes, said predetermined angle being such that said blanket cylinder and said plate cylinder are respectively replaceable by at least one other size of corresponding blanket and plate cylinders in which said blanket cylinder is adapted to be moved into and out of printing relationship tangent to said impression cylinder and said plate cylinder and with the axes of rotation of said first mentioned plate cylinder and the replacement plate cylinder being substantially at the same place.

6. In a printing apparatus, a base, an impression cylinder rotatably mounted from said base, a plate cylinder, means removably and rotatably mounting said plate cylinder on said base in spaced relationship to said impression cylinder, a carrier movably mounted on said base, a blanket cylinder, a shaft, means rotatably mounting said blanket cylinder on said shaft, a pair of holder means rockably supported from said carrier for removably holding opposite ends of said shaft to support said blanket cylinder, cam means engaging said holder means for moving said holder means to carry said blanket cylinder between a retracted position and a printing relationship tangent to said plate cylinder and said impression cylinder responsive to turn of said cam means, means coupled to said cam means for turning said cam means, said carrier being movable in a substantially straight line at a predetermined angle relative to said impression cylinder and said plate cylinder to carry said blanket cylinder into and out of printing relationship tangent to said impression cylinder and said plate cylinder, said plate cylinder and said blanket cylinder being of substantially the same corresponding sizes, said predetermined angle being such that said blanket cylinder and said plate cylinder are respectively replaceable by at least one other size of corresponding blanket and plate cylinders in which said blanket cylinder is adapted to be moved into and out of printing relationship tangent to said impression cylinder and said plate cylinder and with the axes of rotation of said first mentioned plate cylinder and the replacement plate cylinder being substantially at the same place.

7. In a printing apparatus, a base, an impression cylinder rotatably mounted from said base, a plate cylinder, means removably and rotatably mounting said plate cylinder on said base in spaced relationship to said impression cylinder, a carrier movably mounted on said base, a blanket cylinder, a shaft, means rotatably mounting said blanket cylinder on said shaft, a pair of holders, pin means respectively rockably mounting said pair of holders on said carrier, said holders removably holding opposite ends of said shaft to support said blanket cylinder from said carrier; each of said holders including a stepped portion and a cap removably mounted in said stepped portion, said cap and said stepped portion providing a bore receiving one end of said shaft; cam means engaging said holder for moving said holder to carry said blanket cylinder from a retracted position to a printing relationship tangent to said plate cylinder and said impression cylinder responsive to turn of said cam means, means coupled to said cam means for turning said cam means, said carrier being movable in substantially a straight line at a predetermined angle relative to said impression cylinder and said plate cylinder to carry said blanket cylinder into and out of printing relationship tangent to said impression cylinder and said plate cylinder, said plate cylinder and said blanket cylinder being of substantially the same corresponding sizes, said predetermined angle being such that said blanket cylinder and said plate cylinder are respectively replaceable by at least one other size of corresponding blanket and plate cylinders in which said blanket cylinder is adapted to be moved into and out of printing relationship tangent to said impression cylinder and said plate cylinder and with the axes of rotation of said first mentioned plate cylinder and the replacement plate cylinder being substantially at the same place.

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