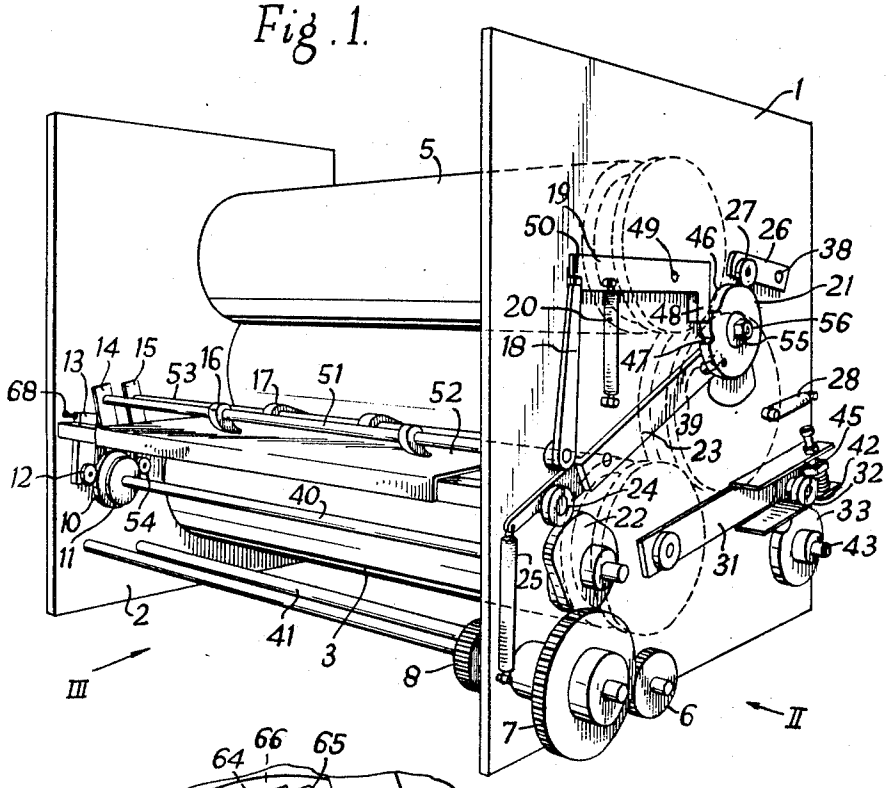
Sept. 29, 1964 F. R. BONSCH 3,150,588

CYLINDER MOUNTING, ADJUSTING AND INTERRUPTING MEANS FOR OFFSET PRINTING AND LIKE MACHINES

Filed May 23, 1962 3 Sheets-Sheet 1

Fig. 1.



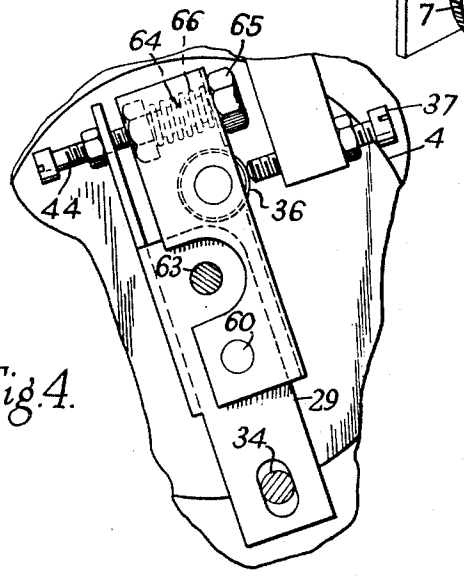


Fig. 4.

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Fig. 2.

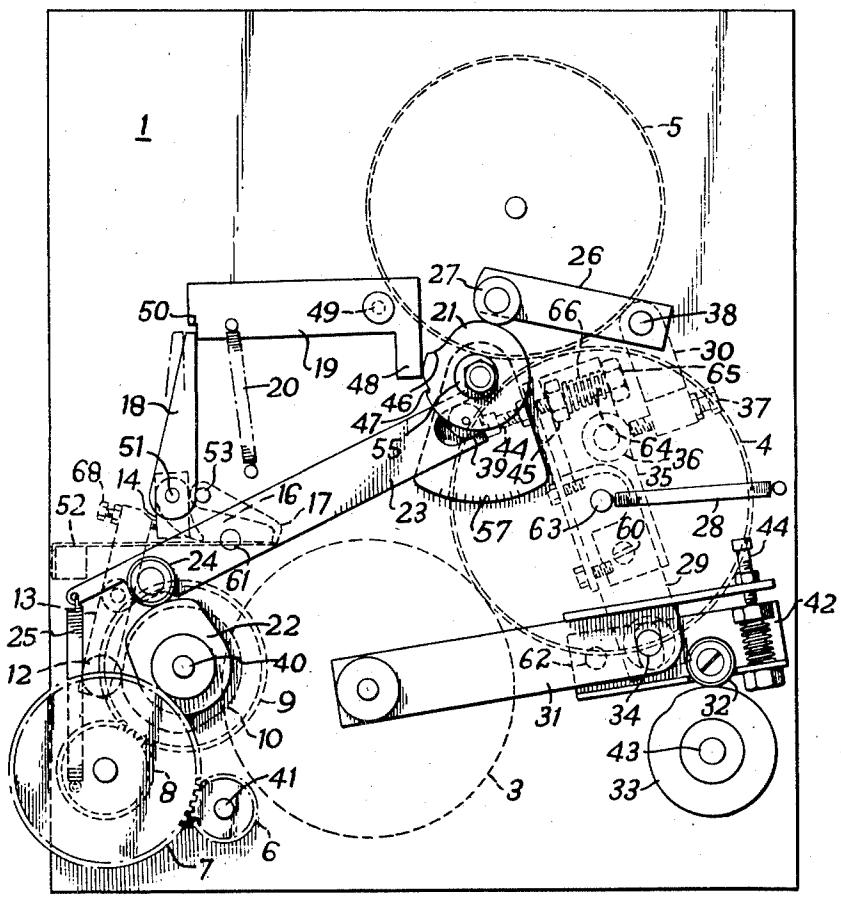

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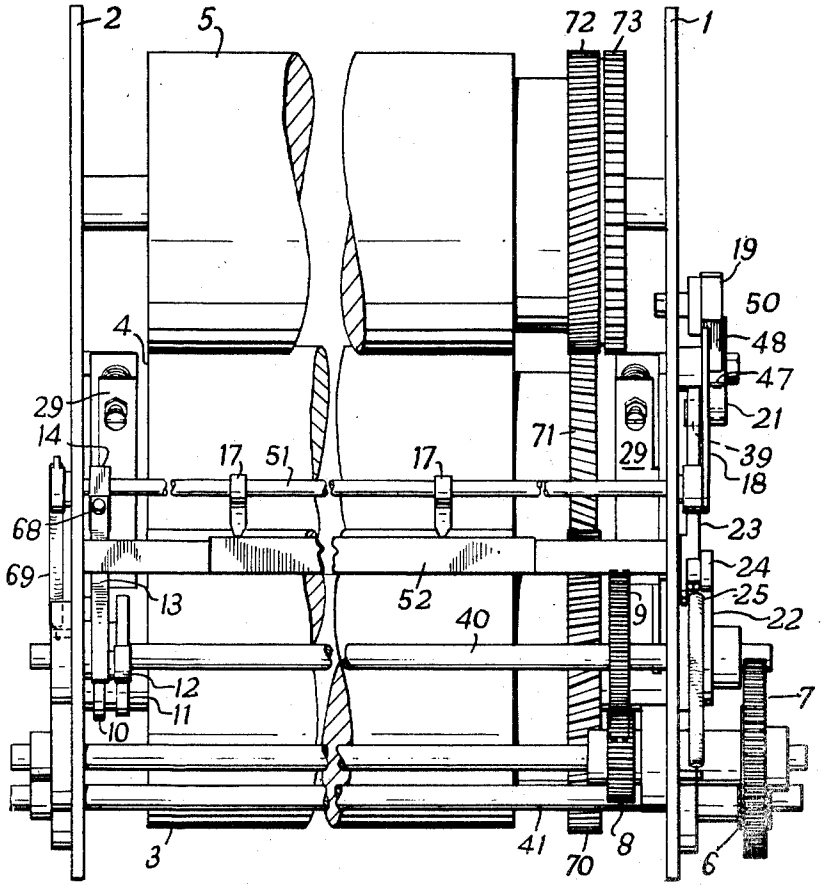
Fig. 3.



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CYLINDER MOUNTING, ADJUSTING AND INTERRUPTING MEANS FOR OFFSET PRINTING AND LIKE MACHINES

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7 Claims. (Cl. 101—218)

This invention relates to offset lithographic, printing, duplicating or like machines and has among its objects the provision of an improved and simplified construction for mounting and adjusting the relative positions of the image-carrying cylinder, the blanket cylinder and the impression cylinder and for effecting automatic release of printing pressure between the blanket cylinder and the impression cylinder upon the absence of a copy sheet at the sheet feed position thereby to avoid offsetting of the printing image upon the surface of the impression cylinder.

In accordance with one feature of the present invention, the image-carrying cylinder, the blanket cylinder and the impression cylinder are so disposed relatively to one another that the angle between the two common planes containing respectively the axes of the image-carrying and the blanket cylinders and the axes of the blanket and impression cylinders is in the vicinity of a right angle, the image carrying and impression cylinders being each arranged for rotation about fixed position centres and the blanket cylinder being so mounted that it is capable of floating movement to separately controllable extents in two directions which coincide approximately with the aforesaid common planes.

According to another feature of the invention, means is provided for causing separation of the respective axes of the blanket cylinder and the impression cylinder to an extent sufficient to prevent contact between the cylinder surfaces once during each operation cycle of the machine at an instant prior to the arrival of the copy sheet at the printing bight unless prevented by latching mechanism controlled by means which sense the presence or absence of a copy sheet at the feed-in position and operative to prevent such cylinder separation only when a copy sheet is present at the sheet feed-in position.

In one form of the last mentioned feature of the invention the separation of the blanket and impression cylinders is arranged to be controlled by an oscillating cam, operated from the machine drive through a yielding coupling.

According to yet a further feature of the invention the said cam is arranged to be rotatable upon a fixed position bearing sleeve which is itself rotatable about an axis eccentric to that of the bearing surface for the cam for the purpose of adjusting the value of printing pressure between the blanket and impression cylinders.

In order that the above and other features of the invention may be more readily understood, one particular constructional embodiment thereof will now be described by way of illustrative example only and with reference to the accompanying drawings in which:

FIGURE 1 is a perspective view of a part of an offset lithographic printing machine embodying the invention.

FIGURE 2 is a side elevational view taken in the direction of the arrow II, FIG. 1.

FIGURE 3 is an end elevational view taken in the direction of the arrow III, FIG. 1, while

FIGURE 4 is a detail view.

Referring to the drawings, the embodiment shown comprises stationary side frame plates 1 and 2 between which are disposed an impression cylinder 3, a blanket cylinder 4 and an image or plate-carrying cylinder 5. The cylinders 3 and 5 are journalled in suitable bearings rigidly secured to the respective frame plates 1 and 2 whereby their respective rotational axes are fixed in position. The intermediate blanket cylinder 4 is supported in a floating manner by being journalled at each end in bearings which are carried by lever arms 29 disposed inside the frame plates 1 and 2.

The lower ends of such lever arms 29 are themselves pivotally connected at 34 to associated further lever arms 31 which are each pivotally mounted at one end on the outside of the respective frame plates 1 and 2 for free rocking movement about the axle of the impression cylinder 3. The pivot connections 34 pass through arcuate slots in the frame plates. As shown more clearly in FIG. 4, each arm 29 has pivotally connected thereto, at a point 60 lying between the axis of the blanket cylinder 4 and the pivotal connection 34, a parallel abutment plate 35 which carries thereon a roller 36 positioned to engage with the end of a pressure adjusting screw 37 which is carried by the lower end of a lever arm 30.

An extension of the lever arm 29 is provided with an adjustable pressure screw 44 positioned to engage with an anvil head 45 formed upon a stud 64 which passes through an aperture in a web of the abutment plate 35 and is provided on the opposite side of such web with a retaining nut 65. The stud 64 is surrounded by a strong compression spring 66 trapped between said web and the underside of the anvil head whereby the latter is effectively resiliently mounted upon the abutment plate to allow it to yield in the event of overload pressure. Adjustment of the pressure screws 44 permits alteration of the position of the rollers relatively to the lever arms 29 upon which they are supported.

The two arms 30, located one at each side of the machine adjacent the inner surface of the adjacent frame plate, are rigidly secured to a transverse rock shaft 38 which is rotatably mounted at each end of the adjacent side frame plates 1 and 2. To the end of this rock shaft 38, which projects through the frame plate 1, is rigidly connected an operating arm 26 which carries a cam follower roller 27 thereon at its free end. This cam follower roller 27 engages with the contoured peripheral surface of a cam disc 21 which is rotatably mounted upon the outer side of the frame plate 1 in a manner which will be described in detail later. This cam disc 21 carries an eccentrically mounted roller 39 on its inner face and this roller is engaged by the forked end of a rocking lever 23, which lever is pivotally mounted at a point intermediate its ends upon a stub axle 61 secured to the frame plate 1. The opposite end of such rocking lever 23 carries a cam follower roller 24 which is urged towards the contoured peripheral surface of a further cam disc 22 by means of a tension spring 25 connected between the end of the lever 23 and a fixed anchorage on the plate 1. The cam disc 22 is secured to a spindle 40 extending transversely between and rotatably mounted in the frame plates 1 and 2. This spindle 40 is arranged to be driven through gear wheels 9, 8, 7 and 6 from a

primary drive shaft 41, whereby the shaft 40 and its attached cam disc 22 make one complete revolution for each operation cycle of the machine.

The lever arms 31, one at each side of the machine, are each provided, in a manner similar to the lever arms 29, with a parallel abutment plate 42 pivotally connected to the lever arm at a point 62 between the axis of the impression cylinder 3 and the point of connection 34 with the lever arm 29. Each abutment plate 42 carries a cam follower roller 32 arranged to co-operate with the contoured peripheral surface of a cam disc 33, the two similar cam discs, one at each side of the machine being rigidly connected to a transverse spindle 43 which is also journalled in the frame plates 1 and 2. Resilient biasing means, shown schematically as springs 28, operate to pull each end of the spindle 63 of the blanket cylinder 4 away from the common plane which includes the axes of the cylinders 3 and 5. The position of each of the cam follower rollers 32, relative to the lever arms 31 by which they are supported, is made adjustable by the provision of a pressure screw 44 acting upon an anvil head 45 resiliently supported upon the abutment plate 42 by means of a stud 64, retaining nut 65 and compression spring 66 in a manner substantially similar to that described above in connection with the lever 29.

The cam disc 21 is shaped to include a relieved region 46 of reduced radius and an arresting notch 47. The latter is arranged to co-operate with the downwardly directed nose-forming end 48 of an L-shaped lever 19 which is pivotally mounted on a fixed stud 49 on the outside of the frame plate 1. This lever 19 is arranged to be urged by means of a spring 20 to bring the nose end 48 thereof into contact with the contoured edge surface of the cam disc 21. The free end of the other arm of the lever 19 is provided with a notch 50 positioned to co-operate with the upper free end of a latching arm 18 which is rigidly secured to a transverse spindle 51 which also extends between and is rotatably supported in the frame plates 1 and 2. In between the frame plates this spindle 51 has a number of sheet detector fingers 16 rigidly secured thereto. Such fingers, if not forcibly raised, rest upon the upper surface of a sheet feed table 52 or upon the upper surface of a copy sheet when the latter is present on such sheet feed table. When a copy sheet is present on the feed table, the upper end of the latching arm 18 is moved in anti-clockwise direction, FIGS. 1 and 2, to be swung to a position as indicated in chain dot lines in FIG. 2 where it is clear of the notched end 50 of the L-shaped lever 19 whereas, in the absence of the copy sheet on the feed table 52, the position taken up by the latching arm 18 is that shown in full lines in FIG. 2 where it can engage within the notch 50.

A further transverse spindle 53, also journalled in the frame plates 1 and 2, carries a group of rocking lay-stop arms 17 whose downturned forward ends serve to position the leading edge of each copy sheet applied to the feed table 52. The spindle 53 has a lever arm 15 secured thereto, adjacent the inner surface of the frame plate 22, such lever arm being provided at its free end with a cam follower roller 54 adapted to bear upon the contoured peripheral surface of a cam disc 11 secured to the spindle 40. The spindle 51 has an abutment lever 14 rigidly secured thereto and this abutment lever is engaged by an abutment screw 68 carried at one end of a rocker arm 13 which is pivotally mounted on the inner side of the frame plate 2 and is provided at the end opposite that carrying the abutment screw with a cam follower roller 12 positioned to engage the contoured peripheral surface of a further cam disc 10 also rigidly secured to the spindle 40 alongside the cam disc 11. A spring 69 connected between the free end of a crank arm secured to the spindle 51 and an anchor stud on the frame plate 2 serves to maintain the abutment lever 14 in contact with the abutment screw 68. A similar arrangement serves to maintain the roller 54 in contact with the cam disc 10.

The image-carrying cylinder 5, the blanket cylinder 4 and the impression cylinder 3 are arranged to rotate in unison in the usual way by means of constantly intermeshing gearwheels 70, 71 and 72 secured to the respective cylinders, the drive to the coupled cylinders being effected through a further gearwheel 73 secured to the cylinder 5.

The manner of operation of the arrangement described above is as follows. During initial setting up of the machine, the blanket cylinder 4 is first brought into engagement with the image-carrying cylinder 5 by manual rotation of the spindle 43. This rotation of the spindle 43 causes the cam discs 33 to be rotated to the point where the maximum radius region of each cam surface is under the associated roller 32. Such positioning of the cam disc 33 causes rocking movement of each lever arm 31 about the axis of the impression cylinder 3 thereby to shift the axis of the blanket cylinder 4 upwardly about an arc centered on the axis of the cylinder 3 through the intermediary of the further supporting lever arms 29. The pressure developed between the blanket cylinder 4 and the image-carrying cylinder 5 is adjusted to the required value and balanced along the cylinder length by alteration of the setting of the two pressure screws 44 at opposite sides of the machine. These screws each alter the position of the cam follower roller 32 with respect to the main body of the lever 31 upon which it is carried and, hence, with respect to the axis of the cylinder 4. It will be observed that such movement of the blanket cylinder 4 is in a direction substantially tangential with respect to the surface of the impression cylinder 3 and accordingly the above described pressure adjustments do not involve any substantical change of the relative spacing distance between the blanket cylinder 4 and the impression cylinder 3.

Coarse adjustment and balancing of the pressure between the blanket cylinder 4 and the impression cylinder 3 is effected in similar manner by rotating the spindle 40 to the position shown in FIG. 2 whereby the cam disc 21 is moved to bring the roller 27 on to the maximum radius part of the cam disc. When in this position, the pressure screws 44 associated with the abutment plates 35 are adjusted to move the blanket cylinder 4 about an arc centered on the pivotal points 34. Since such movement of the blanket cylinder 4 is tangential to the image-carrying cylinder 5, such pressure adjustment does not disturb the pressure setting between the cylinders 5 and 4.

During each printing operation cycle of the machine, the cylinders 3, 4 and 5 and the spindles 40 and 43 are each rotated through 360° in accurate timed relationship. The rotation of the spindle 40 causes the sheet detector fingers 16 first to the lifted by means of the cam 10 to allow forward movement of a copy sheet laid upon the table 52 up to the lay-stop arms 17. The sheet detector fingers 16 are then lowered again so that the latching arm 18 takes up a position which is dependent upon the presence or absence of a copy sheet. If a copy sheet is present, the arm 18 will finally lie in a position as shown in chain-dotted lines in FIG. 2, where it is clear of possible contact with the notch 50 of the lever 19. If, however, a copy sheet is absent from the feed table then the latching arm 18 will take up the position shown in full lines in FIG. 2.

In the meantime the simultaneous rotation of the cam disc 22 on spindle 40 causes rocking movement to be imparted to the rocking lever 23 whereby the cam disc 21 is first moved in a clockwise direction and then, towards the extreme end of the operation cycle, is returned to the position shown.

In the position as shown in FIGURES 1 and 2, where the cam follower roller 27 bears upon the maximum radius region of the cam surfaces of the disc 21, the rock shaft 38 is rotated through the intermediary of the lever arm 26 to the pressure-applying position where the

pressure screws 37 carried by the lever arms 30 bear against the rollers 36 carried by the abutment plates 35 of the respective lever arms 29 and thereby operate to force the axis of the blanket cylinder 4 towards the axis of the impression cylinder 3 with the pressure predetermined by the previously described setting-up adjustment of the screws 44. The forcing movement is against the influence of the spring means 28.

Assuming now that a copy sheet is present on the feed table 52, the displaced position of the latching lever 18 will allow the L-shaped lever 19 to rock about its pivot stud 49 under the influence of the spring 20 with its opposite nose end 48 in continuous contact with the surface of the cam disc 21. Such nose end 48 accordingly enters the arresting notch 47 in the cam disc 21 and thereafter prevents any further clockwise movement of such disc by means of the cam 22 and roller 24. In this arrested position of the cam disc 21 the roller 27 is still upon a maximum radius part of the cam disc 21 so that the pressure between the blanket cylinder 4 and the impression cylinder 3 is still at the chosen maximum value. Upon the subsequent release of the copy sheet for forward movement due to the raising of the lay-stop fingers 17, such copy sheet can be fed to the impression cylinder 3 and thereafter carried to the printing bight between the impression cylinder 3 and the blanket cylinder 4 to effect offset printing in the ordinary way.

In the contra case, where a copy sheet is absent from the feed table 52, the latching arm 18 is moved to the position as shown in full lines in FIG. 2 where it lies in the path of the notch 50 in the lever 19. In consequence, when the cam disc 21 is rotated, the lever 19 becomes latched up and the nose end 48 thereof is no longer free to follow the contoured surface of the cam disc 21. Instead it is held at a position where it cannot enter the arresting notch 47 of such disc. The disc 21 is therefore not arrested and partakes of the full extent of clockwise movement impartable thereto by the rocking lever 23, such movement taking the cam disc to a position where the cam follower roller 27 enters the relieved region 46 of the contoured surface of the cam disc. The entry of the roller into such relieved region causes rocking movement of the arm 26 and consequent outward swinging movement of the lever arms 30 to relieve the pressure exerted by the screws 37 upon the rollers 36 associated with the lever arms 29. As a result, the blanket cylinder 4 is withdrawn by the spring means 28 from contact with the impression cylinder, thereby preventing any possibility of offsetting from the inked impression on the blanket cylinder onto the surface of the impression cylinder due to the absence of a copy sheet.

The cam disc 21 is rotatably mounted upon a suitable bearing surface formed upon a bearing sleeve 55 which itself is arranged to be capable of being rotated within and then rigidly secured to the frame plate 1 by means of a clamp bolt 56. This bolt 56 passes through a hole in the sleeve which is eccentric to the outer bearing surface upon which the disc 21 rotates. The sleeve 55 is further provided with an index plate 57 which carries a series of graduation marks arranged for cooperation with a suitable fixed index on the frame plate 1. By rotating the sleeve 55 and then clamping it in the chosen adjusted position by means of the bolt 56, the cam disc 21 can, in effect, be moved bodily in the common plane of the disc and the follower roller 27 thereby to alter the actual printing pressure which is exerted between the cylinders 4 and 3. The aforesaid graduations are conveniently arranged to correspond to, say, one-thousandth of an inch, and thus permit easy setting and readjustment of the machine to suit different thicknesses of paper used as the copy sheet material.

While one particular constructional form of machine has been described by way of example, it will be apparent that numerous details may be altered widely without departing from the invention.

I claim:

1. An offset lithographic printing, duplicating or like machine which comprises an image-carrying cylinder, a blanket cylinder, an impression cylinder, a machine framework, said image-carrying and said impression cylinders being rotatably mounted at fixed positions in said framework with their respective peripheral surfaces spaced from each other, means rotatably supporting said blanket cylinder at a position where the common plane of the axes of said image-carrying and said blanket cylinders intersects the common plane of the axes of said blanket and impression cylinders at an angle which is approximately a right angle, said blanket cylinder supporting means comprising first and second pivotally mounted support structures, said second support structure being rockable about the axis of one of said fixed position cylinders and said first support structure having said blanket cylinder rotatably mounted therein and being pivotally mounted upon said second support structure for swinging movement of said blanket cylinder bodily towards and away from said impression cylinder in a direction substantially radial to the axis of said impression cylinder and tangential to the outer surface of said image-carrying cylinder and for swinging movement of said blanket cylinder towards and away from said image-carrying cylinder in a direction substantially radial to the axis of said image-carrying cylinder, and tangential to the outer surface of said impression cylinder and first and second pressure applying means for providing respectively an adjustable pressure between said blanket cylinder and said image-carrying cylinder and an independently adjustable pressure between said blanket cylinder and said impression cylinder, said first pressure applying means being operative to rotate said first support means relative to said second support means to move said blanket cylinder bodily towards said impression cylinder and said second pressure applying means being operative to rotate said second support means about the axis of said fixed position cylinder to move said blanket cylinder bodily towards said image-carrying cylinder.

2. A machine according to claim 1 which each of said first and second support structures comprise parallel lever arms at opposite ends of said cylinders and in which each of said lever arms is provided adjacent their cylinder-supporting ends with a pivotal abutment member adapted to be engaged by said pressure applying means, and in which screw adjustment means is provided for altering the position of each of said abutment members relative to the lever arm by which it is carried.

3. A machine according to claim 2 which includes a machine drive shaft, copy sheet sensing means, a rotatable cam disc, lever mechanism controlled by the contoured surface of said cam disc for forcibly moving said blanket and impression cylinders towards one another, means including a yielding coupling for imparting oscillatory movement to said cam disc from said machine drive shaft once during each machine operation cycle, a latching notch on said cam disc and a latching member adapted to be brought into locking engagement with said latching notch in the event of the detection of the absence of a copy sheet by said copy sheet sensing means.

4. A machine according to claim 3 in which said rotatable cam disc is mounted upon a pivot member whose position is adjustable for the purpose of altering the printing pressure between the blanket and impression cylinders.

5. A machine according to claim 4 in which said pivot member comprises a sleeve having a bearing for said rotatable cam disc and itself rotatable about an axis parallel but eccentric to the axis of said cam disc bearing surface.

6. A machine according to claim 5 in which said sleeve

includes clamping means and an associated scale and index system.

7. A machine according to claim 6 which includes means operated in timed relationship to the machine operation cycle for separating said blanket and image-carrying cylinders at the end of each operation cycle.

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