Sept. 1, 1959 I. P. KNOPS ET AL 2,901,970

ROTARY PRINTING MACHINES

Filed May 12, 1958 2 Sheets-Sheet 1

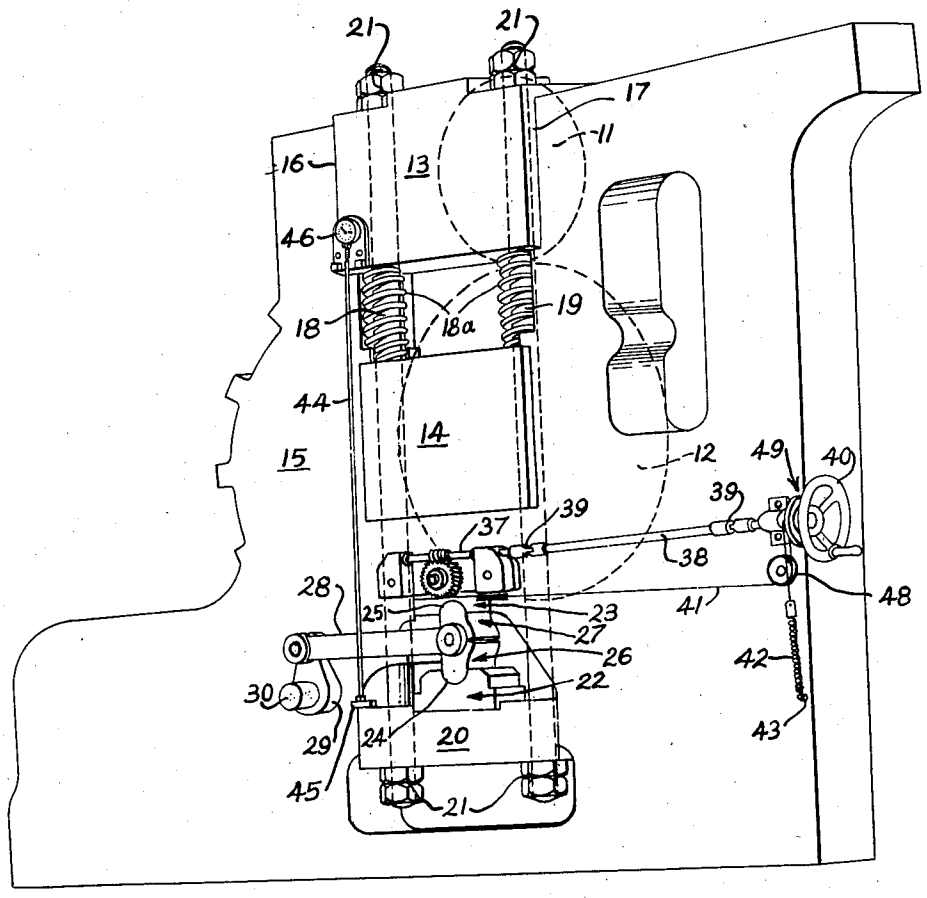


Fig. 1.

Inventors:
Ivan Peter Knops
and
David Christopher Camp
By their attorneys:
Baldwin & Wight

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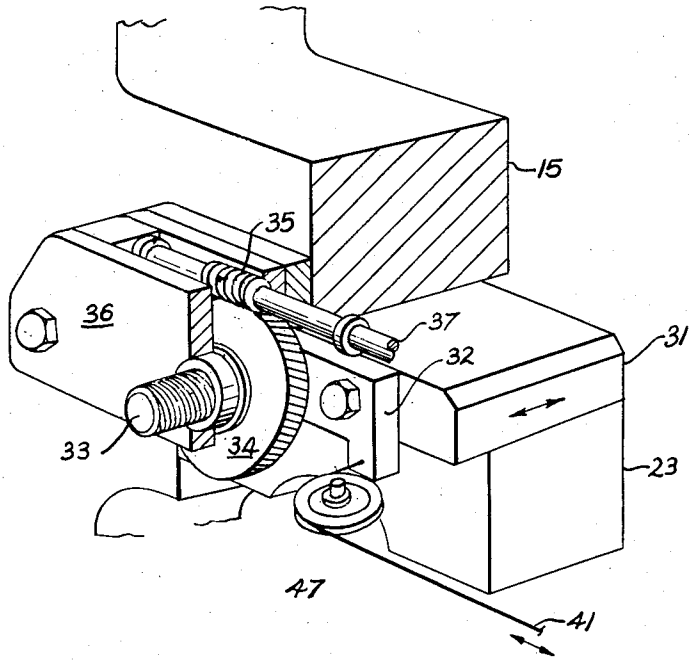


Fig. 2.

Inventors:
Ivan Peter Knops
and
David Christopher Camps
By their attorneys:
Baldwin & Wight

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ROTARY PRINTING MACHINES

Ivan Peter Knops, Twickenham, and David Christopher Camps, Long Ditton, England, assignors to the De La Rue Company Limited, a company of Great Britain

Application May 12, 1958, Serial No. 734,533

Claims priority, application Great Britain August 7, 1957

6 Claims. (Cl. 101—247)

This invention relates to rotary printing machines and especially to an arrangement whereby the printing pressure can be adjusted within desired limits.

The usual method of varying the printing pressure is by adjusting the "make ready," i.e. the amount of packing on the impression cylinder beneath its covering of resilient material. This method, however, is somewhat difficult to put into effect as it requires that the machine must be stopped and the "make ready" varied at any time when a pressure variation is required.

An object of this invention is to provide means whereby the printing pressure can be varied readily by a printer and without it being necessary to stop the machine and to use other than a standard "make ready."

Another object is to provide means whereby the printing pressure can be gauged accurately.

According to this invention a rotary printing machine comprises a main frame, a plate cylinder journalled in a pair of first bearing blocks fast with said main frame, an impression cylinder mounted above said plate cylinder and journalled in a pair of second bearing blocks capable of moving between upper vertical parallel sliding surfaces of said main frame, vertical tension studs passing through and joining said second bearing blocks and a pair of base blocks, nuts on the upper and lower ends of said tension studs and bearing against the upper faces of said second bearing blocks and the lower faces of said base blocks respectively, coil springs between the lower faces of said second bearing blocks and the upper faces of said first bearing blocks, a pair of lower seating blocks each intergral with one of said base blocks, a pair of upper seating blocks spaced from and vertically above said lower seating blocks and capable of being moved vertically, members adapted to exert alternately predetermined high and low pressures between said upper and lower seating blocks, a pair of transversely movable wedge members between mating faces of said upper seating blocks and the main frame and manually operable remote-control means to move said wedge members to adjust the position of said upper seating blocks thereby varying the movement of said base blocks on application of said high pressure between said seating blocks thereby varying the movement of the second bearing blocks against the action of the coil springs and thus varying the pressure between the impression and plate cylinders during the application of said pressure.

Preferably the plate cylinder is provided with a gear wheel having a pitch circle radius slightly less than the overall radius of the plate cylinder with printing plates, which gear wheel is driven by a prime mover and drives the impression cylinder through the medium of a gear wheel associated with the latter when a printing pressure is not required and when said low pressure is applied between said seating blocks.

Preferably also the gear associated with the impression cylinder has a pitch circle radius equal to the radius of the impression cylinder and incorporates a slip mechanism whereby, when said high pressure is applied between said seating blocks, the plate cylinder is driven by its gear and drives the impression cylinder by friction between the surfaces of the plate and impression cylinders.

Preferably also means to measure the pressures between the impression and plate cylinders include an extensiometer adapted to record the linear stretch of the tension studs.

The invention is illustrated in the drawings accompanying the provisional specification, in which:

Figure 1 is a perspective diagrammatic view of one side of a rotary printing machine. It should be noted that complementary parts are to be found on the other side of the machine.

Figure 2 is an enlarged sectional perspective view of part of the mechanism shown in Figure 1.

Referring to Figure 1, the mechanism includes an impression cylinder **11** and a plate cylinder **12** which latter carries printing plate (not shown) on not more than half its circumference. The impression cylinder **11** is journalled in a bearing block or housing **13** and the plate cylinder in a bearing block or housing **14** fast on a main frame **15**; the bearing block **13** is adapted to slide between two surfaces **16**, **17** of the said frame **15**. Tension studs **18** and **19** connect the bearing block **13** with a base block **20** which also is capable of sliding vertically in the main frame. Coil springs **18A** are arranged between the lower face of the bearing block **13** and the upper face of the plate cylinder bearing block **14**, to lift the impression cylinder free of the plate cylinder when a printing pressure is not required. The studs **18** and **19** are secured to the blocks **13** and **20** by means of nuts and check nuts **21**. A seating block **22** is mounted on and above base block **20** and spaced from and vertically above seating block **22** is seating block **23**.

The opposing faces of the seating blocks **22** and **23** are grooved at **24** and **25** respectively. Pressure is applied to the seating blocks **22** and **23** by means of toggles **26** and **27**, which work in the grooves **24** and **25** respectively. The toggles are operated by a pair of connecting rods, one of which is indicated at **28**, and are reciprocated by levers **29** mounted on a rocking shaft **30** which is driven by a cam arrangement (not shown) in the drive for the plate cylinder **12** in such a way that the toggles **26** and **27** act upon the seating blocks **22** and **23** after each half revolution of the plate cylinder, so that the surfaces of the impression and plate cylinders are alternately separated and brought together. A gear wheel is attached to the spindle of the plate cylinder and another gear wheel is freely mounted on the spindle of the impression cylinder, the ratio of the gears being 2:1. The plate cylinder has a slightly larger radius than that of the pitch circle of its gear wheel but the radius of the impression cylinder is equal to that of the pitch circle of its gear wheel. The plate cylinder gear wheel is driven by a prime mover and is adapted to drive the impression cylinder during a first revolution of the latter when no printing operation is required and when no paper is passing through the nip of the cylinders; during a second revolution of the impression cylinder a slip gear mechanism in the impression cylinder gear comes into play in the manner described in the specification of our co-pending application Serial No. 734,531, filed May 12, 1958, and the impression cylinder is then frictionally driven by the plate cylinder for such time as the printing plates and the plate cylinder coact with the impression cylinder. Movement of the impression cylinder arises through movement of the bearing block **13** and the base block **20** through action of the toggles **26** and **27**.

A transversely adjustable wedge member **31** (Figure 2) is mounted between the main frame **15** and the upper seating block **23**. The lower face of the frame **15** and

the upper face of the wedge member **31** are horizontal but the bottom face of the wedge member **31** tapers towards the other side of the machine and the upper face of the setting block **23** is complementary with the tapering face of the wedge member so that the opposite faces are horizontal.

An adaptor plate **32** is bolted to the outside edge of the wedge member **31** and is connected to and adapted to be moved by a screw **33**. An externally threaded worm wheel **34**, located between bearing plates **36**, is mounted on the screw **33** and is adapted to be actuated through the medium of a worm **35**. The worm forms part of a shaft **37** which is connected by way of shaft **38** (Figure 1) and universal couplings **39** to a hand wheel **40** which is carried in a bearing attached to the machine frame.

In order to vary the printing pressure by altering the distance between the centers of the impression and plate cylinders all that is necessary is for an adjustment to be made to the hand wheel **40**. This results in movement being transmitted through the shaft **38** to the worm **35** on the shaft **37**, thence to the worm wheel **34** which causes movement of the screw **33** and thus of the wedge **31**, in a desired direction. The result of such movement of the wedge is a change in the position of the seating block **23** and this results in a different pressure being obtained between the impression and plate cylinders when they are in mating contact one with another, since the position of seating block **23** changes with the position of the wedge **31** and the action of the toggles **26** and **27** brings about a corresponding change in the position of the seating block **22** and of the base block **20**.

A device to indicate the degree of movement of the wedge member **31** comprises a flexible cable **41** anchored to the adaptor plate **32** and guided by pulleys **47**, **48** to an indicating disc **49** freely mounted on the shaft of the hand wheel **40**. The indicating disc **49** is provided with a stepped periphery round which the cable **41** passes. The end of the cable is connected to a spring **42** attached to the frame by a stud **43**. Calibration of the disc **49** enables the position of the upper seating block **23** to be varied in accordance with a desired printing pressure during the period that the impression cylinder is friction driven by the plate cylinder.

An equivalent mechanism is provided on the other side of the machine.

In order to obtain a value for the printing pressure existing between the impression and plate cylinders an extensiometer device may be included to measure the stretch of the tension studs **18** and **19** between the bearing blocks **13** and the base blocks **20**. As the bearing block **14** is fixed the pressure between the two cylinders is directly proportional to the stretch of the studs. A non-stressed steel rod **44** is attached to base block **20** by means of a mounting plate **45**, and at its upper end to a thin spring steel strip which bears and acts upon the shock proof anvil of a dial gauge **46**. The gauge indicates elastic deformation of the studs but can be calibrated to give relative impression pressure readings.

What is claimed is:

1. A rotary printing machine comprising a main frame, a first pair of bearing blocks fast with said main frame, a second pair of bearing blocks capable of movement between upper vertical parallel sliding surfaces on said main frame, a plate cylinder journalled in said first bearing blocks, an impression cylinder mounted above said plate cylinder and journalled in said second bearing blocks, a pair of base blocks, vertical tension studs passing through and joining said second bearing blocks to said blocks, nuts on the upper and lower ends of said tension studs and bearing against the upper faces of said second bearing blocks and the lower faces of said base blocks respectively, coil springs between the lower faces of said second bearing blocks and the upper faces of said first bearing blocks, a pair of lower seating blocks each integral with one of said base blocks, a pair of upper seating blocks spaced from and vertically above said lower seating blocks and capable of being moved vertically, members adapted to exert alternately predetermined high and low pressures between said upper and lower seating blocks, a pair of transversely movable wedge members between mating faces of said upper seating blocks and the main frame, and manually operable remote-control means to move said wedge members to adjust the position of said upper seating blocks, thereby varying the movement of said base blocks on application of said high pressure between said seating blocks, thereby varying the movement of the second bearing blocks against the action of the coil springs and thus varying the presure between the impression and plate cylinders during the application of said pressure.

2. A rotary printing machine as claimed in claim 1, in which the plate cylinder is provided with a gear wheel having a pitch circle radius slightly smaller than the overall radius of the plate cylinder with printing plates, which gear wheel is driven by a prime mover and drives the impression cylinder through the medium of a gear wheel associated with the latter when a printing pressure is not required and when said low pressure is applied between said seating blocks.

3. A rotary printing machine as claimed in claim 2, in which the gear associated with the impression cylinder has a pitch circle radius equal to the radius of the impression cylinder and incorporates a slip mechanism whereby, when said high pressure is applied between said seating blocks, the plate cylinder is driven by its gear and drives the impression cylinder by friction between the surfaces of the plate and impression cylinders.

4. A rotary printing machine as claimed in claim 1, in which an extensiometer is provided to measure the pressures between the impression and plate cylinders by recording the linear stretch of the tension studs.

5. A rotary printing machine as claimed in claim 2, in which an extensiometer is provided to measure the pressures between the impression and plate cylinders by recording the linear stretch of the tension studs.

6. A rotary printing machine as claimed in claim 2, in which the gear associated with the impression cylinder has a pitch circle radius equal to the radius of the impression cylinder and incorporates a slip mechanism whereby, when said high pressure is applied between said seating blocks, the plate cylinder is driven by its gear and drives the impression cylinder by friction between the surfaces of the plate and impression cylinders, an extensiometer being provided to measure the pressures between the impression and plate cylinders by recording the linear stretch of the tension studs.

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