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(54) Title:
A ROTARY PRINTING PRESS

(57) Abstract:
A rotary printing press in which a web to be printed is to be conducted via an impression cylinder and there to be provided with print by means of a printing unit ,is built around a beam structure, from which the printing unit and possibly other means is suspended and on or in which the other means of the printing press are arranged.

A ROTARY PRINTING PRESS

Technical Field

The present invention relates to a rotary printing press, in which a web to be printed is arranged to be conducted via an impression cylinder and there to be imprinted by means of a printing unit.

Background of the Invention

Traditional printing presses are built with frameworks standing on a floor. The printing presses are compact, the floor surfaces in and in the vicinity of the printing press are limited and cluttered with equipment, and the different cylinders in the printing press and its printing units are difficult to reach. Thus, such printing presses are very hard to work with for the printing personnel, especially when a change of printing order shall occur, and it becomes very hard to keep the area in and around the printing press clean.

The Invention

In accordance with the invention the printing press is instead built around a beam structure, from which the printing unit and possibly other means is suspended and on or in which the other means of the printing press are arranged.

The main advantage obtained hereby is that the floor under the printing press becomes free, so that the printing personnel can move around the printing unit and perform necessary tasks on the unit. Furthermore, the construction becomes very tidy, and the cleaning in and around the printing press becomes very easy.

The beam structure may preferably be supported from a foundation (the floor) by means of pillars, but it may equally well be suspended from supporting portions of a building in which the printing press is arranged.

A further advantage is according to the invention accomplished in that the printing unit is displaceable

crosswise to the beam structure in brackets or roller conveyors. Hereby the printing unit can be pulled out crosswise for maintenance works and exchange of colour or cylinders.

The printing unit preferably consists of a frame with cylinders, which are rotatably journalled therein and are arranged to be driven synchronously with the impression cylinder, when the printing unit is in printing position underneath the impression cylinder.

In a preferred embodiment of the invention the beam structure comprises to longitudinally beams and crossbeams.

A rotary printing press for four-colour printing has four printing units but can also have a fifth printing unit, if a dominating colour ("house colour") is often printed. According to the invention the four or five printing units are all arranged under the beam structure.

The impression cylinders are rotatably journalled in the beam structure, which for their operation is provided with an electric primary motor, longitudinal drive shafts and angle joints.

It has been said above that printing units can be pulled out crosswise for maintenance works and exchange of cylinders and colours. If according to the invention the beam structure at each longside is provided with a jib arrangement, more than one set of printing units may be movably arranged crosswise to the beam structure. Hereby one set of printing units can be active for printing in the printing press, at the same time as a second set is prepared for the next consecutive printing order. Extremely short set-up times are obtained in this way.

Each jib arrangement may be composed of a framework consisting of cross bars and a longitudinal bar.

The construction of the printing press around a beam structure does not only embrace the advantages with the hanging printing units as stated above, but the conduction

of the web of the top side of the beam structure can also be very short and simple with accompanying advantages, among them a high reliability of service and a small material waste.

Breaf Description of the Drawings

The invention will be further described below under reference to the attached drawings, in which FIG 1 is a diagrammatic side view of a printing unit for a printing press according to the invention, FIG 2 is a side view of a printing press according to the invention and FIG 3 is a view seen obliquely from above of the printing press according to FIG 2 with certain parts at the top side left out for the sake of clarity.

Description of Preferred Embodiments

A printing unit for a rotary printing press diagrammatically shown in FIG 1 has a number of cylinders described below, which are driven synchronously by means not shown in FIG 1, for example gearwheels (illustrated in FIG 3).

In the configuration illustrated in FIG 1 the printing unit in a lowermost position has a screen cylinder 1 (often called an anilox cylinder), which at rotation picks up printing ink from a doctor chamber 2. The printing ink, which preferably has a very high viscosity, is deposited on the screen cylinder 1, which in a known manner is provided with a very large number of small depressions for pickup of the printing ink on its entire peripheral surface.

From the screen cylinder 1 the ink is transferred to a form cylinder 3, which bears against the screen cylinder and rotates with the same speed and whose surface is somewhat elastical by being made of ground rubber material. In order to accomplish a distribution of the ink on the form cylinder 3 which is as even as possible, an oscillating cylinder 4 (a polished steel cylinder) is in rotational engagement with the form cylinder 3, while a rubber

cylinder 5 in turn is in rotational engagement with the oscillating cylinder 4. In the preferred embodiment a fully satisfactory distribution of the ink on the form cylinder 3 is obtained by means of the two cylinders 4 and 5, but a greater number of ink distributing cylinders may of course be arranged in the vicinity of the form cylinder 3.

The next cylinder in the printing unit is a plate cylinder 6, on the periphery of which a printing plate is arranged. At least a part of the periphery of the plate cylinder 6 is made of a magnetic metal material, while the thin and pliable printing plate has a metal base adhering to the periphery of the plate cylinder. Over the metal base the printing plate is provided with a plastic layer, in which the desired printing pattern is worked out. Other ways of attaching the printing plate on the plate cylinder 6 are possible, such as by mechanical or vacuum based means. The plate cylinder 6 bears against the form cylinder 3 and has the same peripheral speed.

The screen cylinder 1, the form cylinder 3 and the plate cylinder 6 preferably have the same diameter.

From the plate cylinder 6 the print is transferred to a rubber blanket cylinder 7 (i.e. a rubber blanket covered steel cylinder), which is in contact therewith and has the same peripheral speed. By the fact that the rubber blanket cylinder 7 preferably has twice as big diameter as the plate cylinder 6 and thus twice as big periphery, the rubber blanket cylinder obtains two full impressions from the plate cylinder at each revolution. The rubber blanket cylinder 7 can alternatively have three or more times as big diameter as the plate cylinder.

Engaging the rubber blanket cylinder 7 is finally an impression cylinder 8, preferably with the same diameter as the former one. A web 9 to be printed is conducted between these two cylinders; this web can be made of a paper material or any other suitable material.

FIG 1 is a very schematic illustration of a printing unit. No journallings, drives or the like are shown. Further guiding in these respects can be obtained from FIGS 2 and 3 together with the description thereof.

By means of a printing unit as described above it is possible to obtain a printing process which can be said to be an intermediary between flexographic printing and offset printing. At flexographic printing, which is most suitable for the printing of single coloured, large areas and not for four colour-printing, use is made - apart from the impression cylinder - of a block cylinder engaging the web and a screen cylinder cooperating with the block cylinder for receiving the ink. At offset printing on the other hand the process is more complicated with a greater number of cylinders and with printing ink and fountain solution (on the non-printing portions of the plate).

With the new printing process it is posible to obtain a printing quality which is very close to that otherwise only obtained by offset printing.

FIG 2 is a side view of a rotary printing press. This printing press is provided with four printing units of the kind illustrated in FIG 1 (or alternatively of some other kind). Each such printing unit, the impression cylinder 8 over which the web is conducted not being regarded as included in the printing unit, has been given the collective reference numeral 10. The reason why the number four has been chosen is of course the traditional one, namely that all printing colours can be obtained by means of the four colours yellow, bluish red (magenta), greenish blue (cyan) and black. In special cases, when a special colour ("house colour") is used to a large extent for printing, a fifth printing unit can be provided for this colour.

A distinctive feature with the printing press according to FIG 2 is that it is formed around a strong beam structure 11, from which the printing units 10 are

suspended and on which in principle all other equipment, described in short below, is arranged. This beam structure 11 is in the shown case supported by means of pillars 12 from the floor but could in principle quite as well be suspended from the ceiling of a printers building. The advantage with this construction is that the floor under the printing press is free for the operators and that the printing units and other equipment are extremely accessible.

Each printing unit 10 is arranged in a frame 13, which thus is suspended from the beam structure 11. Each printing unit 10 with its frame 13, which together can be called a cassette, can accordingly easily be dismounted and exchanged to a new one and/or be serviced.

The web 9 enters the printing press to the right in FIG 2, where it is first exposed to surface treatment at 14 and thereafter for cleaning at 15. A lateral guiding arrangement 16 is arranged at the end of the beam structure 11 and accomplishes a lateral guiding of the web by turning around an axis parallel with the longitudinal axis of the beam structure 11. The web tension, which is essential for the function of the printing press and the quality of the print, is controlled by means of entrance nip cylinders 17 and exit nip cylinders 17' and also - if needed - a web tension arrangement 17", which consists of a tilting lever, which is controlled by means of a pneumatic cylinder and has a roller, over which the web 9 is conducted.

After having passed over the impression cylinder 8 in a printing unit, where the web 9 has been provided with print in the form of an array of high viscosity printing ink, the web 9 passes a drying device 18. In the actual case this drying device 18 consists of UV-lamps, as the used printing ink is of the type hardened by means of UV-radiation. Alternatively, hot air drying or other drying can be used.

When the web 9 has passed all printing units 10 in the printing press and accordingly been provided with the desired four colour-print, it can pass through an inspection system, for example past a stroboscope lamp 19, so that an operator can check the printing quality, before the printed web 9 leaves the printing press to the left in FIG 2.

The impression cylinders 8, over which the web 9 is conducted, are rotatably journalled in the beam structure 11, whereas the cylinders 1, 3-7 of each printing unit 10 are rotatably journalled in the frame 13. At the exchange of printing format, i.e. a change of cylinder diameters, or possibly a change of printing ink the printing unit cassettes 10, 13 can easily be removed from the printing press and be replaced by new casettes. These new casettes can be prepared during the previous run. Altogether this means that the time lost at casette exchange becomes extremely short. At a casette exchange the web 9 is further not affected, which minimizes the waste at changes.

It appears from FIG 2 that the printing unit casettes 10, 13 can be suspended from brackets 20 at the underside of the beam structure 11 and accordingly can be pulled out laterally and handled for example with trolleys or a traverse.

The construction is very operator friendly and leaves the floor in principle free. The suspended printing units with the ink storage (the doctor chambers 2) furthest down has the effect that ink cannot pour over the equipment. The web path between the printing units can be very short and stable.

In FIG 3, where the printing press is shown in an oblique top view, devices on the top side of the beam structure 11 are omitted in order that certain aspects of the design shall appear more clearly and not be blocked by these devices.

It appears in FIG 3 that the beam structure 11 in the shown case consists of longitudinal beams 11' and cross beams 11". The beam structure 11 is supported by the pillars 12. The impression cylinders 8, the entrance nip cylinders 17 and the exit nip cylinders 17' are rotatably journalled in the longitudinal beams 11' of the beam structure.

The impression cylinders 8 and the entrance nip cylinders 17 in the beam structure 11 are arranged to be driven by means of an electric primary motor 21 via longitudinal drive shafts 22 and angle joints 23. The exit nip cylinders 17' are arranged to be driven by means of an electric motor 21'.

A jib arrangement 24 is provided on either side of the beam structure 11 and consists for example of cross bars 24', attached to the longitudinal beam 11', and a longitudinal bar 24". The jib arrangement 24 at one side of the beam structure 11 is also visible in FIG 2. The jib arrangement 24 can, if required, be supported by pillars 12.

The brackets 20 mentioned above or roller conveyors for the printing unit casettes 10, 13 are arranged at the lower side of the jib arrangement 24. As shown in FIG 3, this means that printing unit casettes 10, 13 in one set can be pulled out to the right under the jib arrangement 24 for after treatment after a previous print run and preparations for a coming print run, at the same time as a second set of printing unit casettes 10, 13 are in the position for printing under the impression cylinders 8. (Only one printing unit casette 10, 13 in printing position is for the sake of clarity provided with a reference numeral in FIG 3). When the printing is completed, the second set of printing unit casettes 10, 13 can easily be brought out under the jib arrangement 24 to the left in FIG 3, while the printing unit casettes 10, 13 under the jib arrangement

24 to the right in FIG 3, prepared for the coming printing, are brought into position for printing under the impression cylinders 8. An extremely short replacement time between different print runs is hereby obtained and accordingly a very high efficiency.

The system can be completed with an external handling system in the form of trolleys or a traverse for handling the printing unit casettes 10, 13, possibly more than two sets.

It appears clearly in FIG 3 that the different cylinders in each printing unit casette 10, 13 are connected to each other by means of a set of gearwheels. When the casette is brought into its printing position under its impression cylinder 8, the uppermost gearwheel in this gearwheel set will be brought into engagement with a corresponding gearwheel of an output gearbox 25 on the outgoing shaft of the impression cylinder 8.

It should be observed that the beam structure 11 with the printing units 10, 13 arranged thereunder is the core of the construction and that the jib arrangements 24 can be present or not.

CLAIMS

1. A rotary printing press, in which a web (9) to be printed is arranged to be conducted via an impression cylinder (8) and thus to be imprinted by means of a printing unit (10,13), c h a r a c t e r i z e d in that the printing press is built around a beam structure (11), from which the printing unit (10,13) and possibly other means is suspended and on or in which the other means of the printing press are arranged.

2. A printing press according to claim 1, c h a r a c t e r i z e d in that the beam structure (11) is supported from a foundation by means of pillars (12).

3. A printing press according to claim 1, c h a r a c t e r i z e d in that the beam structure (11) is suspended from supporting portions of a building in which the printing press is arranged.

4. A printing press according to claim 1, c h a r a c t e r i z e d in that the printing unit (10,13) is displaceable crosswise to the beam structure (11) in brackets (20) or roller conveyors.

5. A printing press according to claim 1, c h a r a c t e r i z e d in that the printing unit (10,13) consists of a frame (13) with cylinders, which are rotatably journalled therein and are arranged to be driven synchronously with the impression cylinder (8), when the printing unit is in printing position underneath the impression cylinder.

6. A printing press according to claim 1, c h a r a c t e r i z e d in that the beam structure (1) comprises two longitudinal beams (11) and crossbeams (11').

7. A printing press according to claim 6, c h a r a c t e r i z e d in that several printing units (10,13), preferably four or five printing units, are arranged under the beam structure (11).

8. A printing press according to claim 7, c h a r a c t e r i z e d in that the impression cylinders (8) are rotatably journalled in the beam structure (11), which for their operation is provided with an electric primary motor (21), longitudinal drive shafts (22) and angle joints (23).

9. A printing press according to claim 1, c h a r a c t e r i z e d in that the beam structure (11) at each longside is provided with a jib arrangement (24), under each of which more than one set of printing units (10,13) may be movably arranged crosswise to the beam structure.

10. A printing press according to claim 9, c h a r a c t e r i z e d in that each jib arrangement (24) is composed of a framework consisting of crossbars (24') and a longitudinal bar (24").

ABSTRACT

A rotary printing press, in which a web (9) to be printed is to be conducted via an impression cylinder (8) and there to be provided with print by means of a printing unit (10,13), is built around a beam structure (11), from which the printing unit and possibly other means is suspended and on or in which the other means of the printing press are arranged.

To be published with FIG 2.

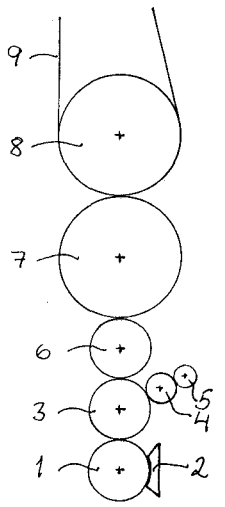

Fig 1

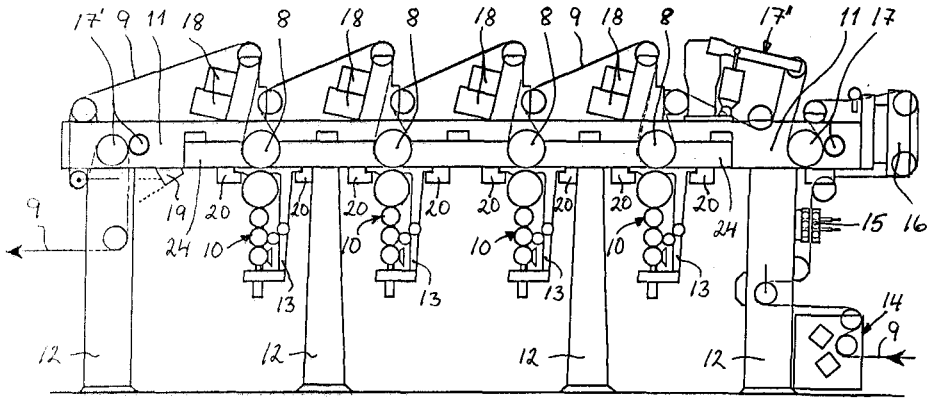

Fig 2

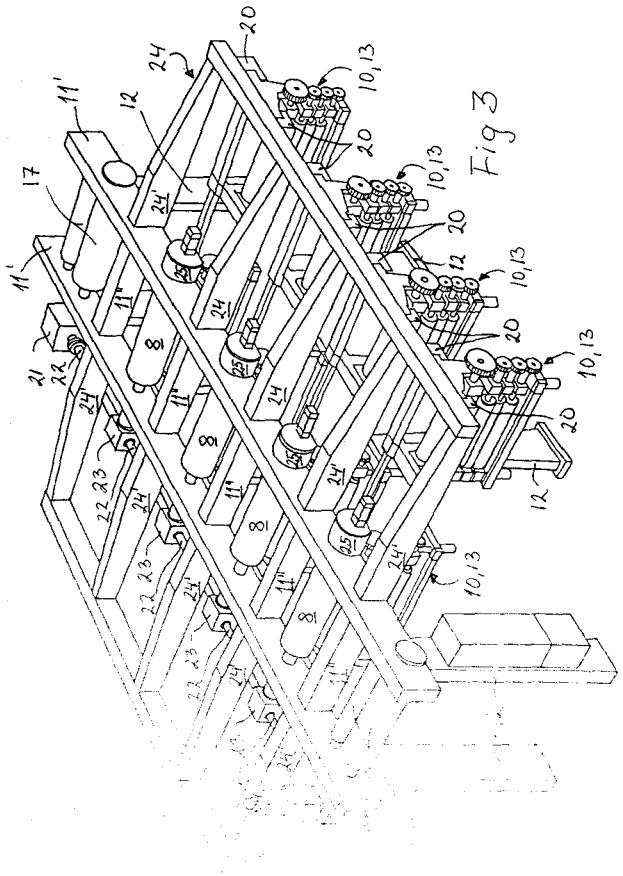

Fig 3

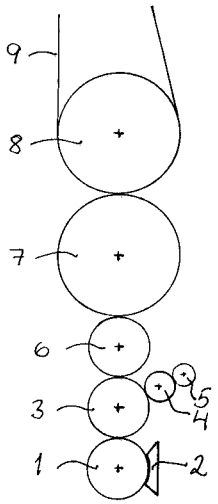

Fig 1

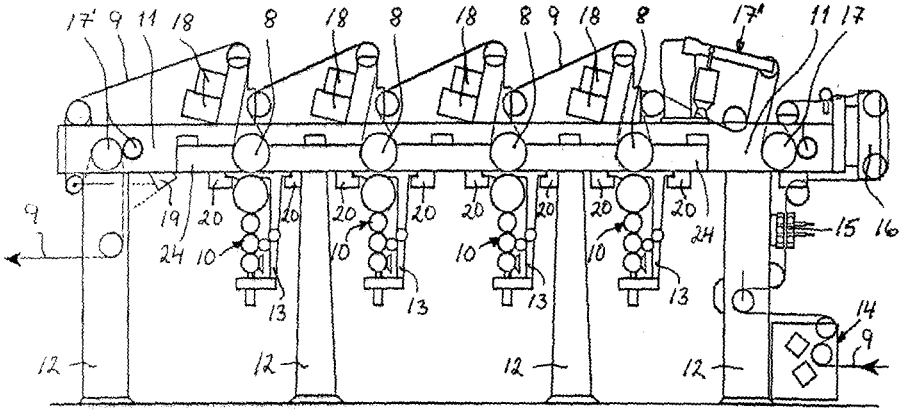

Fig 2

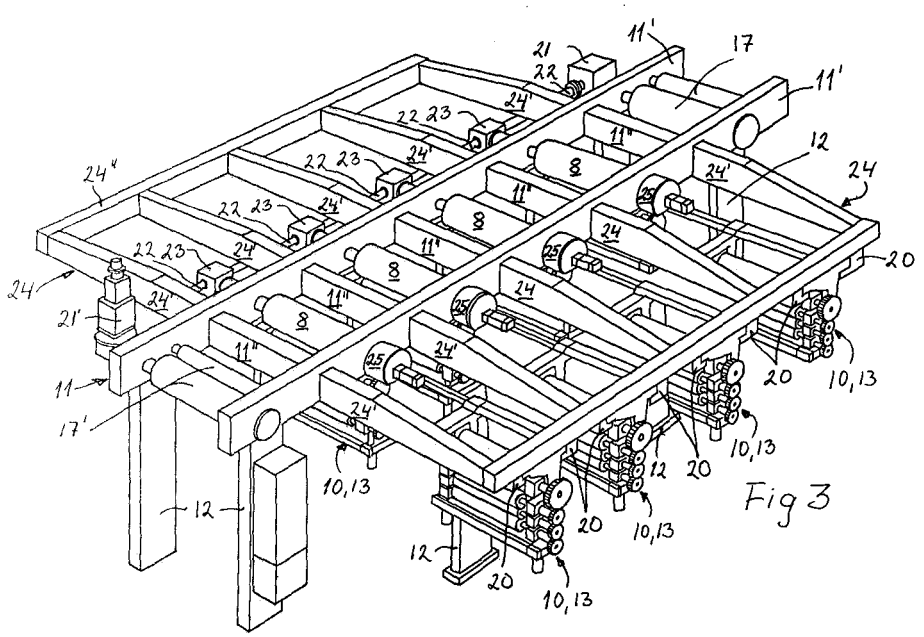

Fig 3