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INKING ARRANGEMENT FOR ROTARY PRINTING PRESSES

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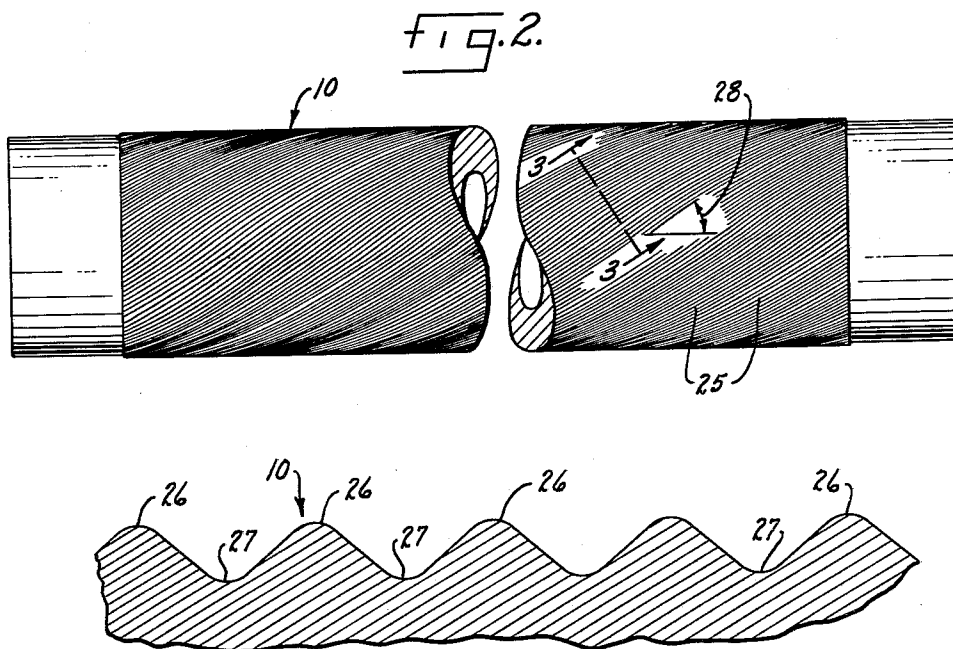
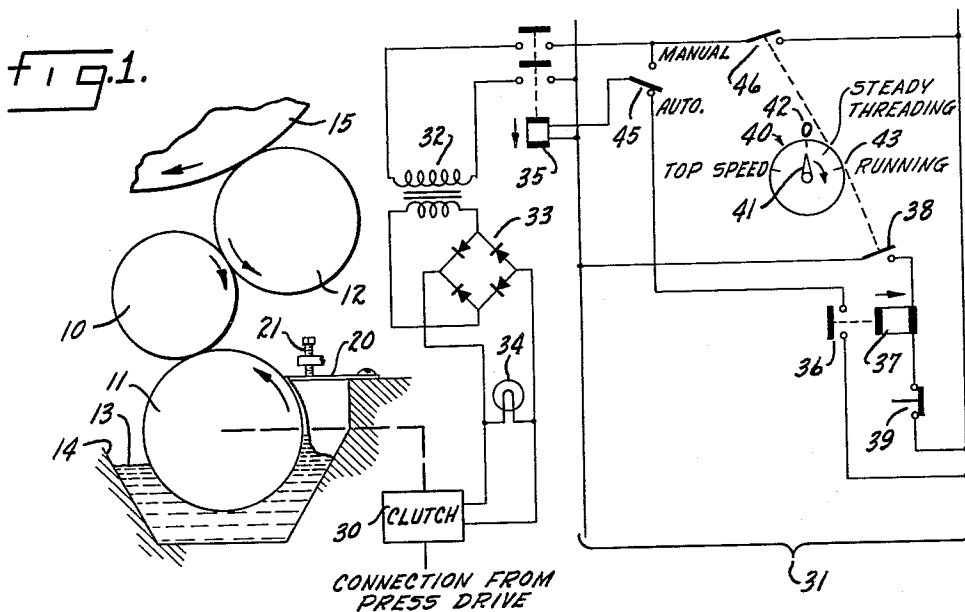


fig. 3.

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1

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INKING ARRANGEMENT FOR ROTARY
PRINTING PRESSES

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This invention relates to rotary printing presses and concerns, more particularly, an ink feeding arrangement for such presses.

In a rotary press continuous ink feeding system, a pickup roller rotates adjacent to a driven fountain roller that is partially immersed in a supply of ink. The periphery of the pickup roller drives through the film of ink on the fountain roller and carries the ink to a resilient transfer roller running in contact with the pickup roller. The transfer roller also runs in contact with a distributing drum or cylinder to which the ink is transferred and spread as a film. Subsequent transfer rollers and drums smooth out the ink film and carry it to the plate or printing cylinder which applies the ink in the desired pattern to the paper.

To vary the amount of ink supplied to different areas across the width of the plate or printing cylinder, a flexible blade is positioned along the fountain roller so that spaced portions thereof are individually deflectable toward and away from the periphery of the fountain roller. Adjusting screws or keys control the blade's position. The blade strips excess ink from the fountain roller, with the amount of ink removed being dependent upon the position of the flexible blade relative to the roller surface. By suitably adjusting the blade keys along the roller, differing amounts of ink are fed through the inking system to related areas on the plate cylinder.

It will be apparent that the better the pickup roller is able to supply an even and uniform flow of ink, the less need there will be for spreading out and smoothing the ink film as it is carried to the plate or printing cylinder. Experience has shown that a smooth surfaced pickup roller does not feed an even flow of ink to the inking system. A pattern of irregular ink blotches forms on a smooth surfaced pickup roller so that ink is not uniformly delivered for any given key and blade setting. To overcome the disadvantages of smooth surfaced pickup rollers, rotary presses have utilized pickup rollers having helical ridges running about the roller surface. Such a construction is disclosed in U.S. Patent No. 2,369,814, issued February 20, 1945, to Worthington. However, while superior in performance to a smooth surface, such helical ridge rollers are subject to some limitations such as a tendency to deliver a pattern of ink strips to the inking system.

It is the general aim of the invention to provide a novel ink pickup roller for a rotary press whose operating characteristics are greatly superior to the types of rollers previously known and used.

With more particularity, it is an object of the invention to provide a novel pickup roller which delivers a substantially uniform flow of ink from a fountain roller to a transfer roller in a press. Therefore, fewer distributing drums for spreading the ink uniformly are required in a system utilizing the roller of the invention.

Another object is to provide a pickup roller as characterized above which is capable of feeding ink at a greater controlled and uniform rate than has heretofore been obtainable. As a result, the novel roller of the invention responds reliably to a full range of fountain roller blade key settings and also makes possible the supplying of an adequate amount of ink as required in certain keyless inking arrangements.

2

A further object is to provide a pickup roller which contributes greatly to minimizing the problem of ink misting and slinging.

It is also an object to provide an ink pickup roller which works effectively and does not flood when the speed of the fountain roller is considerably increased relative to the speed of the pickup roller. In this way, the press operator obtains much faster key response and is, therefore, better able to control the flow of ink to the printing cylinder. Moreover, the ink flow to the printing plates remains uniform throughout considerable ranges in press speed.

In one of its aspects, it is an object of the invention to provide a novel control system which helps prevent a buildup of ink on the pickup roller of a press as the press is started and stopped or is being threaded at slow speeds whether or not plates and paper are in the printing couple.

Other objects and advantages of the invention will become apparent upon reading the following detailed description and upon reference to the drawings, in which:

FIGURE 1 is a somewhat diagrammatic representation of an inking system embodying the present invention;

FIG. 2 is an elevation of the novel pickup roller utilized in the system in FIG. 1; and

FIG. 3 is a greatly enlarged fragmentary section taken approximately along the line 3—3 in FIG. 2.

While the invention will be described in connection with a preferred embodiment, it will be understood that we do not intend to limit the invention to that embodiment. On the contrary, we intend to cover all alternatives, modifications, and equivalents as may be included within the spirit and scope of the invention as defined by the appended claims.

Turning now to the drawings, there is shown a portion of a rotary press ink feeding arrangement including an ink pickup roller 10 constructed in accordance with the present invention. The pickup roller 10 is journaled parallel to and cooperates with both a fountain roller 11 and a resiliently surfaced transfer roller 12. The fountain roller 11 rotates partly submerged in a supply of ink 13 carried in a press fountain 14.

The pickup roller 10 is in firm contact with the transfer roller 12 but is slightly spaced from the fountain roller 11 a distance having a magnitude on the order of approximately 0.005 to 0.006 of an inch. The transfer roller 12 is also in firm contact with a distributing drum or cylinder 15.

The pickup roller 10, transfer roller 12 and distributing drum 15 are all driven from the main drive of the press at the speed at which the press is running. In a modern rotary press, this means that these rollers and the drum will have a running or normal operating peripheral speed of about 2,000 feet per minute. The fountain roller 11 is also driven from the main press drive but at a speed which is proportional to but much slower than the peripheral speed of the pickup roller 10. It has been common to run such fountain rollers at a peripheral speed of approximately 20 feet per minute, although the fountain roller 11 is run at a greater speed as is brought out below.

In operation, the fountain roller 11 lifts a fairly heavy coating of ink from the fountain 14. The pickup roller 10 drives through the layer of ink on the fountain roller 11 and picks up a supply of ink which it carries to the transfer roller 12. The resilient transfer roller 12, pressing against both the pickup roller 10 and the distributing drum 15, spreads out and smooths the ink from the pickup roller 10 into a film on the drum 15. The ink is thereafter carried into the press where it is applied to the plate or printing cylinder (not shown).

To vary the amount of ink supplied along the width of the press, a flexible blade 20 is mounted along one side of the fountain 14 within its edge closely adjacent

the periphery of the fountain roller 11. The blade is provided with a plurality of keys, of which only the key 21 is shown, that are adjustable to vary the spacing between the blade and the fountain roller. By shifting portions of the blade toward and away from the fountain roller by operating the keys 21, the thickness of the film of ink carried on the surface of the fountain roller is controlled so that the fountain roller supplies varying amounts of ink along the length of the pickup roller 10 to be conveyed to the plate or printing cylinder.

In accordance with the invention, the surface of the pickup roller 10 is formed by a helically wound pattern of grooves 25 which define rounded ridges 26 and valleys 27 having a configuration, in cross section, similar to a sine wave. The grooves 25 are shallow and closely spaced with there preferably being from 20 to 60 grooves per inch, as measured in the plane of FIG. 3, and with each valley 27 being from 0.002 to 0.020 of an inch deep. The pitch of the grooves 25, that is, the angle 28 at which they are disposed with respect to a plane through the pickup roller axis, is preferably in the range between 15° and 60°.

As can be seen in FIG. 3, the sine wave description for the configuration of the ridges 26 and the valleys 27 is not intended to be mathematically precise and is used only to suggest, in a convenient way, the rounded ridges 26 and rounded valleys 27 which make up the surface of the roller.

While the reasons for their effective operation are not altogether clear, it has been found that pickup rollers similar to the roller 10 handle greater quantities of ink much more uniformly than previously known designs. The ink is uniformly fed to the remaining rollers in the ink system without the development of a noticeable pattern that is carried through the inking system and applied to the paper being printed. Experience has shown that the pickup roller 10 supplies ink with sufficient uniformity as to make unnecessary a second distributing drum or cylinder similar to the drum 15 as is commonly found in a rotary press inking system. Also, a shorter ink drum oscillation stroke is required. Eliminating one drum assembly and shortening the stroke of the remaining drum reduces frictional heat buildup and lessens power requirements in the press. It is observable at low speeds that the ink droplets which form on the roller 10 are of a minute, pinhead size and that they are closely spaced and uniformly distributed. In contrast, on pickup rollers of the type shown in the patent identified above the ink droplets form more irregularly and are approximately $\frac{1}{16}$ to $\frac{1}{8}$ of an inch in diameter.

Because of the high ink carrying capacity of the roller 10, the fountain roller 11 can be driven at a much higher speed without flooding the pickup roller and causing it to throw off ink. With the pickup roller 10 running at a peripheral speed of 2,000 feet per minute, it is possible to raise the peripheral speed of the fountain roller from the normal 20 feet per minute to a peripheral speed of 50 to 200 feet per minute. The practical effect of this change in operation is that the operator of the press experiences a much faster key response since a change in the gap between the blade 20 and the fountain roller 11 is quickly translated into a change in the amount of ink supplied to a given area on the printing or plate cylinder. It is also important to note that the high ink carrying capacity of the pickup roller 10 makes possible a keyless inking system which relies upon supplying more ink to the ink drum system than is supplied in conventional arrangements.

It is also true that the use of pickup rollers similar to the roller 10 greatly reduces the problem of ink misting and slinging in a press. In the first place, no large droplets are formed on the pickup roller which could be thrown off to contribute to the ink misting and slinging problem. Secondly, the uniformity of ink delivery obtained through the use of the roller 10 permits the

elimination of an entire set of transfer rollers and accompanying distributing drum, and of course, the fewer the rollers in the inking train, the less misting inherently occurs. Finally, because of the rounded configuration of the grooves 25, the resilient transfer roller 12 presses into the valleys 27 and engages substantially all areas of the pickup roller surface, thus completely cleaning the roller and preventing the buildup of relatively large droplets on the pickup roller which eventually are thrown off.

Because of the smoothly rounded outer configuration of the grooves 25, the roller 10 is self-cleaning in the sense that there is no tendency for paper dust or other foreign material becoming trapped on the roller.

During web threading operations with the press being run slowly, printing couples without plates or without associated paper do not give up ink and hence the inking system would soon flood if the fountain roller continued to feed more ink into the system. Also, when the press is stopped during a high speed printing run, ink drips down into the system and builds up a surplus supply which will cause the plates to be flooded when printing is resumed.

It is, therefore, a feature of the invention to provide a novel control which interrupts rotation of the fountain roller when press speed drops below slow running speed. For this purpose, a clutch 30 is interposed between the fountain roller 11 and the main press drive, with the clutch being electromagnetically engaged upon being coupled to the main press power lines 31 through a transformer 32 and a rectifier 33. In the illustrated circuit, a pilot light 34 is connected in parallel with the clutch 30 so as to visually indicate when the clutch is engaged and the fountain roller 11 is being driven.

A solenoid controlled switch 35 operates the clutch 30 by coupling, when energized, both input leads of the transformer 32 to the lines 31. The solenoid switch 35 is controlled by a set of contacts 36 operated by a second solenoid 37. The solenoid 37, in circuit with a normally open switch 38 and a normally closed switch 39, is connected across the lines 31. The switch 38 is coupled to a press speed control 40 having an element 41 which is moved clockwise from a zero position 42 as the speed of the press is increased. When the element 41 passes "steady threading" speed and reaches press running speed at 43, the switch 38 is closed so as to energize the solenoid 37. This closes the contacts 36 and energizes the solenoid switch 35 which engages the clutch 30 to drive the fountain roller. So long as the press speed remains above the predetermined limit, here the slow running speed of the press, the clutch 30 remains engaged and the fountain roller 11 continues to be driven. Upon exceeding this lower limit, as when the press is being threaded, the solenoid 37 is dropped out and the clutch 30 is disengaged so that the fountain roller can no longer supply ink to the pickup roller 10.

The switch 39 is a portion of the emergency stop control for the press and it can be seen that operation of this switch deenergizes the solenoid 37 and thus disengages the clutch 30.

In the preferred construction, a selector switch 45 is interposed in the circuit with the solenoid switch 35 so that the switch 45 can be turned from the "automatic" position illustrated, wherein the solenoid 35 is controlled by the contacts 36, to a "manual" position which bypasses the contacts 36 and their controlling solenoid 37. In the "manual" position, the clutch 30 is engaged at the closing of a switch 46 by control 40 and this permits the press operator to supply ink to the press for purposes of registering the printing plates at steady threading speed.

In the illustrated arrangement, the control 40 opens the switch 46 when the press speed drops below threading speed. Opening the switch 46 deenergizes the transformer 32 so as to cause disengagement of the clutch 30

5

whether the switch 45 is in its "automatic" or its "manual" position. Thus, it can be seen that when the press is again started after being stopped during a high speed run, the inking system has a chance to clear itself of "drain-back" ink as press speed builds up before the clutch 30 is engaged and more ink is fed into the system.

We claim as our invention:

1. In a printing press, an ink feeding arrangement comprising, in combination, an ink fountain, a fountain roller journaled for rotation in said fountain, means for rotating said fountain roller, a transfer roller journaled parallel to said fountain roller and being spaced therefrom, a pickup roller journaled parallel to said fountain and transfer rollers with the surface of the pickup roller being in contact with said transfer roller and slightly spaced from said fountain roller, said surface being formed by a helical pattern of grooves which define rounded ridges and valleys having a configuration in cross section similar to a sine wave, and means for rotating said pickup and transfer rollers.

2. In a printing press, an ink feeding arrangement comprising, in combination, an ink fountain, a fountain roller journaled for rotation in said fountain, means for rotating said fountain roller, a transfer roller journaled parallel to said fountain roller and being spaced therefrom, a pickup roller journaled parallel to said fountain and transfer rollers with the surface of the pickup roller being in contact with said transfer roller and slightly spaced from said fountain roller, said surface being formed by a pattern of shallow, closely spaced grooves formed helically about said roller and defining rounded ridges and valleys as seen in cross section, and means for rotating said pickup and transfer rollers.

3. In a printing press, an ink feeding arrangement comprising, in combination, an ink fountain, a fountain roller journaled for rotation in said fountain, means for rotating said fountain roller, a transfer roller journaled parallel to said fountain roller and being spaced therefrom, a pickup roller journaled parallel to said fountain and transfer rollers with the surface of the pickup roller being in contact with said transfer roller and slightly spaced from said fountain roller, said surface being formed by a helically wound pattern of grooves which define rounded ridges and valleys having a configuration in cross section similar to a sine wave, the pitch of said grooves defining an angle with respect to a plane through the pickup roller axis lying approximately in the range between 15° and 60°, and means for rotating said pickup and transfer rollers.

4. In a printing press, an ink feeding arrangement comprising, in combination, an ink fountain, a fountain roller journaled for rotation in said fountain, means for rotating said fountain roller, a transfer roller journaled parallel to said fountain roller and being spaced therefrom, a pickup roller journaled parallel to said fountain

6

and transfer rollers with the surface of the pickup roller being in contact with said transfer roller and slightly spaced from said fountain roller, said surface being formed by a helically wound pattern of grooves which define rounded ridges and valleys having a configuration in cross section similar to a sine wave, with there being from 20 to 60 grooves per inch, said valleys being from 0.002 to 0.020 of an inch deep, and means for rotating said pickup and transfer rollers.

5. In a printing press, an ink feeding arrangement comprising, in combination, an ink fountain, a fountain roller journaled for rotation in said fountain, means for rotating said fountain roller, a transfer roller journaled parallel to said fountain roller and being spaced therefrom, a pickup roller journaled parallel to said fountain and transfer rollers with the surface of the pickup roller being in contact with said transfer roller and slightly spaced from said fountain roller, said surface being formed by a helically wound pattern of grooves which define rounded ridges and valleys as seen in cross section, the pitch of said grooves defining an angle with respect to a plane through the pickup roller axis lying approximately in the range between 15° and 60° with there being from 20 to 60 valleys per inch, said valleys being from 0.002 to 0.020 of an inch deep, and means for rotating said pickup and transfer rollers.

6. In a printing press having a main drive, an ink feeding arrangement comprising, in combination, an ink fountain, a fountain roller journaled for rotation in said fountain, means including an electrically operated clutch for selectively coupling said fountain roller to said press drive so as to rotate said fountain roller when said clutch is engaged, a pickup roller journaled parallel to said fountain roller with the surface of the pickup roller being slightly spaced from said fountain roller, said surface being formed by a pattern of shallow, closely spaced grooves wound helically about said roller and defining rounded ridges and valleys as seen in cross section, means coupling said pickup roller to said press drive so that the pickup roller runs at the speed of the press, a control circuit for disengaging said clutch when the press runs at threading speed, and means for selectively by-passing said circuit to permit ink to be fed at press threading speed when desired.

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