July 12, 1938. A. SCHLESINGER 2,123,476

INKING APPARATUS

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Fig. 1.

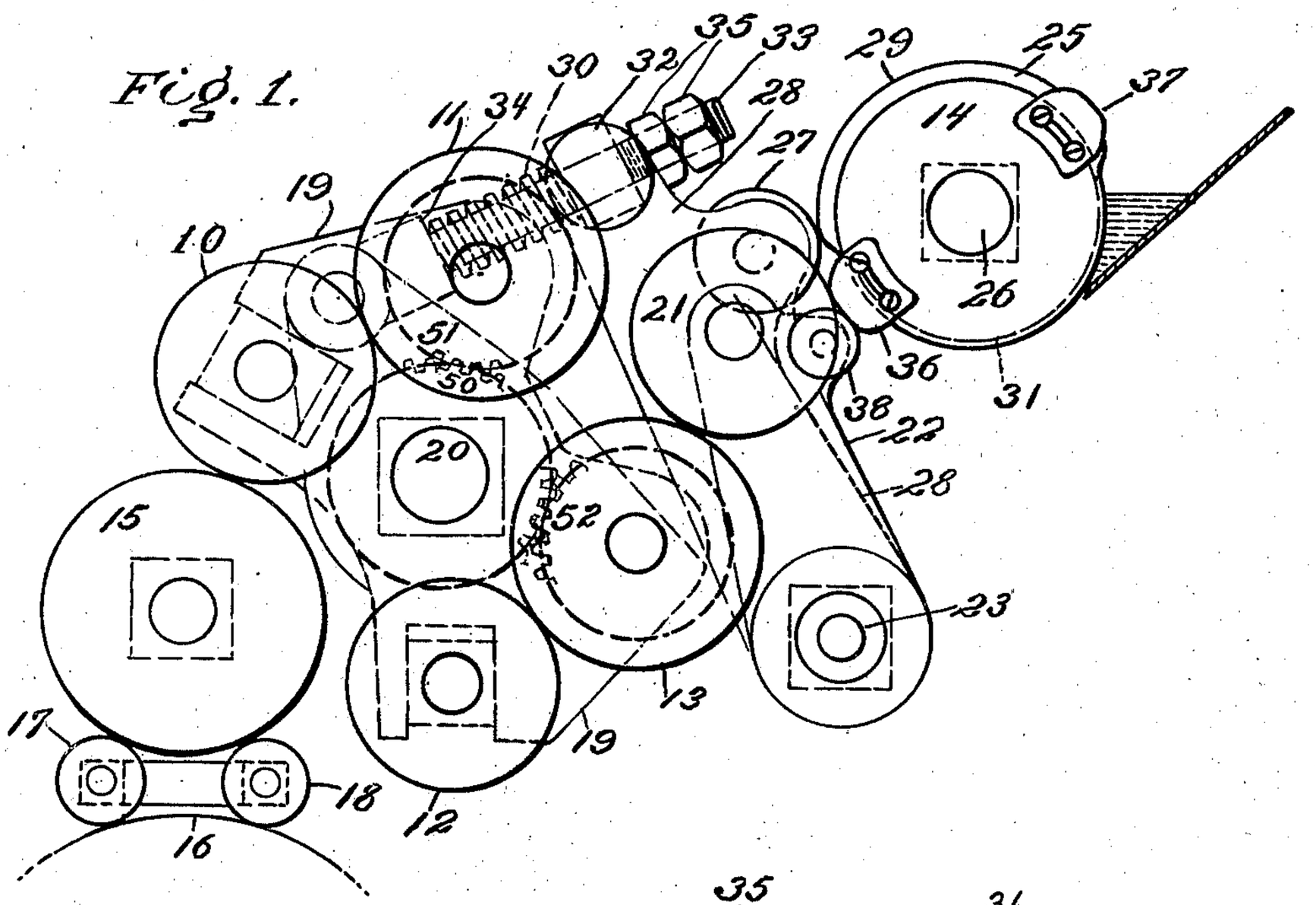
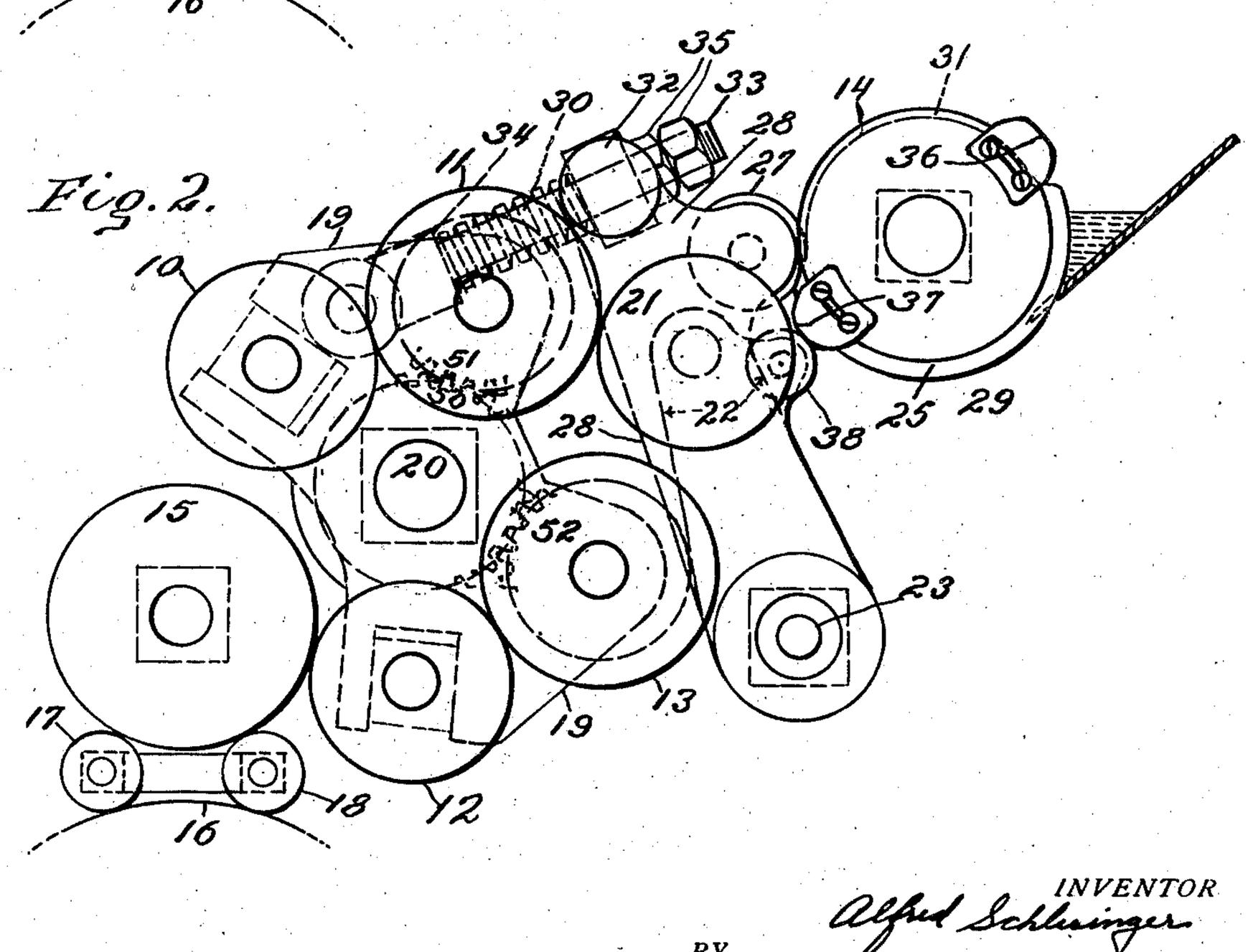


Fig. 2.



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INKING APPARATUS

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Fig. 3.

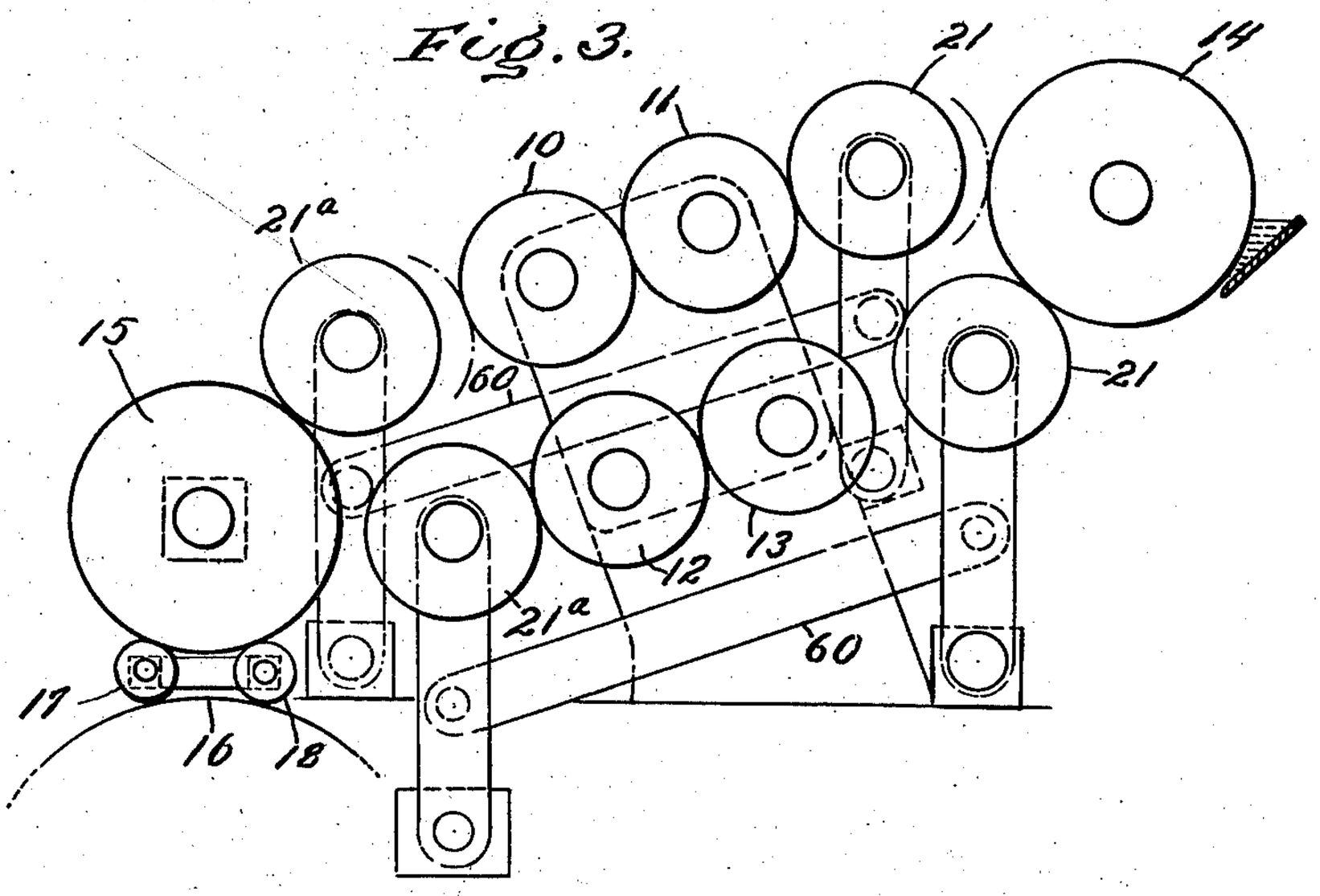
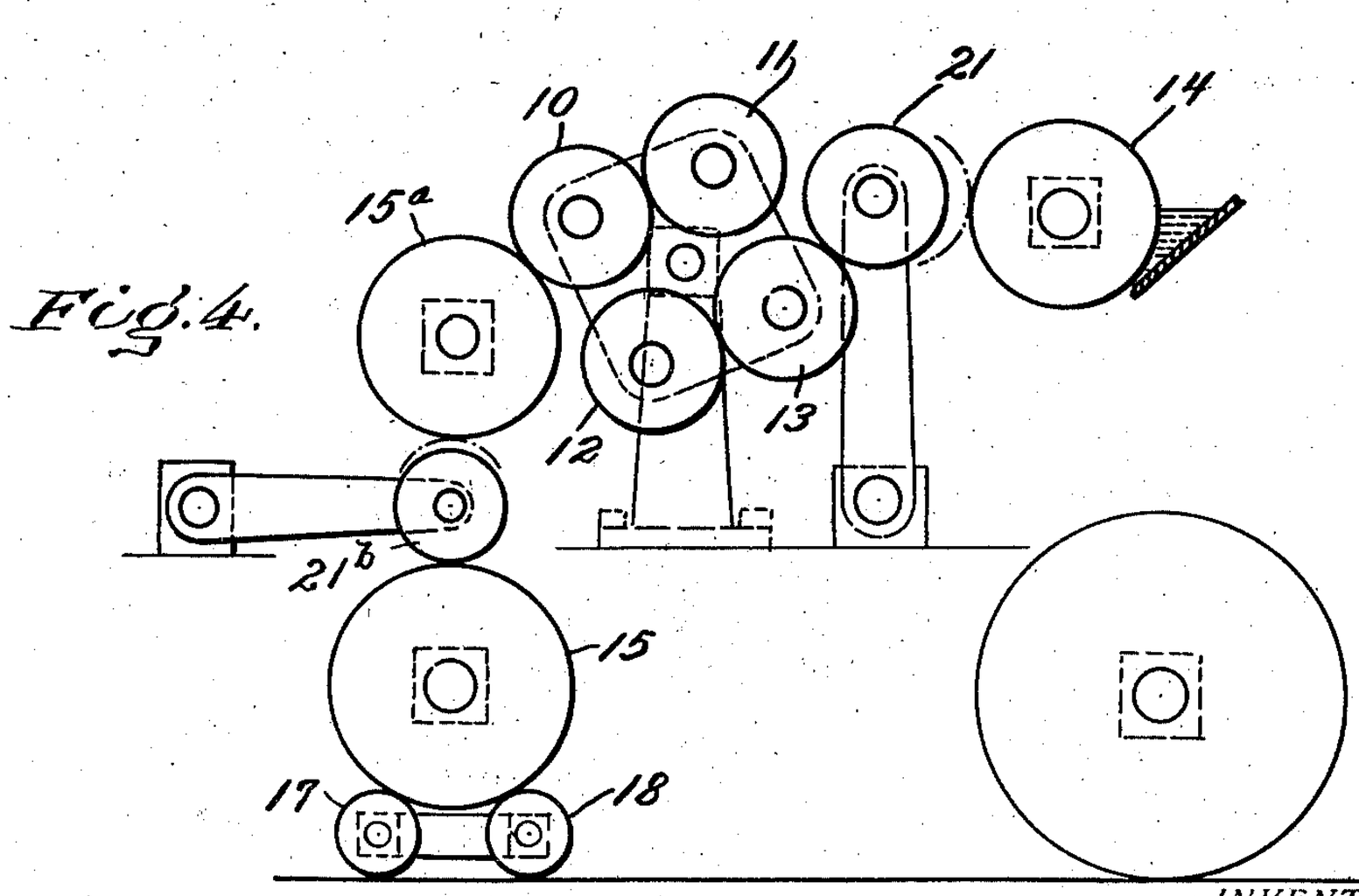


Fig. 4.



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INKING APPARATUS

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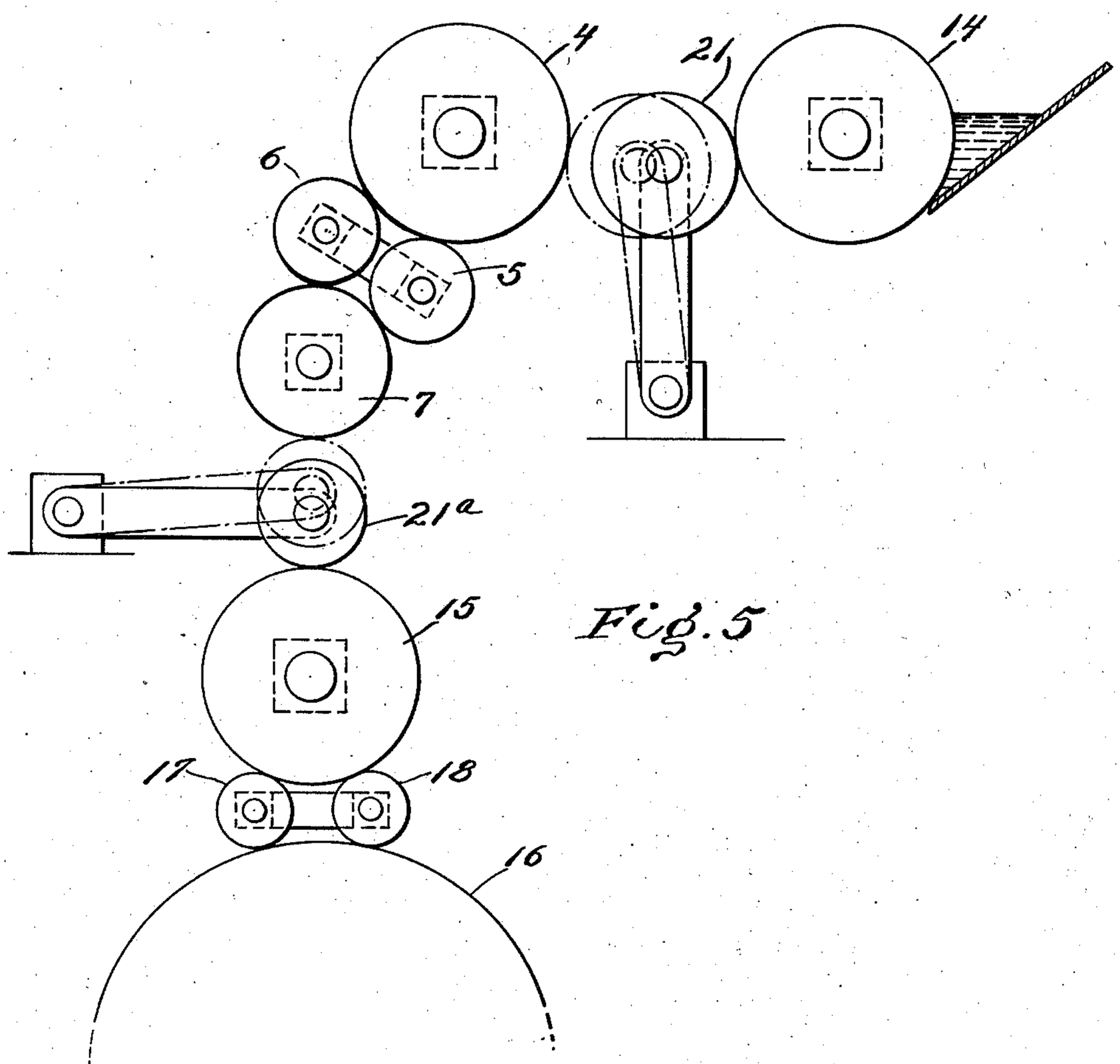

Fig. 5

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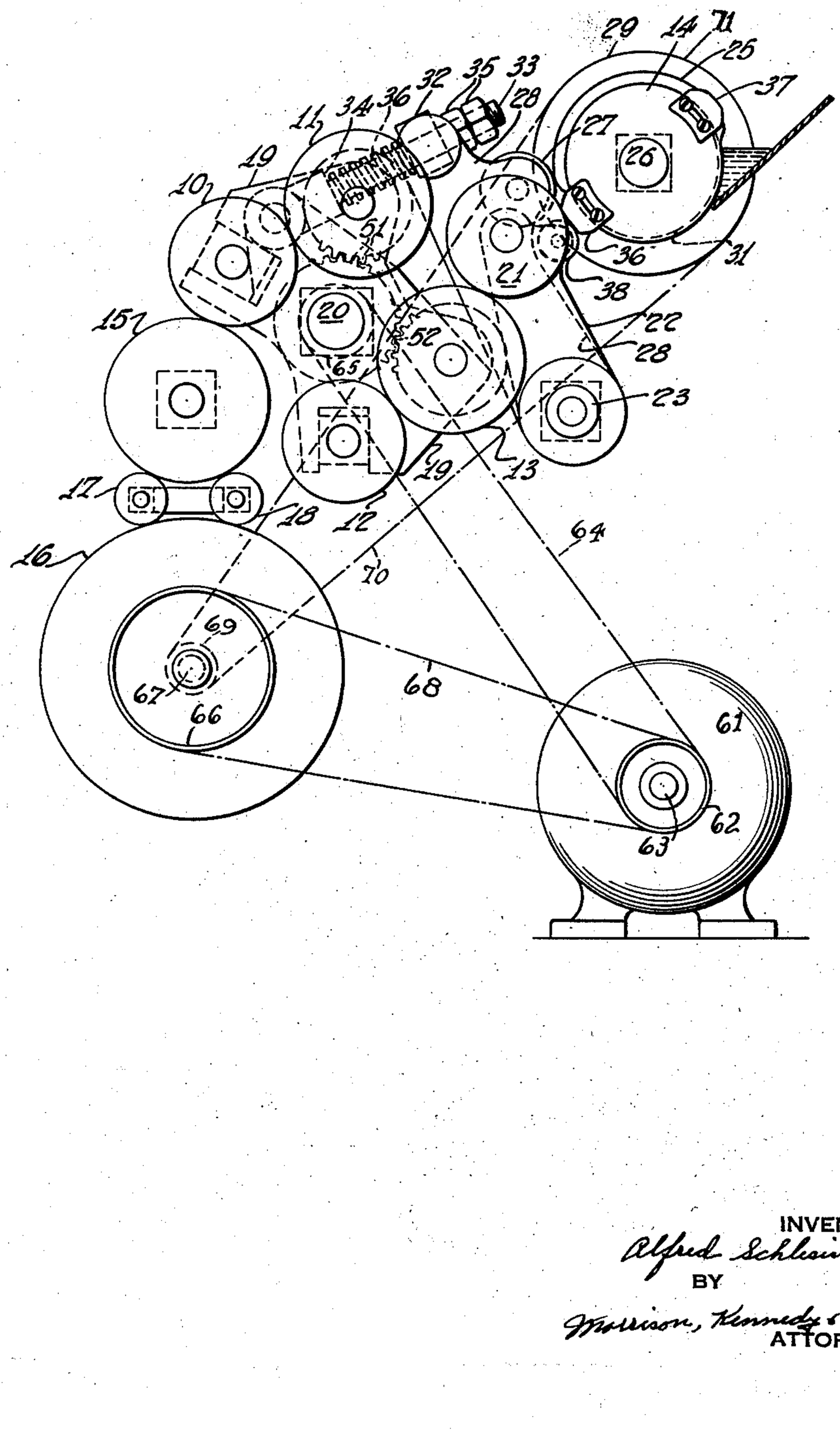
Fig. 6.



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2,123,476

UNITED STATES PATENT OFFICE

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INKING APPARATUS

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Application October 2, 1936, Serial No. 103,637

14 Claims. (Cl. 101—350)

This invention relates to inking apparatus for printing machines, wherein ink is taken from an ink-fountain roller and conducted through one or more series of rollers and thereby rubbed or spread into a film for application to the printing form by the inking rollers.

Printing machines now in use have been developed to increase their speed and capacity and to improve the quality of the printing, and in an effort to keep pace with such developments the inking apparatus therefor has been altered and improved upon by the provision of subsidiary devices for rapidly rubbing the ink in order to render it softer and more fluid for application to the printing form than was possible theretofore with the usual ink conducting and rubbing rollers alone. These improvements, however, are not entirely satisfactory, since they provide usually for rubbing the ink by means of rollers rotating at a higher circumferential speed than that of the printing cylinder during a portion only of the time required for the printing cylinder to make one complete rotation, and ink of high concentration, toughness, and other characteristics which require it to be more thoroughly rubbed before it is ready for printing usually cannot be rubbed at high speed or heated rapidly to too high a temperature lest it be decomposed or because of its extreme tackiness produce a damaging effect on the rubber rollers of the rubbing device, or in some other respect be rendered unfit for printing for reasons known to those skilled in the art.

The present invention is intended to obviate these and other difficulties and, to this end, contemplates an improved arrangement for rubbing the ink preliminary to its application to the printing form. Broadly stated, the invention provides ink-rubbing rollers constructed and arranged to heat and rub a given supply of ink without transferring it during the period of more than one rotation of the printing cylinder to soften the ink and bring it to the desired fluidity for later transfer to the inking rollers. More specifically, and according to a preferred embodiment, the invention provides intermediate the ink-fountain roller and the printing-form inking rollers, an ink-rubbing unit comprising two sets of rubbing rollers, heated or unheated, as desired, operable at a given circumferential speed and arranged for operation successively to rub a supply of ink during the period of a plurality of printing operations and then transfer it, one set rubbing the ink as rubbed ink is transferred from the other, and vice versa.

In the accompanying drawings, the invention has been shown merely by way of example and in preferred form, and obviously many modifications may be made therein and in its mode of application which will still be comprised within its spirit. It is to be understood, therefore, that the invention is not limited to any specific form or embodiment except insofar as such limitations are specified in the appended claims.

Referring to the drawings:

Fig. 1 is a diagrammatic side elevation of a preferred embodiment of the invention;

Fig. 2 is a view similar to Fig. 1, but showing the parts in a different position;

Fig. 3 is a side elevation of a modification of the embodiment of the invention shown in Figs. 1 and 2;

Fig. 4 is a side elevation of another embodiment of the invention;

Fig. 5 is a side elevation of still another embodiment of the invention; and

Fig. 6 is a view similar to Figs. 1 and 2, showing drive means for the different parts.

The invention may be carried out by several different arrangements of the rubbing rollers. For example, a single set of rollers may be arranged to rub the ink and a vibratory transfer roller provided to transfer rubbed ink periodically from the rubbing rollers to the inking rollers and thus provide a given period devoted solely to the rubbing of the ink without its continuous passage through a series of rollers. On the other hand, two sets of rubbing rollers may be adapted to operate successively to rub and transfer ink, one set rubbing while the other transfers, and vice versa; or more than two sets of rubbing rollers may be arranged for the successive transfer of rubbed ink, the ink being transferred from one set while the others operate to rub ink without transferring it. Only one difference results from the several structural arrangements and that is that an interrupted transfer of rubbed ink is obtained by the use of the first arrangement while the latter two arrangements provide for a substantially continuous transfer. However, each is desirable since the interrupted transfer of the ink is satisfactory for ordinary printing such as newspaper work and the continuous transfer is nicely adapted for high quality printing and art work. In each instance, the sets of rollers are out of engagement with the transfer rollers while functioning solely to rub the ink and may be rotated at any desired speed and at different relative speeds to provide an actual rubbing action and, preferably, a relative axial movement is imparted to them as they rotate. Moreover, the

rubbing rollers may be heated and maintained at a predetermined temperature, electrically or by other suitable means, to hasten the softening of the ink, or frictional heat developed by the rollers may be relied upon when adequate or desirable for a slower heating of the ink.

Two of the chief advantages arising from the invention are that the ink rubbing period may be fixed, as required, so that the ink may be rubbed and heated for a given length of time and at a given speed, i. e., slower, equal to or faster than the circumferential speed of the inking rollers and printing cylinder depending upon the consistency of the ink as supplied, properly to soften the ink and render it more fluid without destroying its composition and vitality, and that the regular series of ink rubbing and conducting rollers may be converted by very slight alteration so that a group of the rollers will operate solely to rub ink during a given period.

According to the preferred embodiment of the invention shown in Figs. 1 and 2, a unit of two sets of ink rubbing rollers comprising each a pair of rollers 10, 11 and 12, 13 is located intermediate the ink-fountain roller 14 and an ink receiving roller 15. Each set of rollers is adapted successively to rub a supply of ink during the period of a plurality of rotations of the printing cylinder 16 and then to transfer the ink to the roller 15 for application by the inking rollers 17 and 18 to the printing form carried by the cylinder 16, one set of the rollers 10, 11 and 12, 13 rubbing the ink while the other set transfers rubbed ink to the roller 15, and vice versa. The two sets of rollers are mounted in a common frame 19 supported on a shaft 20 to rock as a unit, so that, when rocked counter-clockwise to the position shown in Fig. 1, the roller 10 engages the roller 15 to transfer rubbed ink and the set of rollers 12, 13 occupies a disengaged rubbing position, and when rocked clockwise to the position shown in Fig. 2, the rollers 10 and 11 occupy a disengaged rubbing position and the roller 12 engages the roller 15 to transfer rubbed ink thereto. In the rubbing position of the two sets of rollers 10, 11 and 12, 13, the rollers 11 and 13 are in position to be engaged for the delivery thereto of unrubbed ink by a ductor roller 21, which is carried by a support 22 mounted on a shaft 23 and adapted to vibrate between the ink-fountain roller 14 and the rubbing rollers 11 and 13 just at the moment that the rocking of the unit in one direction or the other has been effected.

The sets of rollers 10, 11 and 12,13 never move radially relatively to one another and, hence, a common drive is provided for both sets of rollers. As shown, the main driving gear 50 is mounted concentrically with the shaft 20 and adapted to mesh with gears 51 and 52 fixed to the shafts of the rollers 11 and 13, respectively, the rollers 10 and 12 being rotated frictionally by their engagement with the driven rollers 11 and 13.

The ink-fountain roller 14 is adapted to be rotated in a predetermined ratio to the speed of rotation of the printing cylinder 16 and the means for rocking the two sets of rollers 10, 11 and 12, 13 comprises a cam 25 secured to the fountain roller 14 or to its drive shaft 26 and on the periphery of which a roller 27 is arranged to track, the roller 27 being carried by an arm 28 connected to the frame 19 and pivoted on the shaft 23. As the roller 27 rides up onto a high portion 29 of the cam the arm 28 is rocked counter-clockwise against the pressure of a compression spring 30 to the position shown in Fig. 1, and as the roller 27 rides down onto a low portion 31 of the cam as shown in Fig. 2 the spring 30 exercises itself to rock the arm 28 in the opposite direction. The upper end of the arm 28 is formed with a bearing 32 through which the threaded end of a stud 33 is adapted to pass, the compression spring 30 being arranged on the stud 33 between a shoulder 34 thereon and the bearing 32 and is placed under the necessary tension by the adjustment of a pair of lock nuts 35 threaded on the end of the stud 33.

The timed actuation of the ductor roller 21 is effected by a pair of cams 36 and 37 adjustably and removably secured to the fountain roller 14 and arranged diametrically opposite one another and adapted, respectively, to engage a roller 38 carried by the roller support 22 just as the roller 27 rides onto the high and low portions of the cam 25 and the rocking of the rubbing rollers 10, 11 and 12, 13 is completed.

With this arrangement for rocking the sets of ink-rubbing rollers and ductor roller, the ink rubbing period may be fixed by the rotation of the fountain roller 14 in any desired ratio to the speed of rotation of the printing cylinder 16. For example, if the ratio is 1 to 10, since the unit is rocked twice during each rotation of the fountain roller 14 the duration of the ink rubbing period will be equal to the time required for five rotations of the printing cylinder 16 and, if a smaller ratio, say 1 to 20, is employed, obviously the duration of the ink rubbing period will be doubled. The cams 36 and 37, however, are adapted for a given ratio, that is, to hold the ductor roller in engagement with the rollers 11 and 13 long enough to deliver a supply of ink for a given number of printing operations and, hence, cams with longer peripheral surfaces must be employed when the ratio is small in order to provide for the delivery of ink sufficient for a greater number of printing operations.

A driving arrangement for rotating the ink-rubbing rollers 10—11, 12—13, the ink-fountain roller 14 and the printing cylinder 16 is shown in Fig. 6. According to the arrangement shown, the parts are rotated by belt drives using a single electric motor 61 as the source of power. Thus the motor 61 has a wide pulley wheel 62 fixed to its shaft 63 and the ink-rubbing rollers 10—11, 12—13 are rotated by a belt 64 running over the pulley wheel 62 and a pulley wheel 65 connected to the drive gear 50. Likewise, a pulley wheel 66 is fixed to shaft 67 of the printing cylinder 16 and the latter is rotated by a belt 68 running over pulley wheels 62 and 66. A second pulley wheel 69 is fixed to the printing cylinder shaft 67 and a belt 70 running over the pulley wheel 69 and a pulley wheel 71 fixed to the ink-fountain roller shaft 26 rotates the ink-fountain roller 14.

The various speed ratios desired are obtained by the use of different size pulley wheels. Thus for rotating the ink-rubbing rollers 10—11, 12—13 at high speed, a pulley wheel 65 smaller than the pulley wheel 62 on the motor shaft 63 is employed, and the relatively slower speed of rotation of the printing cylinder 16 is obtained by the use of the pulley wheel 66 on the printing cylinder shaft 67 which is larger than the pulley wheel 62; while the relatively very slow speed of rotation of the ink-fountain roller is effected by the use of the small driving pulley wheel 69 on the printing cylinder shaft 67 which is only about one-fifth the size of the pulley wheel 71 on the ink-fountain roller shaft 26.

Obviously, the form and arrangement of the driving connections may be varied, and the foregoing is intended merely as an example of one way in which the rotation of the different rollers can be effected.

Fig. 4 illustrates diagrammatically a slightly modified arrangement wherein a single ductor roller 21 is provided and the unit of ink rubbing rollers 10, 11 and 12, 13 is adapted to be rocked as in the case of the embodiment shown in Figs. 1 and 2. This arrangement, however, is shown as being particularly adapted for flat press printing, and a vibratory ductor roller 21b is employed for periodically transferring rubbed ink from an intermediate ink receiving roller 15a to the ink receiving roller 15. Although there is an interrupted transfer of rubbed ink from the roller 15a to the roller 15 the arrangement is, nevertheless, adaptable to flat press printing wherein the printing form reciprocates in both directions in engagement with the inking rollers 17 and 18 between each printing operation and, hence, a supply for several printing operations may be transferred to the roller 15 intermittently and the duration of the ink rubbing period governed accordingly.

The embodiment of the invention shown in Fig. 5 is illustrative of a group of rollers of the usual series of ink rubbing and conducting rollers adapted for the interrupted transfer of rubbed ink therefrom to the inking rollers, the series comprising between the ductor rollers 21 and 21a an intermediate series of rubbing rollers 4, 5, 6, and 7. The vibration of the ductor rollers 21 and 21a may be effected in timed relation and at definite periods, and, as in the case of the embodiment shown in Fig. 3, the rollers 4, 5, 6 and 7 may be rotated at any desired circumferential speed.

It will be understood, of course, that the main series of rubbing and conducting rollers usually comprises many more rollers between the ink-fountain roller 14 and the printing cylinder 16 than are shown in the drawings, which are merely diagrammatic showings for an understanding of the invention. As already stated, the prolonged ink-rubbing period provided by the invention allows for the proper rubbing of the ink without injurious effect thereto. This, coupled with the continuous delivery of the rubbed ink, is advantageous in all fields of printing and especially in art work where different colored inks are employed. For the first time it is possible with highly concentrated true colored red, blue and yellow inks to reproduce all different colors on any paper; whereas heretofore in practice it has been necessary to use seven or more different colored inks, especially in offset printing, to obtain the different colors.

Having thus described my invention, what I claim is:

1. An inking apparatus including, in combination, a series of rollers for transmitting ink from the ink-fountain roller to the printing-form inking rollers of a rotary cylinder printing machine, said series including two sets of ink-rubbing rollers supported for unitary movement into and out of an ink-receiving and an ink transfer position, one set of rollers rubbing a charge of ink as a charge of rubbed ink is transferred from the other set, and vice versa, means for rotating the rollers of said sets, and means for effecting the unitary movement of said sets at intervals of greater duration than the time required for one rotation of the printing cylinder.

2. In an inking apparatus adapted for conditioning ink in its transmission from the ink supply to the printing-form inking rollers of a printing machine, the combination of means for isolating for a period of more than one rotation of the printing cylinder a definite charge of ink to be used for printing, means operative during such period of isolation for subjecting said charge of ink to an auxiliary rubbing action of such intensity as to develop enough frictional heat to bring the whole charge of ink to a uniform condition of fluidity suitable for printing, and means for thereafter transferring the charge of frictionally heated ink for transmission to the inking rollers of the machine.

3. In an inking apparatus adapted for conditioning ink in its transmission from the ink-fountain roller to the printing-form inking rollers of a printing machine, the combination of a series of rollers for transmitting the ink, said series including a plurality of ink-rubbing rollers, means for effecting a relative movement between the ink-rubbing rollers on the one hand and other rollers of said series on the other hand for the delivery of a supply of unrubbed ink from the fountain roller to the ink-rubbing rollers and the transfer of rubber ink from the ink-rubbing rollers to other rollers of the series for transmission to the printing form, means for establishing a distinct pause in such relative movement of the rollers for a period of more than one rotation of the printing cylinder to interrupt the supply and transfer of ink during said pause while the rubbing operation of the ink-rubbing rollers continues, and means to effect the operation of said ink-rubbing rollers.

4. In an inking apparatus adapted for conditioning ink in its transmission from the ink-fountain roller to the printing-form inking rollers of a printing machine, the combination of a series of rollers for transmitting the ink, said series including a plurality of sets of ink-rubbing rollers, means for effecting a relative movement between the sets of ink-rubbing rollers on the one hand and other rollers of said series on the other hand for the delivery of a supply of unrubbed ink from the fountain roller to the sets of ink-rubbing rollers and the transfer of rubbed ink from the sets of ink-rubbing rollers to other rollers of the series for transmission to the printing form, and means for establishing a distinct pause in such relative movement of the rollers for a period of more than one rotation of the printing cylinder, the sets of ink-rubbing rollers during each pause being operative to transfer rubbed ink from one set while ink is being rubbed in another set.

5. An inking apparatus including, in combination, a series of rollers for transmitting ink from the ink-fountain roller to the printing-form inking rollers of a rotary cylinder printing machine, said series including a plurality of ink-rubbing rollers, means for rotating said ink-rubbing rollers continuously, and means operative in timed relation to the rotation of the printing cylinder for effecting relative movement between said ink-rubbing rollers on the one hand and other rollers of the series on the other hand first to receive a charge of ink in the ink-rubbing rollers, second to isolate the charge of ink in the ink-rubbing rollers to allow said rollers by their continuous rotation to subject the isolated charge of ink to a rubbing action during the period of more than one rotation of the printing cylinder, and thereafter to effect the transfer of the rubbed ink to other rollers of the series for transmission to the inking rollers.

6. An inking apparatus according to claim 5, wherein the means for rotating the ink-rubbing rollers are independent of the means for rotating the other rollers of the series.

7. An inking apparatus according to claim 5, wherein the means for rotating the ink-rubbing rollers are operative to rotate them at a circumferential speed different from that of the other rollers of the series.

8. An inking apparatus according to claim 5, wherein the means for rotating the ink-rubbing rollers are operative to rotate them at relatively different circumferential speeds.

9. An inking apparatus according to claim 5, wherein the means for rotating the ink-rubbing rollers are operative to rotate them at circumferential speeds different from one another as well as from that of the other rollers of the series.

10. An inking apparatus including, in combination, a series of rollers for transmitting ink from the ink-fountain roller to the printing-form inking rollers of a rotary cylinder printing machine, said series including a plurality of sets of ink-rubbing rollers, means for rotating the rollers of said sets continuously, and means operative in timed relation to the rotation of the printing cylinder for effecting relative movement between said sets of ink-rubbing rollers on the one hand and other rollers of the series on the other hand to receive successive charges of ink in the sets of ink-rubbing rollers, second to isolate the charge of ink in each set of ink-rubbing rollers to allow the rollers of the set by their continuous rotation to subject the isolated charge of ink to a rubbing action during the period of more than one rotation of the printing cylinder, and thereafter to effect the transfer of the rubbed ink from each set of ink-rubbing rollers in turn to other rollers of the series for transmission to the inking rollers.

11. An inking apparatus according to claim 10, wherein the means for rotating the ink-rubbing rollers of said sets are operative to rotate them at relatively different circumferential speeds.

12. An inking apparatus for rotary cylinder printing machines including, in combination, an ink-fountain roller, means for rotating the ink-fountain roller in timed relation to the rotation of the printing cylinder, printing-form inking rolles, a series of intermediate rollers for transferring the ink from the ink-fountain roller to the inking rollers, said series including two sets of ink-rubbing rollers, means for supporting said sets of rollers, means for rotating the rollers of said sets continuously, and a cam mounted for rotation with the ink-fountain roller and arranged to actuate said supporting means for moving said sets of rollers to ink receiving and ink transfer positions to receive each a charge of ink and isolate it to allow the rollers of the set by their continuous rotation to subject the charge of ink to a rubbing action during the period of more than one rotation of the printing cylinder and then transfer the rubbed ink, one set of rollers rubbing the ink as rubbed ink is transferred from the other set, and vice versa.

13. An inking apparatus according to claim 12, including means for delivering unrubbed ink from the ink-fountain roller to said sets of rollers, and a second cam mounted for rotation with the ink-fountain roller and operative in timed relation to the first cam for actuating said ink delivering means.

14. An inking apparatus for rotary cylinder printing machines including, in combination, an ink-fountain roller, means for rotating the ink-fountain roller in timed relation to the rotation of the printing cylinder, printing-form inking rollers, a series of intermediate rollers for transferring the ink from the ink-fountain roller to the inking rollers, said series including two sets of ink-rubbing rollers, means for supporting said sets of rollers, means for rotating the rollers of said sets continuously, and a pair of cams mounted for rotation with the ink-fountain roller, one cam being operative to actuate said supporting means for moving the sets of rollers to ink receiving and ink transfer positions to receive each a charge of ink and isolate it to allow the rollers of the set by their continuous rotation to subject the charge of ink to a rubbing action during the period of more than one rotation of the printing cylinder and then transfer the rubbed ink, one set of rollers rubbing the ink as rubbed ink is transferred from the other set, and vice versa, and the other cam being operative in timed relation to the first mentioned cam to effect the delivery of unrubbed ink from the ink-fountain roller to said sets of rollers, characterized by the fact that the speed of rotation of the fountain roller may be varied at will and that said other cam is removably mounted for replacement by a cam of different contour, as required, depending upon the duration of the ink-rubbing period according to the speed of rotation of the ink-fountain roller.

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