July 27, 1965 A. FINKE 3,196,787

INKING DRIVE AND INTERRUPTER FOR MULTICOLOR ANILINE PRINTING MACHINE

Filed July 16, 1963 3 Sheets-Sheet 1

FIG. 1

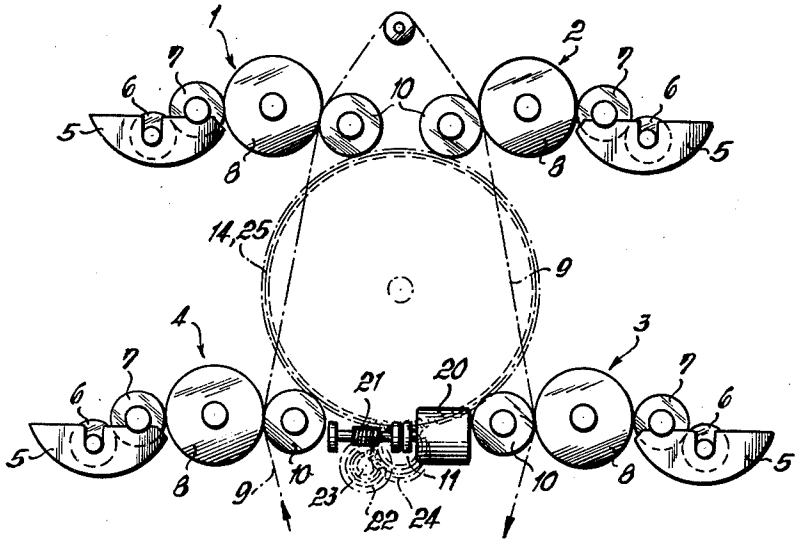
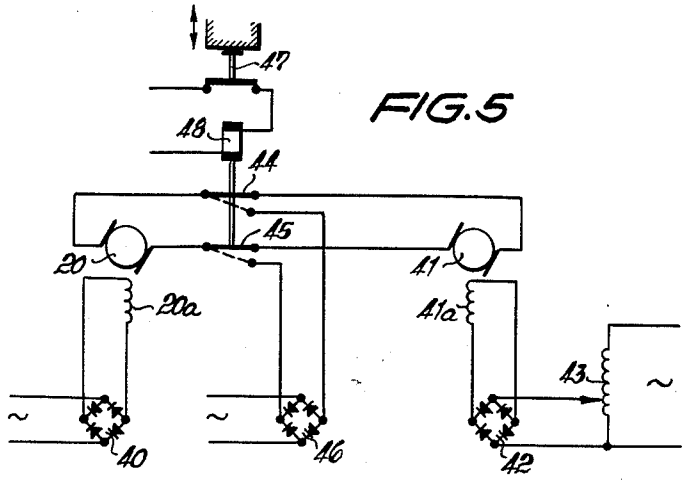


FIG. 5



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FIG. 2

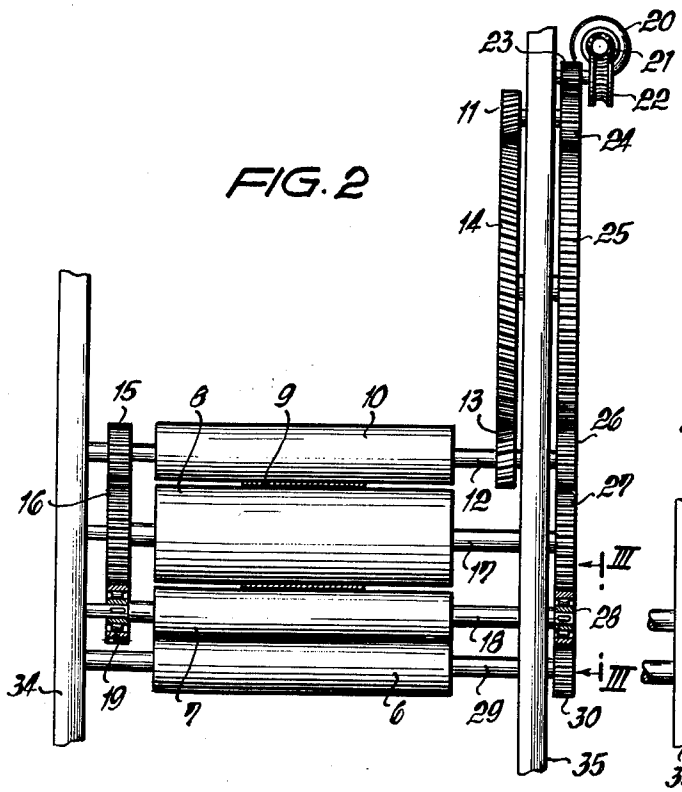


FIG. 4

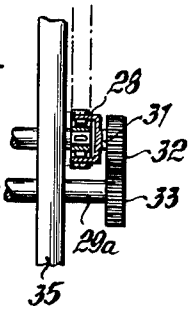
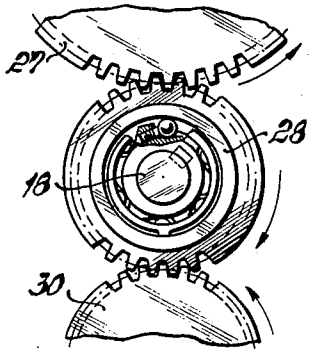


FIG. 3



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FIG. 6

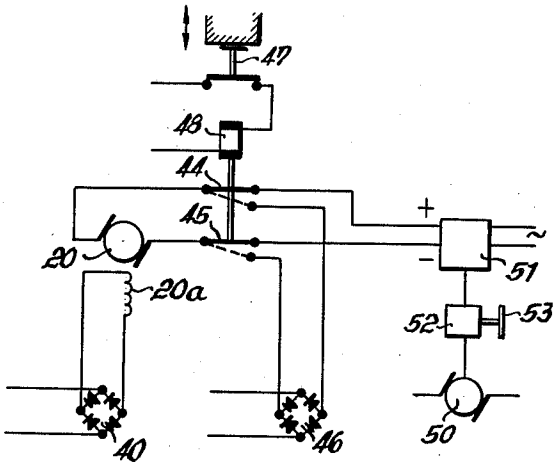
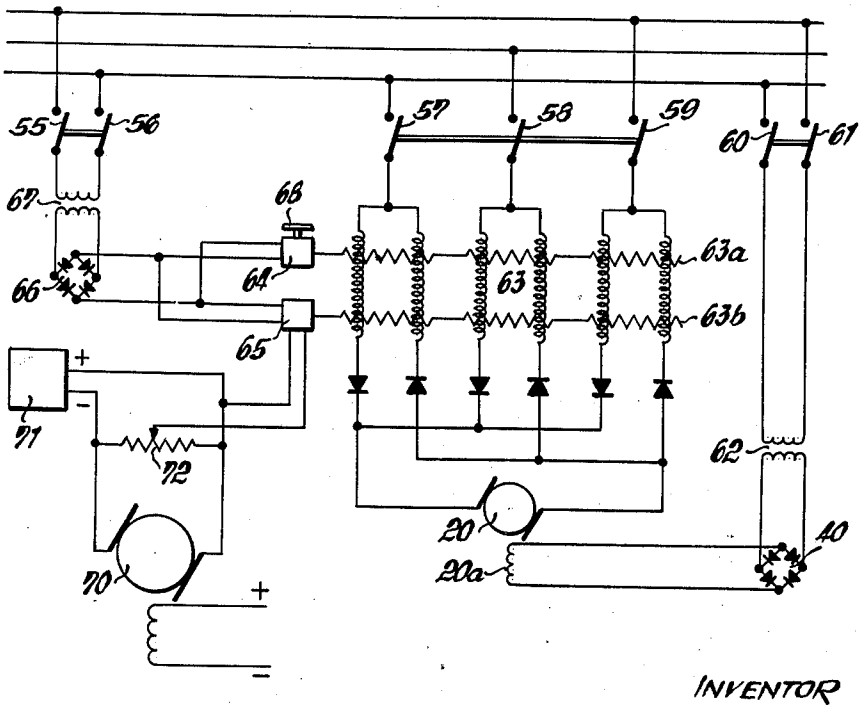


FIG. 7



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3,196,787

INKING DRIVE AND INTERRUPTER FOR MULTICOLOR ANILINE PRINTING MACHINE

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Claims priority, application Germany, July 18, 1962, W 32,625
6 Claims. (Cl. 101—182)

The present invention relates to a multicolor aniline printing machine in which the dipping and applicator rollers of all printing units are driven after the stopping of the main motor by an auxiliary motor in order to avoid a drying and encrusting of the ink on the rolls during intervals or pauses in the printing.

In known machines of this type, the auxiliary motor is disconnected after the connecting of the main motor and the bringing of the plate cylinder into the operating position and the drive of the ink rollers of the printing units is also taken over by the drive motor, the dipping and inking rollers rotating with the same peripheral speed.

In practice, however, it has been found that particularly when the inking rollers are developed as screen rollers, in case of the same peripheral speed of the dipping and inkling rollers, the transfer of ink between the two rollers is defective. In order to obtain simultaneously with the transfer of the ink also an advantageous distributing of the ink onto the inking roller, it has been the practice to drive the dipping roller at a somewhat lower speed than the inking roller, so that the two ink rollers scrape. The amount of the difference in speed is, however, very slight and not variable.

It is accordingly the purpose of the present invention, inter alia, to create a multicolor aniline printing machine of the type described above in which the speed of the dipping rollers is variable within wide limits, but in which this speed, however, cannot exceed the speed of the inking rollers.

In accordance with the invention, this result is obtained in the manner that as an auxiliary motor, there is used an adjustable continuously rotating motor, so that the dipping rollers of all printing units are continuously driven by the auxiliary motor, and that the inking rollers of all printing units are connected in each case with the interposition of a freewheel clutch, both with the main motor and with the auxiliary motor of the machine in such a manner that the inking rollers are driven by the main motor when it is in operation and by the auxiliary motor when the main motor is stopped.

It has proven advisable that the auxiliary motor drives, in known manner, a central gear which in its turn drives, via intermediate gears, the outer ring, containing a gear rim, of the first freewheel clutch on the shaft of each inking roller, that a gear fixed to the shaft of each plate cylinder drives the outer ring also containing a gear rim of the second freewheel clutch on the shaft of each inking roller, and that the inner rings of the freewheel clutches can rotate with the same or higher speed as that of the outer rings.

The drive of each dipping roller is effected from the gear rim of the first freewheel clutch. In this connection, a gear wheel which drives a dipping roller can be in direct engagement with said gear rim.

In order to create the possibility of being able to drive individual dipping rollers with a special step-up ratio, there can be connected with the gear rim of the first freewheel clutch of each inking roller a replaceable gear which is in engagement with a gear, also replaceable, on the shaft of the corresponding dipping roller.

In order to avoid any unintended large scraping of the dipping and inking rollers which are driven independently

of each other during the printing, resulting from an increase in the speed of operation of the machine, the invention proposes driving the auxiliary motor as a function of the main motor in such a manner that its speed of rotation, adjusted by actuation of an adjusting member, changes proportionally with the speed of rotation of the main motor.

The dependence of the auxiliary motor on the main motor can be obtained on the one hand by providing a generator which is driven by the main motor and which feeds the auxiliary motor with the plate cylinders brought into their operating position.

On the other hand, it is possible to provide a generator which generates a signal and which is driven by the main motor and which feeds a voltage conversion device, via which the auxiliary motor, when the plate cylinders are brought into their operating position, is fed from the powerlines.

When using a D.C. main motor, the dependance of the auxiliary motor on the main motor can be obtained in such a manner that when the main motor is fed via a rectifier from a variable transformer, the auxiliary motor, when the plate cylinders are brought into their operating position, is fed via a rectifier from a transformer, the primary winding of which is connected to the voltage tapped from the adjustable transformer for the main motor.

In these embodiments, there is provided a unit switch which cooperates with the jointly adjustable plate cylinder and which in its rest position connects the auxiliary motor to a power line and which in actuated position connects the auxiliary motor to the circuit controlled by the main motor, or vice versa, depending on the arrangement.

If a D.C. motor is used as a main motor, then, as a further development of the invention, the dependance of the auxiliary motor on the main motor can also be obtained by having a voltage tapped from its feed voltage act on a voltage conversion device through which the auxiliary motor is fed from a power line. In this embodiment, the limit switch which cooperates with a plate cylinder is eliminated.

For adaptation to the operating conditions which are most favorable in the instant case, the speed ratio of the two motors is preferably variable by means of an adjusting member.

One embodiment of a multicolor aniline printing machine having the features of the present invention is described by way of example below with reference to the accompanying drawings in which:

FIG. 1 is a side view of a four-color aniline printing machine shown schematically;

FIG. 2 is a top view of one printing unit of the machine;

FIG. 3 is a view along the line III—III of FIG. 2 of a portion of the chain of wheels, on a larger scale;

FIG. 4 shows a detail of FIG. 2 in a modified embodiment;

FIG. 5 is a schematic showing of one form of electrical circuit for the auxiliary motor;

FIG. 6 is a schematic showing of a further form of the electrical circuit for the auxiliary motor; and

FIG. 7 is a schematic showing of a still further form of the electrical circuit for the auxiliary motor.

The four printing units 1 to 4 (FIG. 1) each comprise a dipping roller 6 which removes the ink from a trough 5, an inking roller 7, a plate cylinder 8 and a back pressure cylinder 10 acting on the back side of the web 9.

From a main motor (not shown) there is driven a gear 11 which is in engagement with a central gear 14 which drives all the back pressure cylinders 10 via separate gears 13 (FIG. 2) fixedly mounted on shaft 12. On shaft 12 of each back pressure cylinder, there is also keyed a gear 15 which, via a gear 16, drives the shaft

17 bearing the plate cylinder 8. On the shaft 18 of each inking roller 7, there is fixedly mounted the inner ring of a freewheel clutch 19, the outer ring of which contains a gear rim which is in engagement with the gear 16.

An auxiliary motor 20, via the worm 21, worm wheel 22 and gears 23, 24 drives a central gear 25 which, in each case, via a pair of intermediate gears 26, 27 (FIG. 2), drives a gear rim which is fixed on the outer ring of a freewheel clutch 28. The inner ring of the freewheel clutch 28 is fixedly mounted like the inner ring of the freewheel clutch 19 on the shaft 18 of the inking roller 7. The clamping members of the two clutches are so arranged that upon rotation of the clutches in the direction indicated by the arrows in FIG. 3, the inner rings can rotate with the same or greater speed of rotation than the outer rings.

In the embodiment shown in FIG. 2, a gear 30 which is fixedly mounted on shaft 29 of the dipping roller 6 is in direct engagement with the gear rim of the freewheel clutch 28.

In order to make it possible to obtain a special speed variation for the dipping roller 6 of individual printing units, a pivot pin 31 is flanged, as shown in FIG. 4, to the gear rim of the freewheel clutch 28, said pivot pin bearing a replaceable gear 32 which is in engagement with a gear 33, also replaceable, on the shaft 29*a* of the dipping roller 6.

The shafts 12, 17, 18, 29 are rotatably supported in sidewalls 34, 35 of the machine frame. The shafts 12 of the back pressure cylinders 10 are capable of limited axial displacement, and the gears 11, 13, 14 are provided with spiral toothing. This affords the possibility of exact adjustment of the plate cylinders 8 in a circumferential direction in such a manner that upon an axial displacement of the back-pressure cylinders 10, there is imparted to the latter by the spiral toothing of the gears 13, 14, a rotary motion which is transmitted to the plate cylinders 8.

The dipping rollers 6 of each printing unit are driven both upon printing and in the intervals between printing by the auxiliary motor 20. The drive of the inking rollers 7, on the other hand, is effected during printing from the main motor via the freewheel clutch 19 and in the intervals between printing from the auxiliary motor 20 via the freewheel clutch 28. During printing, the inner ring of the freewheel clutches 28 in general rotates with greater speed than the outer ring, while in the intervals between printing the inner ring of the freewheel clutches 19 rotates and the outer ring generally is stationary. Due to the freewheel clutches 28, there is an assurance that the dipping rollers 6 can never travel faster than the inking rollers 7.

The drive of the auxiliary motor can be effected in various ways. A first embodiment is shown in FIG. 5. As auxiliary motor 20, there is used an adjustable D.C. motor, the field winding 20*a* of which is excited by a direct current of constant voltage produced in a rectifier 40. In the position shown in the drawing, the armature winding of the motor is fed by a D.C. generator 41, which is driven by the main motor. The field winding 41*a* of the generator is excited by a direct current produced in a rectifier 42 By means of an adjustable transformer 43, the voltage of field winding 41*a* can be adjusted. The speed of rotation of the auxiliary motor 20 thus changes proportionally with the speed of rotation of the main motor. By adjusting the adjustable transformer 43 manually, the speed ratio between the two motors can be varied. By shifting the contacts 44, 45 into the position shown in dashed lined, the auxiliary motor can be connected, with the interposition of a rectifier 46, to an alternating current system. The switching of the auxiliary motor 20 is effected as a function of the bringing of the plate cylinder 8 into rest or operating position. For this purpose, there is provided a limit switch 47

adapted to be actuated by one of the plate cylinders 8 and which in actuated condition closes the excitation circuit of an auxiliary electrically operated contactor 48 which controls the excitation circuit through the contacts 44, 45 in an actuated or non-actuated condition.

A second possibility of the driving of the auxiliary motor 20 is shown in FIG. 6. In this embodiment, in contradistinction to the embodiment of FIG. 5, there is provided a signal generator 50 driven by the main motor The generator 50 sends a signal to a D.C. conversion apparatus 51 through which the auxiliary motor 20 is fed from a power line when the plate cylinders are brought into their operating position. The switching to pure powerline operation is effected in the same manner as in the case of the embodiment of FIG. 5. Therefore, the same reference numbers have been used for identical parts. Between the generator 50 and conversion apparatus 51, there is provided a voltage regulator 52 having an adjusting member 53 for the manual adjustment of the speed of rotation of the auxiliary motor.

A third possibility for driving the auxiliary motor 20 with the main motor in operation, as a function of the latter, is shown in FIG. 7. The contacts 55 to 61 can be actuated either directly by special switches or else indirectly, for instance by an auxiliary contactor, in the excitation circuit of which there lies a contact which is under the influence of the main switch of the machine. The field winding 20*a* of the auxiliary motor 20 is excited, also in this embodiment, by a D.C. current of constant voltage produced in a rectifier 40. The alternating voltage applied to the rectifier 40 comes from a transformer 62, the primary winding of which can be connected via the contacts 60, 61 to a power line. Through the contacts 57, 58, 59, a voltage conversion device 63 with D.C. output is connected to the power line, the output therefore feeding the armature winding of the auxiliary motor 20. With the interposition of separate voltage regulators 64, 65, two exciter windings 63*a*, 63*b* of the conversion device 63 are connected with a rectifier 66 which feeds them and to which an alternating voltage coming from a transformer 67 is applied. The primary winding of the transformer can be connected via the contacts 55, 56 with the alternating current power lines. By means of an adjusting member 68 operatively connected to regulator 64, the no-load speed of the auxiliary motor 20 can be regulated. In this embodiment, the main motor 70 must be a D.C. motor. The main motor receives its feed voltage for instance from an adjustable transformer 71 with rectifier or from a conventional source of supply provided with rectifier Through a variable resistance 72, there is tapped off from the feed voltage of the main motor a voltage which is applied via the regulator 65 to the second exciter winding 63*b* of the conversion device 63. In this embodiment, the speed of rotation of the auxiliary motor 20 can be regulated by adjusting the variable resistor 72 in the speed range below the instantaneous speed of the main motor.

In contradistinction to the embodiment shown in FIG. 7, instead of the rectifier 66 and the transformer 67 shown in the drawing, in each case a rectifier and possibly a transformer can be combined into a single unit with the regulating members similar to that of the regulators 64, 65.

When using a D.C. main motor which receives its voltage via a rectifier from a variable transformer, the auxiliary motor can receive its feed voltage also via a rectifier from a variable transformer, the primary winding of which is applied to the voltage tapped from the adjustable transformer for the main motor When the main motor is stopped, the auxiliary motor will in this case also be fed from a power line corresponding to the circuits of FIGS. 5 and 6.

For the sake of clearaness it may be further stated, that the D.C. conversion apparatus 51 in FIG. 6 and the volt-

age conversion device with D.C. output 63 in FIG. 7 are amplistates.

The voltage regulator 52 and adjusting member 53 in FIG. 6 as well as the voltage regulator 64 and the adjusting member 68 in FIG. 7 serve for adapting the voltage of the incoming current to the need of the amplistates 51 and 63 respectively. The elements 52 and 64 therein are the adjustable resistances and the elements 53 and 68 respectively are handwheels thereto for making the adjustment.

The voltage regulator 65 in FIG. 7 is a non-adjustable resistance in which the voltage of the combined currents coming from the rectifier 66 on the one hand and from the variable resistance 72 on the other hand is adapted to the need of the amplistate 63.

What is claimed is:

1. In a multicolor printing machine, a plurality of printing units, each unit comprising a plate cylinder, a dipping roller, and an inking roller in engagement therewith, first gear means connected to said plate cylinders and interconnecting said inking rollers, first freewheel clutch means operatively associated with said first gear means and each of said inking rollers, a main electric motor operatively connected to said first gear means to drive said plate cylinders and said inking rollers at a given speed through said first freewheel clutch means, second gear means interconnecting said dipping rollers, second freewheel clutch means operatively associated with said second gear means and said inking rollers, and an auxiliary electric motor operatively connected to said second gear means to drive said dipping rollers continuously through said second freewheel clutch means at a speed slightly different to that of said main motor and to drive said inking rollers through said second freewheel clutch means upon deenergization of said main motor at a speed corresponding to that of the dipping rollers.

2. In a multicolor printing machine according to claim 1 wherein each said freewheel clutch means comprising an inner ring and an outer ring, said inner ring being rotatable at a speed at least equal to that of said outer ring, and said outer ring being provided with a gear rim to cooperate with said gear means.

3. In a multicolor printing machine according to claim 1 wherein each said freewheel clutch means comprising an inner ring and an outer ring, said inner ring being rotatable at a speed at least equal to that of said outer ring, and said outer ring being provided with a replaceable gear operatively connected to a further replaceable gear keyed to the shaft of each of the dipping rollers to vary the speed of at least one of said dipping rollers with respect to the other dipping rollers.

4. In a multicolor printing machine according to claim 1, an operating means including generator means adapted to be driven by said main motor, said generator means being operatively connected to said auxiliary motor to drive same at a speed slightly different to that of said main motor, and an adjustable transformer operatively associated with said generator means to vary the speed ratio between said auxiliary motor and said main motor.

5. In a multicolor printing machine according to claim 1, an operating means including generator means adapted to be driven by said main motor, voltage conversion means operatively connected between said auxiliary motor and said generator means and adapted to be controlled by said generator means, and regulating means disposed between said generator means and said voltage conversion means to vary the speed ratio between said auxiliary motor and said main motor.

6. In a multicolor printing machine according to claim 1, an operating means including a main voltage supply, voltage conversion means operatively connected to said auxiliary motor, regulating means disposed between said main voltage supply and said voltage conversion means to control same, and further regulating means operatively connected between said main motor and said voltage conversion means to vary the speed ratio between said auxiliary motor and said main motor.

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