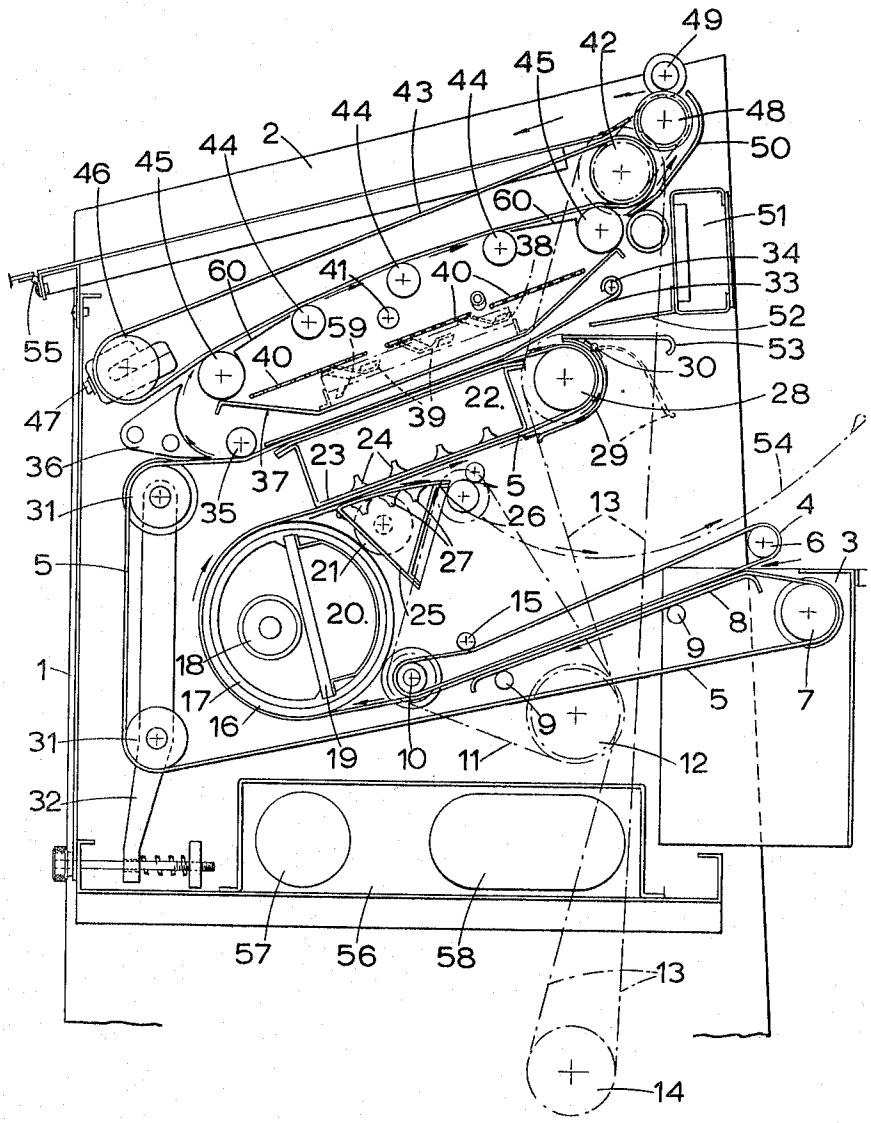
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DIAZOTYPE PRINTING MACHINE

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DIAZOTYPE PRINTING MACHINE

Adi Kaikhushroo Ashburner, Wanstead, London, England, assignor to Harper & Tunstall Limited, Edgware, England, a British company

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The invention relates to diazotype printing machines consisting of a printer unit and a developer unit and particularly to such machines in which, the printer unit and developer unit are mounted in the same frame and run at the same speed, and in which the printer feeds the developer. Such a machine is known as a "Combined Synchronous and Continuous Printing Machine."

In such machines it is necessary to separate the original from the print, before the print passes to the developer. In known machines this is done by applying air suction pressure to both sides of a pair of perforated plates between which the sheets pass. A large number of holes is necessary in the perforated plates to effect separation, and very large fans are needed to create sufficient air suction at each hole.

It is sometimes necessary when printing to remove the undeveloped prints from the machine before developing; for example when a double-sided print is required. In known machines a set of fingers is provided which can be caused to project down between multiple parallel bands conveying the print and original, to eject the print and original from the machine. This method has the disadvantage that if the fingers are lowered as the sheets are passing underneath, the print and original may easily be torn.

It is known in diazotype developers to pass the print between a perforated plate and a conveyor band, the developing fluid provided in the developing tank passing through the perforations to develop the print. Perforated rollers mounted close together have also been used instead of a plate.

Both constructions have the disadvantage that a high friction drag is applied to the print, and the print may be scratched or torn, also the ensuing print tends to be patchy due to condensation dropping from the tank on to the print through the perforations.

In known diazotype printing machines the developing tank is provided either substantially vertically alongside a vertical conveyor band, or substantially horizontally above a horizontal conveyor band. Both of these arrangements have the disadvantage that a tall casing is required to accommodate them. Such machines also have the disadvantage that the print is either ejected at the back of the machine, or if an additional conveyor is provided, the print may be delivered at the front of the machine; however it will not emerge facing the operator, but will emerge with the printed side facing the back of the machine.

The invention has among its objects to provide a more compact machine, in which the above enumerated disadvantages are mitigated.

According to the invention a diazotype printing machine comprises in combination endless conveyor means adapted to feed a master sheet and a print in contact relation past a light source, means for separating the sheets after passing the light source, further endless conveyor means co-operating with said first conveyor means to feed the print past a developer and means for guiding the developed print to present said print at the upper part of the machine with the printed face uppermost.

According to the invention furthermore the print is presented at the front of the machine.

According to the invention furthermore the means for separating the sheets are vacuum means and comprise inwardly directed pierced dimples in the outer face or faces of at least one duct, past which duct the sheets are fed after passing the light source.

According to the invention furthermore a flap is provided on the machine, said flap being movable to one or other of two positions, in one of the positions allowing an undeveloped print to be ejected from the machine by the endless conveyor means, and in the other position constraining the undeveloped print to proceed through the machine to the developer.

According to the invention moreover the developer is provided as a tank, said tank being positioned substantially horizontally and below said further endless conveyor along the underside of which further endless conveyor the print is caused to move over rollers, said rollers having a substantially plain surface and being adapted to press a developing fluid, provided in the developer tank into the material of the print.

By dimpling the holes provided in the perforated plates which perforated plates form a part of the duct or ducts past which the sheets pass, suction pressure applied to a small hole is effective over a relatively large area of the print. Thus the number of holes required to effect separation of the sheets, is reduced, thereby reducing the size of fan necessary to produce the suction pressure in the duct or ducts. A more uniform and effective suction pressure is thereby applied to the sheets.

By providing a movable flap, preferably hinged at its upper end, positioned during normal printing to cause the print to follow the path of the conveyor, the print can be ejected, before passing to the developer, merely by swinging the flap out of the path of the print. The means causing the print to continue through the machine are thus removed and the undeveloped print will be ejected from the machine with no danger of it being damaged.

By mounting the developer tank substantially horizontally below the further endless conveyor, the overall height of the machine may be reduced, and the lay out of the conveyor can be such that the print is delivered at eye level at the front of the machine, and then allowed to fall over on to the top of the machine, with the printed side uppermost. This lay out of conveyor has the advantages that the operator can check the print, for complete printing and for developing quality, as the print emerges, without having to handle it, and the prints are stacked on top of the machine in a pile and may be collected either from the front or from the back of the machine.

By providing spaced rollers having a substantially plain surface, in the developer, the developing fluid is allowed to pass between the rollers and to react uniformly with the coating on the print.

In addition to holding the print against the conveyor the rollers act, to press the developing fluid into the print ensuring more effective developing, and also act to cause turbulence in the developer tank, agitating the developing fluid and ensuring uniform developing over the whole print. The developer is thus rendered more efficient, and machine speeds higher than previously used are possible without increasing the size of the developing tank necessary. As the developing speed is the limiting factor in machines of the kind described, a higher speed machine is possible relative to known machines without any increase in overall size.

One embodiment of the invention is diagrammatically illustrated by way of example in the accompanying drawing, which is a schematic end view of a diazotype printing machine with the end covers removed.

In the following description the words front and rear and derivaties thereof are intended to means the left and

right sides of the drawing respectively as normally viewed and upper and lower and derivaties thereof to mean the top and bottom of the drawing respectively as normally viewed.

The machine is mounted in a cabinet 1, having a sloping top 2 formed as a tray, and having a small working table 3 provided at the front, at the position at which the operator normally stands. Immediately above and below the rear of the table 3 are provided endless conveyor bands 4 and 5 respectively. The conveyor bands 4 and 5 advantageously a series of separate parallel bands, are provided to extend almost the complete width of the machine and are adapted to pass around rollers 6 and 7 respectively. A smooth inclined support 8 advantageously of sheet metal is provided beneath the belt 5 and is supported upon rigidly secured transverse rods 9. A roller 10, provided at the inner end of the band 4, is adapted to be driven by a chain 11, which chain is driven by a chain wheel 12 which is in turn driven by a chain 13 from a variable speed motor driven sprocket 14. An adjustable jockey pulley 15 is provided to adjust the tension of the band 4. The band 5 passes around a glass cylinder 16 which cylinder is rotatable but is provided with a non-rotatable centre portion 17. A light source 18, advantageously a mercury discharge tube, is provided within the portion 17. A partition 19 divides the compartment holding the light 18 from a cooling duct 20. The cylinder 16 is not provided with a central support but rotates against the roller 10 and a further roller 21 and is held there-against by the tension of the band 5.

Adjacent the upper forward side of the roller 16 is provided a duct 22 advantageously formed of sheet metal and having, in a lower face 23 a series of inwardly directed jets 24 formed as pierced dimples in the material of the sheet. The dimples are advantageously formed with the walls of the dimples convex inwardly and so that a small hole in the jet corresponds to a relatively large area of the face 23. A further duct 25 having an upper face 26 and inwardly directed jets 27 formed as pierced dimples may be provided below the duct 22.

Adjacent the forward face of the duct 22 the band 5 reverses its direction around a roller 28. Adjacent the forward circumference of the roller 28 and spaced therefrom is provided an elongated transverse flap 29, pivoted at 30 and movable between the solid and the dotted line positions shown. An upper face of the duct 22 acts as a support for the belt 5 after the belt has passed over the roller 28, the belt then passes over two rollers 31, said rollers 31 being adjustable by means of a spring loaded member 32, the belt then passes back to the roller 7. Above the duct 22 is provided a static guide 33 mounted on a rod 34 and adjacent the rear of the guide 33 is mounted on idler guide roller 35 and an elongated curved guide 36.

Above the static guide 33 is provided a developer having a tank 37. Secured to the inner face of the bottom of the tank is provided a tray 38 comprising a plurality of transverse channels 39 the channels being inter-connected at their ends to form a zigzag path. An electric heater 40 is provided above the tray 38 and is under the control of a thermostat 41. At the upper front end of the machine a roller 42, driven by the chain 13 which chain also drives the roller 28, carries a further endless conveyor band 43. The conveyor band 43 is adapted to pass over idler rollers 44 which are mounted above the developer tank 37, static rollers 45 are provided at the front and rear of the tank 37 and have secured to them the opposite ends of a plurality of fine wires 60 which wires are stretched from the front to the rear of the developer tank and lie in small grooves in the rollers 44.

A roller 46 having position adjusting means 47, is provided at the rear of the machine for the band 43, and further rollers 48 and 49 are provided at the front of the machine at its upper end.

An elongated sheet guide 50 is provided adjacent the rollers 42 and 48 and 49, and an elongated control and indication panel 51 is provided at the front of the machine, the panel 51 supporting a guide member 52, said guide member 52 co-operating with a further guide member 53. An arcuate tray 54 is provided at the front of the machine. Hinged extension means 55 are provided at the rear of the top of the machine and are movable between a vertically down position and a substantially horizontally up position. A duct 56, provided at the bottom of the machine, is exhausted by a fan (not shown) and thus creates a suction pressure which exhausts a duct 57 leading to the duct 20 and also a duct 58 leading to the ducts 22 and 25.

In operation an original print and a coated sheet to be printed are inserted together in contact relation with the original uppermost between the bands 4 and 5 at the table 3. The sheets are conveyed between the two sets of moving bands 4 and 5 and pass around the glass cylinder 16. The light from source 18 except where there are dark markings on the original to obstruct the path of the light, shines through the glass cylinder 16, through the original, and reacts with the coating on the sheet to be printed.

The two sheets are then conveyed between the two ducts 22 and 25 and are separated by the air suction pressure through the jets 24 and 27 in the plates 23 and 26. The original is ejected into the tray 54 provided at the front of the machine. The print is held against the underside of the belt 5 by the air suction pressure through the jets 24 and passes to a position adjacent the flap 29. In the position shown in the drawing the flap 29 will cause the print to follow the band 5 around the roller 28 and proceed to the developer. If however, the flap 29 is moved outwardly to the dotted position shown in the drawings the print will be ejected from the machine by the band 5.

If the print is constrained to pass around the roller 28, it is then conveyed by the band 5, beneath the static skid 33 and under the roller 35 to be deflected by the guide 36 and to be picked up by the further band 43.

The band 43 conveys the print over one of the static rollers 45, and over the series of idler rollers 44 to the further static roller 45. The wires 60 lying in the grooves in the idler rollers 44 prevent the leading edge of the print from dropping into the developer tank. Whilst passing over the rollers 44, the print is subjected to a mixture of ammonia gas and water vapour, preferably in the ratio of 9:1, which is provided in the tank 37. The mixture is produced by supplying a solution of ammonia gas in water to the top end of the tray 38 the mixture runs down the gullies or channels 39 and any mixture that is not evaporated leaves by a drain pipe 59 provided at the rear of the tray 38.

The vapor mixture passes between the rollers 44 and reacts with the coating on the paper to develop the print. The rollers 44 have plain surfaces except for the grooves for the wires 60 and these plain surfaces press the vapour mixture into the paper and ensure even developing. The rollers also act to create turbulence in the developer tank 37 ensuring a consistent mixture of ammonia and water vapour. After passing over the second static roller 45, the print is fed by the belt 43 on to the roller 42 and to the roller 48 which ejects it from the machine. The print thus leaves the machine with the printed side facing the operator who stands in front of the machine and can thus easily check the print for complete printing and uniform developing. The print is then fed across the top of the machine into the tray 2, successive prints being stacked one on top of the other ready for collection either from the front or from the back of the machine.

If the flap 29 is raised and the print allowed to leave the machine undeveloped, the print can subsequently be reinserted for developing by feeding it between the guides 52 and 53.

I claim:

1. A diazotype printing machine for printing one face of a print in accordance with markings on a master sheet and comprising in combination a light source, a motor, first endless conveyor means driven by said motor for feeding said master sheet and said print past said light source, vacuum separation means for separating said master sheet from said print, said separation means ducts having inwardly directed pierced dimples in the outerface of at least one duct, said master and print sheets being fed past said duct after passing said light source, the pierced hole in the dimple being of a size considerably smaller than the size of the dimple, developer means for said print, second endless conveyor means co-operating with said first endless conveyor means for facilitating chemical reaction between said print and said developer and guiding means for presenting said print at the front of the upper part of the machine with the printed face uppermost.

2. A diazotype printing machine according to claim 1, in which a hinged guide flap is provided on the machine, said hinged guide flap being movable to one of two positions, in one of the positions allowing an undeveloped print to be ejected from the machine by the endless conveyor means, and in the other position acting upon the leading edge of the print to constrain the undeveloped print to proceed through the machine to the developer, said flap being movable between said positions during

operation of the machine without risk of damage to the print.

3. A diazotype printing machine according to claim 1, in which the developer is provided as a tank, said tank being positioned substantially horizontally and below said second endless conveyor, and including idler rollers positioned along the underside of said second endless conveyer and means for causing the print to move over said idler rollers, said idler rollers having a substantially plain surface and being adapted to press a developing fluid, provided in the developer tank into the material of the print.

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JULIA E. COINER, *Primary Examiner.*

EVON C. BLUNK, *Examiner.*