

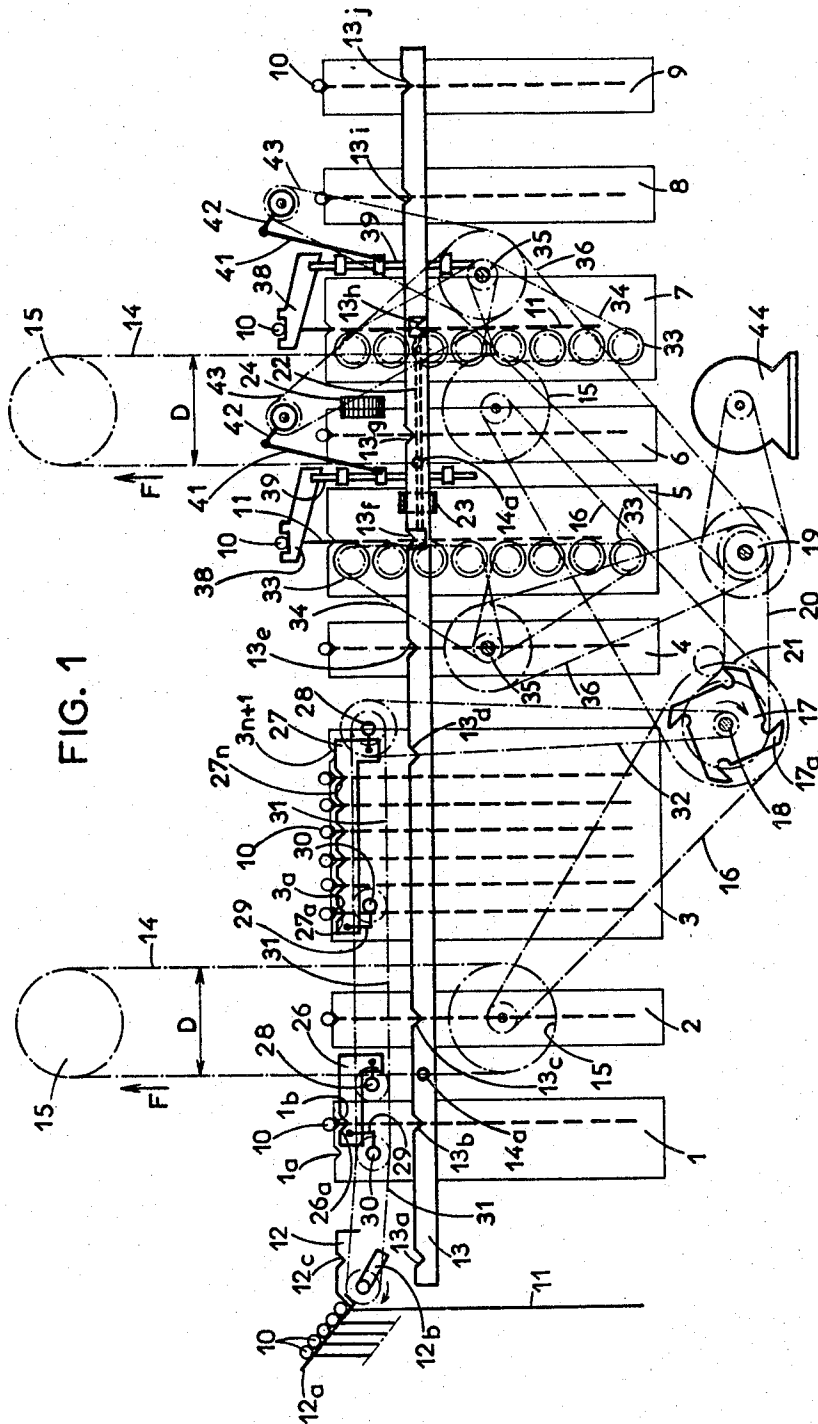
May 14, 1968

B. SAVART
AUTOMATIC MACHINE FOR THE TREATMENT OF
METAL OFFSET PRINTING PLATES

3,382,520

Filed June 3, 1966

3 Sheets-Sheet 1



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FIG. 3

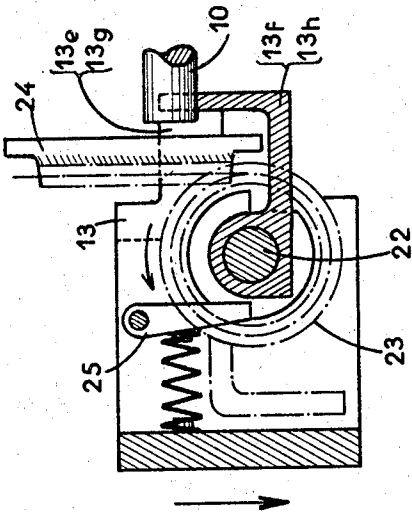
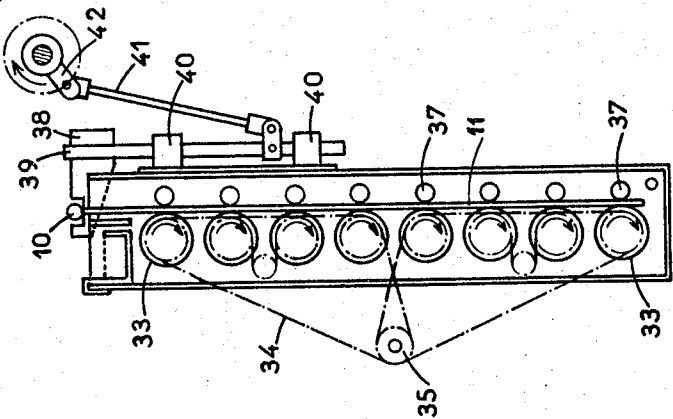


FIG. 2



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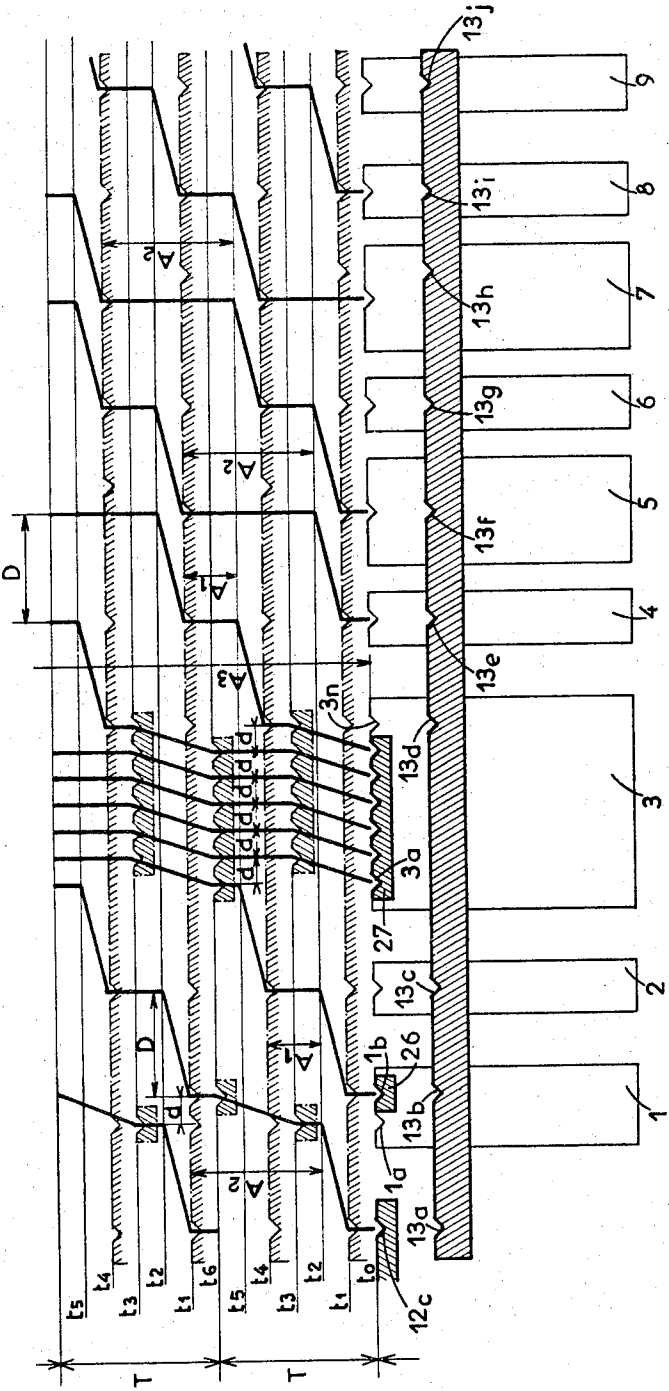
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FIG. 4



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3 Claims. (Cl. 15—77)

ABSTRACT OF THE DISCLOSURE

An automatic machine for the treatment of metal offset printing plates has a plurality of successive treatment tanks for the plates. A feed mechanism introduces the plates into the machine in the same cadence and transfers the plates between each of the tanks. Auxiliary feed mechanism moves the plates horizontally within the tanks in which the length of treatment is longer than the cadence of introduction of the plates into the machine.

This invention relates to an automatic machine for the treatment of metal offset printing plates.

In offset printing, engraved metal plates wrapped around a cylinder receive ink and transfer it to the actual printing cylinder.

The plates may be engraved or etched by coating them with a photo-sensitive varnish which is exposed to light through a block representing the text or image for reproduction; the plates then undergo a number of treatments as follows:

The varnish which has not undergone any structural modification as a result of exposure to light is dissolved.

The plate is then etched by attacking the places exposed by development.

The plate is then brushed at least once to remove the varnish residues.

The plate then undergoes a final treatment, more particularly drying, to enable the plates to be used in a printing machine.

Rinsing operations are also required between the above operations.

The object of the machine according to the invention is to enable the various operations required on a plurality of plates introduced into the machine to be carried out automatically at the highest possible speed, the succession of operations being compatible with the times required for each of the various operations and the times naturally differing according to the operations; to this end, for a given speed of introduction and removal of the plates, the machine according to the invention enables the retention times obtained in some of the treatment tanks to be multiples of the intervals of time separating the introductions of the plates into the machine.

According to the invention, the machine comprises in alignment and separated from one another by rinsing tanks; a plurality of treatment tanks such as a developing tank, an etching tank, at least one brushing tank and, if required, subsequent treatment tanks, each of the tanks being provided with abutment means for at least one flat support for the transportation and suspension of a plate, the plates being taken, in use, through the machine from a feed station by a mechanism for periodic transfer of the plates between the tanks, said mechanism being connected firstly to means for delaying the plate transfers between some of the tanks and secondly to means for horizontal transport of the plates to the interior of tanks intended to contain a plurality of plates simultaneously, said horizontal transports being carried out, in use, in

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time with the introduction of plates into the machine, in such a manner that the retention time of each plate in said tanks is a multiple of the interval of time between the introductions of the plates into the machine.

Other features of the machine will be apparent from the following description of one exemplified embodiment of the machine with reference to the accompanying drawing, wherein:

FIGURE 1 is a highly diagrammatic general view of the machine;

FIGURE 2 is a partial view to an enlarged scale, showing a detail of FIGURE 1 and the arrangement of a plate brushing tank;

FIGURE 3 is a partial view to an enlarged scale, being a detail of FIGURE 1 and showing a device for delaying the engagement of the plates by the inter-tank transfer mechanism;

FIGURE 4 is a diagram showing the plate transfer cycle.

The machine shown in highly diagrammatic form in FIGURE 1 comprises successive tanks 1 to 9; tank 1 is intended for development, tank 3 for etching, tanks 5 and 7 for brushing and tank 9 for drying of the plates. Rinsing tanks 2, 4, 6 and 8 are disposed between said tanks.

The plates to be treated are mounted on flat supports (not shown) and each has a rod 10, the two ends of which are intended to bear in notches at the top of the two side walls of each of the tanks.

Since the machine is symmetrical with respect to a central vertical plane parallel to the side walls of the tank, the arrangement of just one of the side surfaces of the machine will be described hereinafter.

Tank 1 has two notches 1a and 1b; tank 3 has equidistant notches 3a . . . 3n+1, the distance between the notches being d; the other tanks have just a single notch a.

The system consisting of the tanks 1 to 9 and of the various mechanisms carrying out the plate transfer, is supported by a common frame (not shown) in the form of two suitably struttled side frames.

The machine is fed with plates via an inclined surface 12a adapted to receive a plurality of suspension rods 10 for the plate supports 11. A reel 12b provides successive transfer of the rods 10 to a retaining notch 12c formed in a stationary support 12.

The rods 10 are transferred between the retaining notch 12c and the notch 1a of tank 1 and from each of the tanks 1-8 to the next tank, by means of a mechanism which on each side of the machine comprises a bar 13 provided with notches 13a . . . 13j and connected by two pivots 14a to two noria chains 14 each extending over two wheels 15. The horizontal distance between the two vertical runs of each noria chain corresponds to a horizontal distance D by which the rods 10 are transferred by the bars 13; the movement transmitted to the bars 13 by the noria chains 14 rotating in the direction of arrow F lifts the plates vertically above the top edges of the tanks and then lowers them vertically to deposit them after a horizontal movement of amplitude D.

The movements of the noria chains 14 are intermittent. To this end, the bottom noria wheels 15 are driven by chains 16 through the agency of a mechanism comprising a drum 17 with four arms 17a angularly solid with the chain pinions 16a of the chains 16. The drum is mounted loosely on a shaft 18 driven through a reduction gear 19 by a chain 20 having a dog 21 intended to contact the arms 17a. Drum 17 is thus driven over a fraction of a revolution, for example 3/4 of a revolution, and remains stationary until the dog 21 next encounters an arm 17a of the drum 17.

The notches 13f and 13h of the bars 13 associated with the brushing tanks 5 and 7 are retractable so that they

can be periodically rendered inoperative on each second downward movement of bars 13. To this end, they are rotatably supported on each of the bars 13 by a shaft 22 (FIGURE 3). A pinion 23 is mounted on shaft 22 and, at the end of the lowering movement of the bars 13, engages a fixed rack 24. Rack 24 rotates pinion 23 and shaft 22 through 180° so that the notches 13f and 13h are alternately brought into the position for engagement with the rods 10 as shown in solid lines and into a retracted position shown in chain-dotted lines. The notches 13f and 13h are locked in their operative position by a pawl 25 at an angle to the shaft 22. Periodic retraction of the notches 13f and 13h results in the plates being moved in the brushing tanks 5 and 7 only on every other upward movement of the bars 13. FIG. 1 shows the active position of the notch 13f, i.e., the position for the notch which will lift bar 10 of the plate in tank 5. During the upward movement of bar 13, pinion 23 will not mesh with rack 24 and the notch 13f will lift the plate in tank 6 in the plane of the notch 13g of FIG. 1. After deposit of the plate in tank 6 by notch 13f, pinion 23 is located in the plane of the rack 24 and will rotate the notch 13f through 180°. During the next upward movement of bar 13, notch 13f is out of operative position and will not lift the plate suspended in tank 5. This inoperative position of the notch is shown in FIG. 1 for notch 13h which, being reversed, cannot lift the plate in tank 7 when the bar 13 moves notch 13h upwardly.

The transfers of amplitude d inside the tanks 1 and 3 are respectively carried out by means of movable combs 26 and 27 each connected at one end to an eccentric 28 and at the other end via an articulated rod 29 to an eccentric 30. The eccentrics 28 and 30 are driven continuously and are connected together by chains 31, the movement being transmitted via a chain 32 from the shaft 18. On each half-revolution of the eccentrics, the combs 26 and 27 effect a transfer inside the tanks 1 and 3, the comb 26 via a notch 26a and the comb 27 via its notches 27a to 27n.

The brushing tanks 5 and 7 are arranged as shown to an enlarged scale in FIGURE 2. Each consists of a container in which rotary brushes 33 are disposed in one vertical plane, the brushes being driven by two chains 34 from a shaft driven by a chain 36 from the input shaft to the reduction gear 19 (FIGURE 1). The brushes 33 are sprayed with a suitable solvent.

Rotation of the brushes 33 tends to drive the plate supports 11 down. On the other side from the brushes the plates bear against rollers 37 which can also be in the form of brushes which may possibly be allocated for brushing a second plate mounted on each of the flat transport supports.

During the brushing operation, the plate supports 11 undergo a vertical reciprocating movement over a distance substantially equal to the distance between two adjacent brushes 33 so as to provide substantially uniform brushing over the entire surface of the plates.

To this end, the notches for retaining the plates in the brushing tanks 5 and 7 are associated with movable supports 38 or are replaced by such supports, each of which is mounted on a vertical rod 39 sliding in two stationary bearings 40 and connected by a rod 41 to an eccentric 42 rotated by a chain 43 from the drive shaft 35 for the brushes 33 (FIGURE 1).

The diagram given in FIGURE 4 shows the transfer times D from one tank to the next, the transfer times d to the inside of some of the tanks, and the times A_1 , A_2 and A_3 during which the plates remain inside the tanks, for two complete cycles T and against equal time intervals t . The continuous succession of operations is as follows:

Time t_0 : Beginning of transfer d of n plates to the interior of tank 3 by combs 27;

Time t_1 : Beginning of transfer D of plates taken by bars 75

13 from feeder 12 and tanks 1, 4, 5, 8. Notches 13h of bars 13 are retracted and do not take the suspended plate from tank 7;

Time t_2 : End of plate transfer by bars 13;

Time t_3 : End of transfer in interior of tank 3 and beginning of transfer of plate in tank 1 by combs 26;

Time t_4 : Start of transfer D of plates taken by bars 13 from tanks 2, 3, 6, 7 and 9. Lugs 13f of bars 13 are retracted and do not take the suspended plate from tank 5;

Time t_5 : End of plate transfer by bars 13;

Time t_6 : End of plate transfer in interior of tank 1 by combs 26 and start of a new cycle T .

During each cycle $T=6t$, the retention time of each of the plates in the various tanks is as follows:

$A_1=2t$ in rinsing tanks 2, 4, 6, 8 and in drying tank 9.

$A_2=5t$ in development tank 1 and brushing tanks 5 and 7.

$A_3=nT-t$ in etching tank 3, n being the number of plates provided in tank 3.

It will be apparent that this arrangement of the machine enables a number of plates to be treated simultaneously, the retention time required for the appropriate treatment being allotted to each of the tanks 1 to 9 and, more particularly, this time may be the required multiple of the intervals of time T between the introduction and removal of the plates.

It will also be apparent that in each of the plate retaining notches the intervals of time between deposition and re-engagement of the plates are at least equal to t , thus obviating any interference between the successive movements and obviating any idle time which would reduce the production cycle of the machine.

Of course the details of the above-described machine may be modified or the machine may be completed by any useful accessory element without thereby departing from the scope of the invention.

Inter alia, the machine will be completed by various pipelines for the flow of the treatment liquids, means for supplying and dissipating heat in some of the treatment tanks, and so on.

I claim:

1. An automatic machine for treatment of metal offset printing plates comprising in alignment an inclined support for a plurality of flat plate supports, rinsing tanks, a plurality of treatment tanks including a developing tank, an etching tank, at least one brushing tank and subsequent treatment tanks, each of said tanks having abutment means for at least one of said flat plate supports, mechanism for periodically moving said plate supports through said tanks from said inclined support, said mechanism including means for delaying said plate supports transfer between certain of said tanks and including means for simultaneous horizontal transport of said plate supports in the interior of said tanks containing a plurality of said plate supports, said horizontal transport means being actuated in time with the introduction of plate supports from said inclined support whereby the retention time of each plate support in said tanks is a multiple of the interval of time between the introduction of the plate supports from said inclined support, said mechanism including two horizontal transfer bars parallel with the alignment of said tanks and notches on said bars, supports for said flat plate supports received in said notches, two noria chains for each of said bars, each of said bars being connected to said two noria chains for vertical movement for removing said plate supports from said tanks for transfer of said plate supports above said tanks and for vertical movement for depositing said plate supports in said tanks, means for intermittently driving said noria chains including a drum, a plurality of arms on said drum, a continuously moving drive chain for said drum, a catch on said drive chain periodically engaging said arms whereby operative and

inoperative periods for said bars are established and two movable combs supporting said plate supports in those of said tanks containing a plurality of said plate supports for transporting said plate supports between a plurality of equidistant notches on said tank, the first and last of said notches on said tank receiving one of said plate supports from and delivering one of said plate supports to said transfer bars.

2. An automatic treatment machine as described in claim 1, said notches in said bar being alternately operative and retracted so as to delay transfer of said plate supports between certain of said tanks.

3. An automatic treatment machine as described in claim 1, each of said brushing tanks containing a plurality of horizontal vertically disposed coplanar rotary brushes and means for reciprocating said plate supports in

front of said brushes in amplitude equal to the distance between the axis of two adjacent ones of said brushes.

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