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CONTINUOUS EXPOSURE OF PRINTING BLOCKS OR CYLINDERS FOR INTAGLIO PRINTING OR THE LIKE

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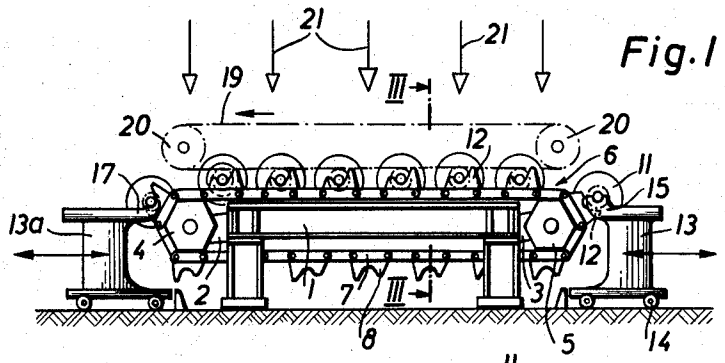


Fig. 1

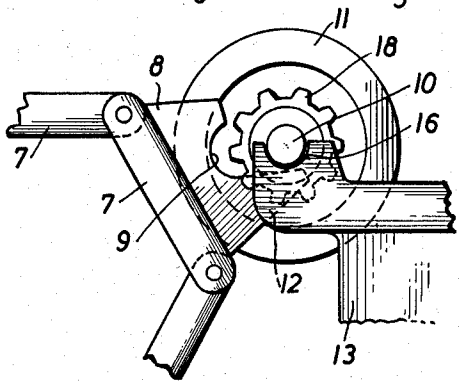


Fig. 2

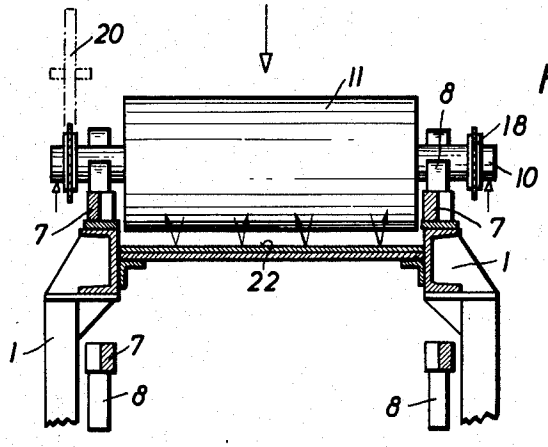


Fig. 3

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CONTINUOUS EXPOSURE OF PRINTING BLOCKS OR CYLINDERS FOR INTAGLIO PRINTING OR THE LIKE

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This invention relates to the continuous exposure of printing blocks, in particular of printing cyclinders, which are coated with a photosensitive solution, (colloid solution) for intaglio printing or the like.

The exposure of printing blocks or cylinders rendered photosensitive on the periphery, and having a copy-pattern stretched over them, necessitates considerable time in the general process and operation of manufacturing printing blocks or printing cylinders, and the manufacturing operation, which in other respects may be conducted continuously, is sometimes seriously disturbed and slowed down. This drawback can be remedied if a plurality of exposure apparatuses is set up, but is uneconnomic, not only as to cost, but also as to the space requirements.

According to the invention these disadvantages are eliminated. The invention is characterized in that the printing blocks, in particular the printing cylinders, are moved past fixed light sources, and are kept in constant rotation, during their exposure. The feed of the printing block to the exposure apparatus, and removal of it therefrom, may take place automatically. The printing blocks are advantageously arranged in a flat, i.e. a horizontal position, in series one behind the other, and moved along for the purpose of exposure.

The device for carrying out the process according to the invention is constructed in a manner wherein the exposure device comprises a conveyor device arranged horizontally and provided with brackets to receive the printing blocks. The brackets are constructed for the printing blocks to be rotatably journalled in them. During the transport of the printing blocks lying horizontally and arranged one behind the other, each individual printing block is set in rotation. This may conveniently be effected by a belt-like drive device which engages with spindles on which the printing blocks are mounted.

The apparatus according to the invention enables the exposure process to be operated continuously and in conformity with the other continuous operations in the manufacture and completion of printing cylinders. The printing cylinders may be constantly fed to the device and constantly removed from it, while the entire process can be carried out with one continuous transporting device. The light sources are stationary, and the printing blocks moved past them. During transport of the printing blocks in the exposure chamber, constant rotation of the printing cylinders is simultaneously ensured, so that each point on the periphery of the printing cylinder is uniformly exposed. The arrangement according to the invention further enables light sources to be arranged on both sides of the device so that the exposure time can be considerably reduced. Alternatively a light source may be located on one side of the printing blocks and a mirror surface be provided on the other side, which mirror appropriately throws back light rays from the light sources on the other side of the blocks.

According to further features of the invention the conveyor device employed may be a conveyor chain which is guided around drive and guide drums, respectively. On links of the chain are located the brackets which receive the spindles of the printing blocks. The brackets

may conveniently be in the form of bearing blocks, with semicircular bearings open upwards, for the printing block spindle. On the rear of each bearing block with reference to the direction of transport there may be provided an extension by which the automatic removal of the printing blocks from a feed block may be effected. The feed block may conveniently be movable.

The belt-like drive device, whereby the printing blocks rotatably journalled in the bearings thereof are adapted to be set in rotation, may consist of a chain which engages with sprockets mounted on the printing block spindle. The chain for the drive device is driven in a manner wherein its lower run moves in the opposite direction to the transport direction of the printing blocks, and thus automatic rotation of the printing blocks is obtained on the translational path of the printing blocks, even when the drive chain is stationary. Upon movement of the drive chain in the opposite direction to the transport direction, the rate of rotation of the printing blocks may be considerably increased.

With the above and other objects in view that will hereinafter appear, the nature of the invention will be more clearly understood by reference to the following detailed description, the appended claims and the several views illustrated in the accompanying drawing:

In the drawing:

FIG. 1 is a diagrammatic side elevation of an exposure device according to the invention;

FIG. 2 is a device for taking over a printing block from a bearing block or feed block on a larger scale; and

FIG. 3 is a cross-section along the line III—III in FIG. 1.

The exposure device illustrated in the drawing comprises a stand 1 extended in a horizontal direction, which carries, on beams 2 and 3, guide wheels in the form of chain drums 4 and 5, around which is guided a chain 6. The chain drum 4 may be driven by an electric motor either directly or by the interpositioning of a driven gear with step-up ratio. At least every second link 7 of the transport chain 6 is provided with a bearing block 8, with semicircular bearing 9 open outwards. The spindles 10 of the printing blocks 11 are rotatably journalled in these bearing blocks. Each bearing block 8 is provided, at the rear, with reference to the transport direction of the chain 6, with an extension 12. By engagement of this extension 12 on the end of the spindle 10 the printing block 11 can be automatically removed from a transport block 13 when the transport block 13 is approached closely enough to the conveyor chain 6. The transport block 13 is rendered mobile by means of the rollers or wheels 14 and carries cantilever arms 15 each formed with a bearing 16 open upwards. The arms 15 are arranged at a shorter distance from one another than the bearing blocks 8 of the chain 6, so that the transport block 13 may, when the chain is running, be approached sufficiently closely to the bearing block 8 for the spindle 10 of the printing block to be caught by the extension 12 and thus lifted off the cantilever arm 15. Upon further movement of the bearing block 8 in the transport direction, the spindle 10 automatically rolls into the open bearing recess 9.

The delivery to a further transport block 13^a of the printing block which has been moved through the exposure device occurs in a similar manner, the transport block 13^a having cantilever arms 17 with bearings 16. In order that the spindle of the printing block shall be released in good time from the downward-moving extension 12 of the bearing block 8, an oblique cam or a roller (not shown) may be provided on the arm 17, on which the extension 12 acts in the sense of a pushing away of the block 11, so that the bearing block 8 with the exten-

sion 12 may move downward with the chain, unobstructed.

On both sides of the printing blocks spindle 10 may be fitted toothed wheels 18 with which may engage a chain 19 located above the transport device 6 and guided around guide rollers 20. The chain 19 is positioned at such a height as to be able to engage with the chain sprockets 18. The chain 19 is suitably driven so that its lower run moves in the opposite direction to the transport direction of the conveyor device 6.

Located above the stand 1, and the printing blocks 11 being moved along it, are light sources 21, preferably stationary, which may be distributed in any desired number and power over the length of the device. Light sources (not shown) may likewise be provided below the printing blocks. A mirror 22 (FIG. 3) may be arranged to reflect the rays emitted by the upper light sources, so that exposure of the printing blocks from below is simultaneously effected.

The exposure apparatus according to the invention operates continuously in such a manner that a prearranged number of printing blocks are passed simultaneously through the exposure chamber, while during the translation movement of the printing blocks they are simultaneously set in rotation by the aid of the chain 19 and the chain sprockets 18 located on the printing block spindles 10. The feed of the printing block to and its removal from the exposure device may be effected with the aid of the individual transport blocks 13 and 13a. These transport blocks may also be so formed that several printing blocks are located on them one behind the other, being fed in each case in the corresponding position to the bearing blocks 8 located on the chain 6. The speed of advance of the conveyor device 6 may be continuously variable and regulated so as to ensure that the printing block on leaving the exposure device at the end of the conveyor path has been amply and sufficiently exposed.

The light sources employed may be the customary carbon filament lamps or arc lighting appliances, or fluorescent tubes emitting the so-called cold light. Where fluorescent tubes are used, these are conveniently surrounded by a housing (not shown) which allows the light to pass only in the direction of the object to be illuminated, and shields it from all other quarters. An eye protection (not shown) may further be provided below the apparatus and also on the other two sides, e.g. by shield plates, so that an operator is in no way incommoded by the light. As virtually no heat is developed with fluorescent tubes, the possibility exists of bringing the light source relatively close up to the printing blocks to be exposed, whereby the exposure time may be reduced.

From the foregoing, it will be seen that novel and advantageous provision has been made for carrying out the desired end. However, attention is directed to the fact that variations may be made in the example method and apparatus disclosed herein without departing from the spirit and scope of the invention, as defined in the appended claims.

What is claimed is:

1. An exposure device for printing blocks such as printing cylinders for intaglio printing comprising a stationary light source, conveyor means disposed below said light source for moving printing blocks beneath said light source and thus exposing the printing blocks, and drive means for engaging and rotating the printing blocks during the movement thereof below said light source, whereby all of the periphery of each printing block will be equally exposed.

2. The exposure device of claim 1 wherein said conveyor means includes a plurality of aligned brackets presenting outwardly opening generally semicircular bearings for the reception of spindle ends of the printing blocks.

3. The exposure device of claim 2 wherein said drive means includes a drive chain for engagement with sprockets on the printing block spindles.

4. The exposure device of claim 2 wherein said drive means includes a drive chain for engagement with sprockets on the printing block spindles, and the direction of movement of the drive chain is opposite to the direction of movement of said conveyor means.

5. The exposure device of claim 2 wherein each bracket has an extension projecting outwardly of the respective bearing and rearwardly thereof in the direction of travel, whereby spindles of printing blocks may be automatically seated in said bearings.

6. The exposure device of claim 1 wherein said light source is supplemented by a reflector disposed beneath said conveyor means path of printing block movement.

7. The exposure device of claim 1 together with transport means for delivering unexposed printing blocks to said conveyor means, and wherein said conveyor means includes means for automatically removing printing blocks from said transport means.

8. The exposure device of claim 1 together with transport means for delivering unexposed printing blocks to said conveyor means, and wherein said conveyor means includes means for automatically removing printing blocks from said transport means, and other transport means for receiving exposed printing blocks from said conveyor means.

9. The exposure device of claim 1 wherein said conveyor means includes a plurality of aligned brackets presenting outwardly opening generally semicircular bearings for the reception of spindle ends of the printing blocks, and transport means for delivering unexposed printing blocks, said transport means including transversely spaced cantilever arms for supporting the printing blocks by the spindles thereon for engagement by said bearings.

10. The exposure device of claim 9 wherein each bracket has an extension projecting outwardly of the respective bearing and rearwardly thereof in the direction of travel, whereby spindles of printing blocks may be automatically seated in said bearings.

11. An exposure apparatus for rotatable printing blocks and the like, said apparatus comprising means for feeding rotatable printing blocks to an exposure device in sequence, said printing blocks having a longitudinal axis and being fed in a linear path to said device with their longitudinal axes being arranged substantially parallel to each other, a source of light for irradiating articles moving through said exposure device, means for moving said printing blocks through said device in sequence with their longitudinal axes substantially parallel to each other and substantially horizontal and for simultaneously rotating said printing blocks about their longitudinal axes at a substantially constant speed as they are moved in a linear path through said device, and means for removing said printing blocks from said device in sequence.

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