March 4, 1952 H. A. OLSSON 2,587,883

APPARATUS FOR THE PRODUCTION OF PRINTS

Filed Feb. 28, 1950

FIG. 1

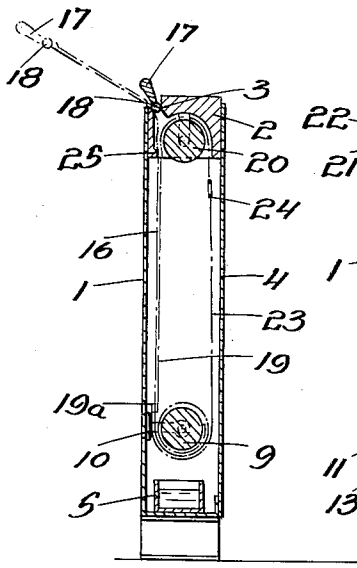


FIG. 2

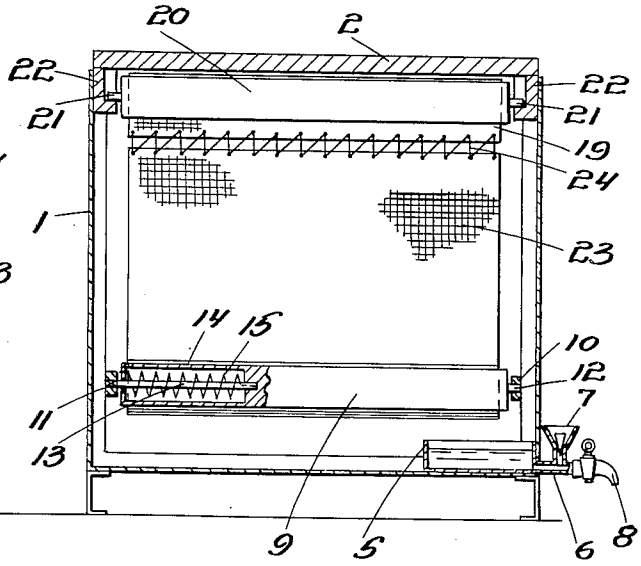


FIG. 3

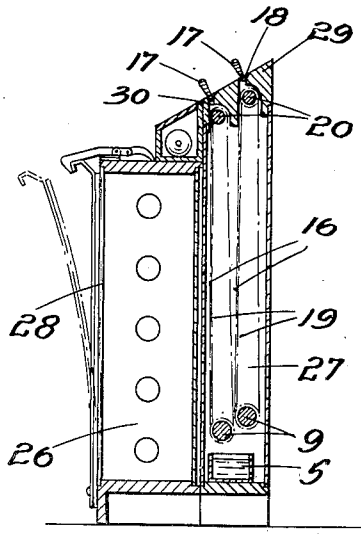
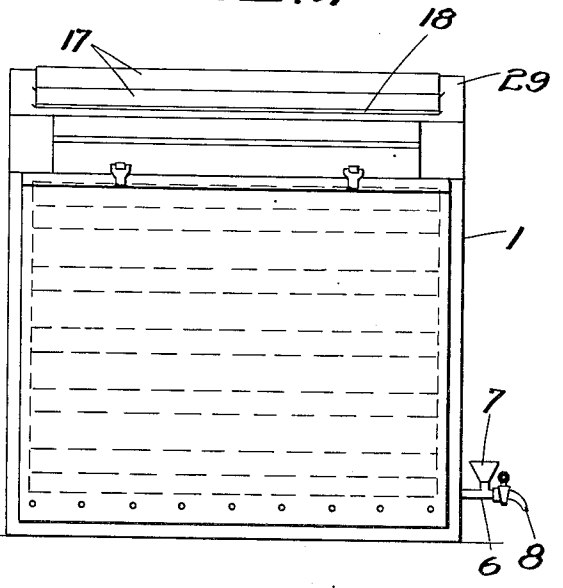


FIG. 4



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APPARATUS FOR THE PRODUCTION OF PRINTS

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10 Claims. (Cl. 95—89)

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This invention relates to an apparatus for the production of prints.

When producing prints exposure and development apparatuses are generally used which are altogether separated from one another and which are each available on the market in a great many forms, the construction of the development apparatus being not dependent on the construction of the exposure apparatus or inversely. While the exposure apparatus may be placed in a room where other work also is performed, e. g. in a drawing office, the development apparatus in which ammonia is used as a developing medium, must generally be placed in a separate room, on one hand in view of the inconvenience that the heavy ammonia smell causes those present in the same room and on the other hand in view of the fact that the printing stock which, at least in smaller quantities, is stored adjacent the exposure apparatus would be damaged if the atmosphere of the room were mixed with ammonia vapour. This is very inconvenient when operating the apparatuses.

Furthermore, it is customary for the development of the prints to use an apparatus comprising a box of wood or other material, in which ammonia gas is produced by evaporation from a supply of liquid situated in the lower part of the box. The prints of drawings are introduced into and removed from the box through an opening which may be closed by means of a cover. Development boxes of this kind have many disadvantages. To begin with, the cover must be opened every time a drawing print is to be introduced or removed, and the person performing the development is exposed to the unpleasant evaporating gas which rapidly spreads in the whole room. Furthermore, it is necessary as a rule to introduce the prints into the box tightly rolled in order that as many prints as possible may be introduced, and as a result the development is delayed.

One object of the invention is to provide an apparatus for the production of prints which does not possess the above-mentioned disadvantages of the known apparatuses.

Another object of the invention is to provide an apparatus of the type referred to, which enables development of prints everywhere, e. g. in a drawing office, without a special closed room being necessary for this purpose.

Another object of the invention is to provide an apparatus of the type referred to, which permits an increased working speed when developing prints.

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Still another object of the invention is to provide an apparatus of the type referred to, by means of which the exposure and development of prints can take place not only in the same room but even in so close connection with each other that the prints may be removed from an exposure unit and introduced into a development unit only by means of some simple manual movements of the operator who does not need to move from his place.

A further object of the invention is to provide a combined apparatus for exposing and developing prints which forms a continuous whole comprising an exposure unit and a development unit which are situated very close together, but of which the latter is so adapted that no appreciable leakage of ammonia gas from the same will take place, for which reason the air adjacent this exposure unit will not be saturated with ammonia vapour to such an extent that the supply of printing stock usually stored adjacent the exposure unit, is damaged.

The invention consists in an apparatus for developing prints, comprising a casing which is altogether closed except for one or more parallel slots for the passage of printing stock and which contains a supply of liquid delivering a developing gas, pairs of cloths provided in the casing and extending adjacent each other inwards into the casing from the slot or each slot to receive the printing stock between them, at least one of which cloths of each pair is permeable to gas, said cloths being movable towards the slot or each slot by manual operation while overcoming a retaining force derived from an energy-storing means arranged within said casing, and away from said slot or each slot by the action of said retaining force to introduce exposed sheets of printing stock one by one into said casing and to discharge them after development, respectively, through said slot.

Furthermore, the invention consists in a combined apparatus for exposing and developing prints, in which an exposure unit in the form of a box having vertical front and back faces and provided on the front face with a glass plate for the application of originals and sheets of printing stock thereto, and a development unit comprising a box-like casing which is altogether closed except for one or more longitudinal slots in its upper wall, are so assembled that the development unit is disposed at the back of said exposure unit, said slots in the casing of the development unit being sealed by sealing means which may be withdrawn to permit introduction

and removal of exposed sheets of printing stock into and from said casing, respectively, through said slots.

In order that the invention may be clearly understood and readily carried into effect it will be described in detail in the following, reference being had to the accompanying drawings in which:

Fig. 1 is a vertical cross section through an embodiment of the apparatus according to the invention,

Fig. 2 is a vertical longitudinal section through the same embodiment,

Fig. 3 is a vertical cross section through an embodiment of a combined apparatus according to the invention, and

Fig. 4 is a vertical elevation of this latter embodiment as seen from in front.

Referring to Figs. 1 and 2, the aparatus comrises a casing 1 in the form of a narrow and high box of suitable material, such as wood, plastic, sheet metal or the like, which is closed on all sides, at the top by means of a block 2 of a similar material as the walls, which block is tightly inserted and fixed in the casing between its side and end walls, said block having a slot 3 for the introduction of exposed sheets of printing stock to be developed in the apparatus. One side wall 4 of the casing 1 is removable to make the interior of the casing available. Placed on the bottom of the casing is an open container for a supply of liquid delivering a developing gas (ammonia), and this container is provided with a pipe connection 6 extending through one end wall of the casing 1 and carrying a filling hopper 7 and a faucet 8.

Arranged in the lower portion of the casing 1 is a horizontal roller 9 which is supported by brackets 10, 11 which may be secured to the end walls of the casing or, as shown in Figs. 1 and 2, to the fixed side wall thereof. The roller is of the same construction as the rod of a roller blind and thus at one end has a bearing pin 12 which is rotatably mounted in one bracket 10, and at the other end a spindle 13 which is rotatably mounted in an axial bore 14 in the roller and the outer end of which spindle is non-rotatably mounted in the other bracket 11. The spindle 13 in said bore 14 is surrounded by a screw spring 15 which has its ends fixed to the roller and the spindle, respectively. A cloth 16, the inner end of which is attached to the roller 9, is rolled several turns around the roller. This cloth is made from a gas repellent material such as different kinds of plastics, e. g. of the polyvinyl chloride type. The outer portion of the cloth 16 extends from the roller 9 upwards through the interior of the casing 1 and out through the slot 3. At the outer end the cloth 16 is provided with a handle rib 17 for pulling out the cloth against the spring force. Along the inner edge of the rib 17 there is fixed on the cloth a round packing 18 of rubber sponge or the like which is adapted to be pressed by said spring force against a seat at the mouth of the slot 3 to seal said slot.

At a distance from the outer end of the cloth 16 a second gas permeable cloth 19 is united with the first-mentioned cloth at one inner end thereof along a transverse line 19*a*, i. e. a line parallel to the slot 3. Said cloth 19 extends adjacent the cloth 16 between the junction line 19*a* and a point adjacent the slot 3 where the cloth is passed over a guide member 20 serving the purpose of deflecting it from the cloth 16 when the latter is pulled out through the slot 3. The cloths 16 and 19 thereby form a pocket adapted to receive a sheet of printing stock which is placed with its light-sensitive face outwards on the outer part of the cloth 16 pulled out through the slot 3 and serving as a support for the exposed sheet, and which is drawn into the casing together with the cloth 16 by the spring force, the sheet of printing stock lying, as will readily be seen, between the cloths with its light sensitive side facing the gas permeable cloth 19. The line of junction 19*a* of the cloths is preferably spaced so far apart from the outer end of the supporting cloth that, when the cloths are introduced at the maximum of their length into said casing, said line will lie near the roller 9, i. e. in the portion of the casing most remote from the slot 3.

The above-mentioned guide member 20 comprises a roller which is freely rotatably mounted by means of pins 21 in bearing members 22 which are arranged at the top and on the inner side of the end walls of the casing 1 inside of the block 2, the ends of which block are recessed to accommodate the bearing means 22 and the inner side of which has a longitudinal recess in which the roller 20 lies. The gas permeable cloth 19 is returned over the roller 20 and is provided behind the roller with an extension 23 running back into the casing 1 up to the supporting cloth 16 rolled onto the roller 9, where it turns around the roller 9 outside of the supporting cloth 16 and is united therewith along the same line of junction 19*a* as the opposite end of the cloth 19. The extension 23 of the cloth 19 could possibly be united with the supporting cloth 16 along another line situated at an optional point on the lower half of the outermost turn of the cloth 19 on the roller 9. In any case there is formed an endless belt running around both rollers 9 and 20. The extension 23 of the cloth 19 can be integral therewith and thus be made from the same material, but it is preferably a separate cloth which is united with the cloth 19 by a detachable connection 24 which is illustrated in Fig. 2 as a lacing.

Due to the slot 3 being very narrow, only an inconsiderable amount of the developing gas escapes through it, when the supporting cloth 16 is pulled out from the casing. To further diminish the escape of gas the block 2 is provided at the front edge of the recess in which the roller 20 is situated, with a longitudinal bead 25, over which the cloths 16 and 19 are passed.

Referring now to Figs. 3 and 4, the combined apparatus shown therein comprises an exposure unit 26 and a development unit 27, of which the latter is disposed at the back of the former. The construction of the exposure unit 26 will not be described in detail, since it does not form any part of the invention and may besides be varied without affecting the nature of the invention. It should be pointed out, however, that said unit 26 is in the form of a box having a vertical front face which is covered by a glass plate 28 to which originals and sheets of printing stock are applied, and that the exposed sheets of printing stock, when removed from the exposure unit, may be transmitted to the development unit 27 very rapidly and conveniently.

The development unit 27 consists of a box-like casing which is assembled with the exposure unit 26 at the back thereof and which projects somewhat beyond said unit. The casing 27 is closed on all sides, at the top like in Figs. 1 and 2 by means of a block 29 tightly inserted and fixed in the casing between the side and end walls thereof. As distinguished from the apparatus in Figs. 1 and 2 the said block 29 has, however, two slots

30 arranged in parallel and spaced apart along the casing of the unit to permit introduction of sheets of printing stock to be developed. The casing 27 contains double arrangements of cloth pairs 16, 19 and pertaining rollers 9 and 20 as well as the other parts of the apparatus in Figs. 1 and 2, described in connection therewith, to enable development of two sheets at a time. Identical parts have the same reference numerals in Figs. 3 and 4 as in Figs. 1 and 2. One container 5 only and the corresponding equipment is naturally necessary. A detailed description of the parts of the development unit is unnecessary under these conditions. However it should be observed that the round packings 18 of rubber sponge or the like which, as stated in connection with Figs. 1 and 2, may be moved aside to permit the introduction and removal of the sheets into and from the casing 27, respectively, always cut off the interior of the casing 27 from the surrounding room so tightly by the force of the springs 15 that there is no risk of ammonia vapour leaking out and giving rise to a content of ammonia vapour in the surrounding air, which may be dangerous to the supply of non-exposed sheets of printing stock adjacent the exposure unit 26. It should also be observed that the block 9 has been given a bevelled shape so that its upper side is inclined, whereby the handle ribs 17 are more easily available. As a result of this shape of the block the upper rollers 20 as well as the lower rollers 9 are mounted at different levels in the casing.

As will readily be realized, it is possible after exposure of a sheet of printing stock in the unit 26 to lift this sheet and merely by moving it a short distance backwards to hold its lower edge above one of the slots 30 in the development unit 27, into the casing of which the sheet may be introduced with the aid of the supporting cloth 16 after the same has been pulled out sufficiently far by means of the handle rib 17. Exposure and development of prints may thus be performed in immediate sequence and the operator does not need to move from his place. Thanks to the fact that the interior of the casing of the development unit 27 is completely cut off from the atmosphere during the greater part of the developing operation and that in any case never more than the narrow slot or slots 30 bring the interior of the casing into communication with the atmosphere for a short time only, it is possible to perform the development in such a close connection with the exposure place—where for practical reasons a store of printing stock must be held available—without the printing stock undergoing any deterioration as a result of the ammonia content of the air.

The invention is not limited to the embodiments described above. The two cloths 16 and 19 forming a pair may be arranged in a manner other than that described, if only they extend closely adjacent each other at least over a part of their length in the casing and permit the sheets of printing stock to be introduced and removed through the slot or slots in the casing to and from a position between the cloths, respectively, in which they are exposed to the action of the developing gas. If considered necessary, the apparatus may be provided with three or more pairs of cloths and pertaining parts which may be arranged in the same relationship as the two pairs of cloths in Figs. 3 and 4.

In apparatuses which are to be used for very big sizes of drawings the rollers 9 and 2 can change places in such a way that the spring roller on which the supporting cloth is wound, is arranged in the part of the casing 1 adjacent the slot 3, while a freely rotatably mounted return roller is arranged most remote from the slot 3. The supporting cloth 16 and the gas permeable cloth 19 may then extend from the slot 3 inwardly (downwardly) into the casing and turn around the said return roller to continue on the other side thereof towards the spring roller. The line of junction of the gas permeable cloth 19 with the cloth 16 should preferably be situated adjacent the first-mentioned roller, when the supporting cloth 16 is completely drawn into the casing. In this modification of the apparatus the end of the cloth 19 which is connected with the extension cloth 23 in Figs. 1 to 4 can be united direct with the supporting cloth on the spring roller.

What I claim and desire to secure by Letters Patent is:

1. An apparatus for developing prints, comprising a substantially closed casing having a slot for the passage of printing stock, means for containing a supply of liquid delivering a developing gas within said casing, a pair of cloths provided in said casing and extending adjacent each other inwards into the casing from said slot, at least one of said cloths being permeable to gas, said cloths being connected to each other along a line parallel to said slot and located in such a position on said cloths that, when the cloths are introduced at their maximum length into said casing, said line is in that part of the latter which is most remote from said slot to form a pocket for receiving said printing stock between the cloths, manual means for moving said cloths towards said slot, and means for imposing a retaining force on said cloths in opposition to said manual means and for returning said cloths away from said slot to introduce exposed sheets of printing stock one by one into said casing and discharge said sheets after development, respectively, through said slot.

2. An apparatus for developing prints, comprising a substantially closed casing having a slot for the passage of printing stock, means for containing a supply of liquid delivering a developing gas within said casing, a cloth provided in said casing and extending inwards into the latter from said slot, said cloth being arranged so as to permit its outermost part to be pulled out through said slot and serving as a support for printing stock, a second cloth provided in said casing adjacent said first-mentioned cloth to enclose the printing stock between said two cloths and being permeable to gas, means inwardly of said slot to deflect said second cloth from said first-mentioned cloth at the pulling out of the latter through said slot, manual means for effecting said pulling out of said first-mentioned cloth through said slot, and means for imposing a retaining force on said cloths in opposition to said manual means and for returning said cloths away from said slot to introduce exposed sheets of printing stock one by one into said casing and discharge said sheets after development, respectively, through said slot.

3. An apparatus for developing prints, comprising a substantially closed casing having a slot for the passage of printing stock, means for containing a supply of liquid delivering a developing gas within said casing, a cloth provided in said casing and extending inwards into the latter from said slot, said cloth serving as a support for printing stock, means provided in the

part of said casing most remote from said slot for winding up said cloth into a roll parallel to said slot, a second cloth provided in said casing adjacent said first cloth to enclose printing stock between said two cloths and being permeable to gas, said second cloth being connected to said first cloth along a transverse line spaced so far from the outer end of said first cloth that said line, when the two cloths are introduced at the maximum of their length into said casing, will lie near said roll, manual means for moving said cloths towards said slot, and means for imposing a retaining force on said cloths in opposition to said manual means and for returning said cloths away from said slot to introduce exposed sheets of printing stock one by one into said casing and discharge said sheets after development, respectively, through said slot.

4. An apparatus for developing prints, comprising a substantially closed casing having a slot for the passage of printing stock, means for containing a supply of liquid delivering a developing gas within said casing, a cloth provided in said casing and extending inwards into the latter from said slot, said cloth serving as a support for printing stock, a roller rotatably mounted in the part of said casing most remote from said slot and parallel thereto for winding up said cloth into a roll thereon, a second cloth provided in said casing adjacent said first cloth to enclose printing stock between said two cloths and being permeable to gas, said second cloth being connected to said first cloth along a transverse line spaced so far from the outer end of said first cloth that said line, when the two cloths are introduced at the maximum of their length into said casing, will lie near said roller, manual means for moving said cloths towards said slot, and spring means mounted within an axial boring in said roller for imposing a retaining force on said cloths in opposition to said manual means and for returning said cloths away from said slot to introduce exposed sheets of printing stock one by one into said casing and discharge said sheets after development, respectively, through said slot.

5. An apparatus for developing prints, comprising a substantially closed casing having a slot for the passage of printing stock, means for containing a supply of liquid delivering a developing gas within said casing, a cloth provided in said casing and extending inwards into the latter from said slot, said cloth being arranged so as to permit its outermost part to be pulled out through said slot and serving as a support for printing stock, a second cloth provided in said casing adjacent said first-mentioned cloth to enclose the printing stock between said two cloths and being permeable to gas, means comprising a roller rotatably mounted inwardly of and parallel to said slot for deflecting said second cloth from said first-mentioned cloth at the pulling out of the latter through said slot, manual means for effecting said pulling out of said first-mentioned cloth through said slot, and means for imposing a retaining force on said cloths in opposition to said manual means and for returning said cloths away from said slot to introduce exposed sheets of printing stock one by one into said casing and discharge said sheets after development, respectively, through said slot.

6. An apparatus for developing prints, comprising a substantially closed casing having a slot for the passage of printing stock, means for containing a supply of liquid delivering a developing gas within said casing, a cloth provided in said casing and extending inwards into the latter from said slot, said cloth serving as a support for printing stock, means comprising a roller rotatably mounted in the part of said casing most remote from said slot and parallel thereto for winding up said cloth into a roll, a second cloth provided in said casing adjacent said first cloth and connected at one end to said first cloth along a transverse line spaced from the outer end of the latter to enclose printing stock in a pocket between said two cloths and being permeable to gas, means comprising a roller rotatably mounted inwardly of and parallel to said slot for deflecting said second cloth from said first-mentioned cloth at the pulling out of the latter through said slot, said second cloth having a continuation thereof extending from said deflecting roller back into the interior of said casing and connected to said first cloth along a transverse line so as to form therewith an endless web surrounding said first-mentioned roller, manual means for moving said cloths towards said slot, and means for imposing a retaining force on said cloths in opposition to said manual means and for returning said cloths away from said slot to introduce exposed sheets of printing stock one by one into said casing and discharge said sheets after development, respectively, through said slot.

7. An apparatus for developing prints, comprising a substantially closed casing having a slot for the passage of printing stock, means for containing a supply of liquid delivering a developing gas within said casing, a cloth provided in said casing and extending inwards into the latter from said slot, said cloth serving as a support for printing stock, means comprising a roller rotatably mounted in the part of said casing most remote from said slot and parallel thereto for winding up said cloth into a roll, a second cloth provided in said casing adjacent said first cloth and connected at one end to said first cloth along a transverse line spaced from the outer end of the latter to enclose printing stock in a pocket between said two cloths and being permeable to gas, means comprising a roller rotatably mounted inwardly of and parallel to said slot for deflecting said second cloth from said first-mentioned cloth at the pulling out of the latter through said slot, said second cloth having a continuation thereof extending from said deflecting roller back into the interior of said casing and around said first-mentioned roller and the roll of cloth wound up thereon and connected to said first cloth along the same transverse line as the said one end of the second cloth so as to form an endless web surrounding said first-mentioned roller, manual means for moving said cloths towards said slot, and means for imposing a retaining force on said cloths in opposition to said manual means and for returning said cloths away from said slot to introduce exposed sheets of printing stock one by one into said casing and discharge said sheets after development, respectively, through said slot.

8. An apparatus for developing prints, comprising a substantially closed casing having a slot for the passage of printing stock, means for containing a supply of liquid delivering a developing gas within said casing, a cloth provided in said casing and extending inwards into the latter from said slot, said cloth serving as a support for printing stock, means comprising a roller rotatably mounted in the part of said casing most remote from said slot and parallel thereto for winding up said cloth into a roll, a second cloth provided in said casing adjacent said first cloth

and connected at one end to said first cloth along a transverse line spaced from the outer end of the latter to enclose printing stock in a pocket between said two cloths and being permeable to gas, means comprising a roller rotatably mounted inwardly of and parallel to said slot for deflecting said second cloth from said first-mentioned cloth at the pulling out of the latter through said slot, a third cloth releasably connected at one end to the other end of said second cloth and extending from said other end towards and around said first-mentioned roller and connected to said first cloth along the same transverse line as the said one end of the second cloth so as to form an endless web surrounding said first-mentioned roller, manual means for moving said cloths towards said slot, and means for imposing a retaining force on said cloths in opposition to said manual means and for returning said cloths away from said slot to introduce exposed sheets of printing stock one by one into said casing and discharge said sheets after development, respectively, through said slot.

9. An apparatus for developing prints, comprising a substantially closed casing having a slot for the passage of printing stock, means for containing a supply of liquid delivering a developing gas within said casing, cloth means provided in said casing and including two cloths extending in closely juxtaposed parallel relation downwards into the casing from said slot to receive printing stock between them, at least one of said cloths being permeable to gas, means associated with said cloth means for supporting said printing stock, manual means for moving said cloths towards said slot, and means for imposing a retaining force on said cloths in opposition to said manual means and for returning said cloths away from said slot to introduce exposed sheets of printing stock one by one into said casing and discharge said sheets after development, respectively, through said slot.

10. An apparatus for developing prints, comprising a substantially closed casing having a plurality of parallel slots for the passage of printing stock, means for containing a supply of liquid delivering a developing gas within said casing, cloth means provided in said casing and including a plurality of pairs of cloths extending in closely juxtaposed parallel relation in each pair downwards into said casing from said slots to receive printing stock between each pair of cloths, one of said pairs of cloths being associated with each of said slots, at least one of the cloths of each pair being permeable to gas, means associated with said cloth means for supporting said printing stock, manual means for moving said cloths towards said slots, and means for imposing a retaining force on said cloths in opposition to said manual means and for returning the cloths away from said slots to introduce exposed sheets of printing stock one by one into said casing and discharge said sheets after development, respectively, through each of said slots.

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