

C. DE LUKACSEVICS.
 BLUE PRINTING MACHINE.
 APPLICATION FILED DEC. 20, 1907.

910,832.

Patented Jan. 26, 1909.

2 SHEETS—SHEET 1.

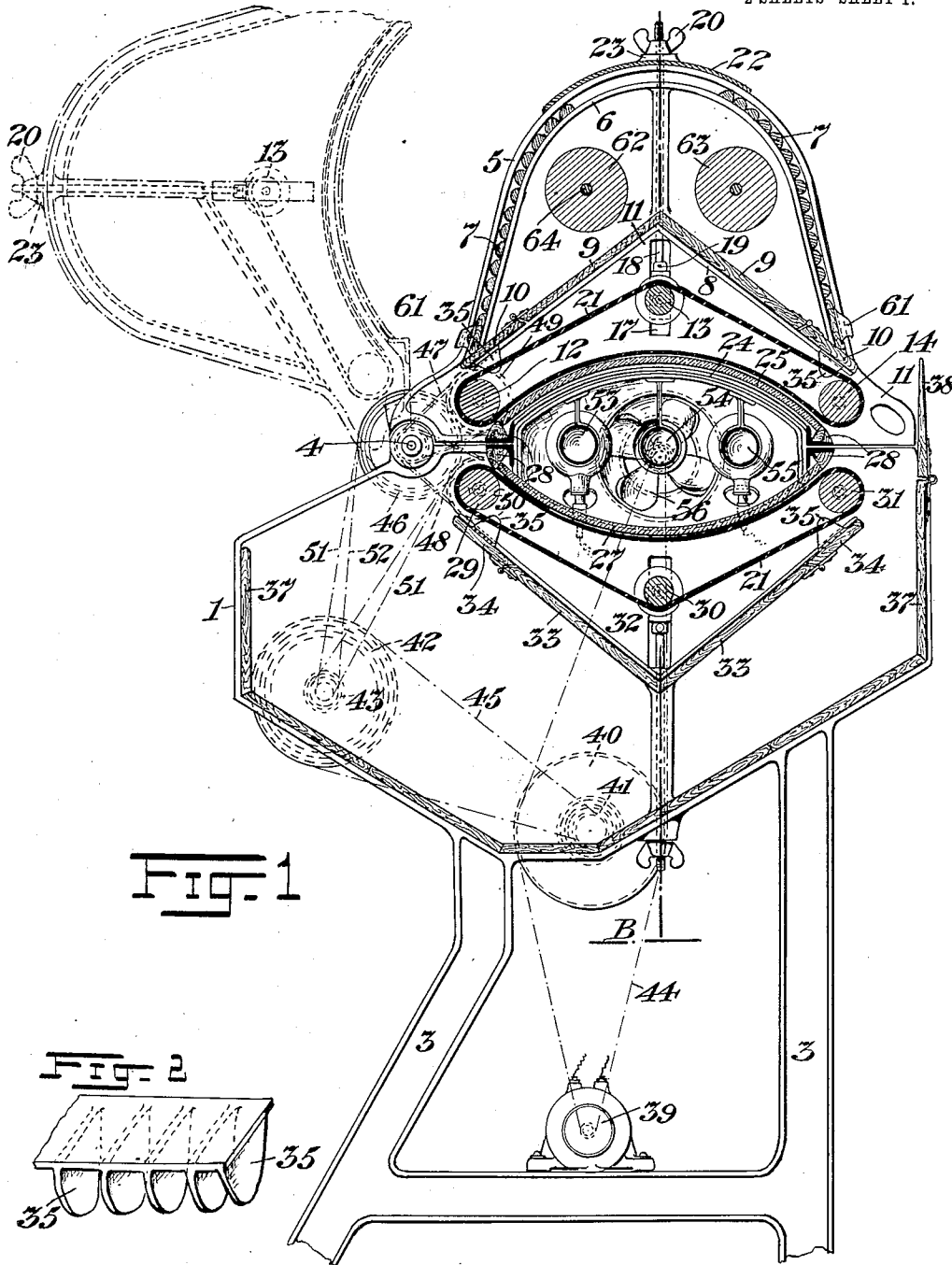
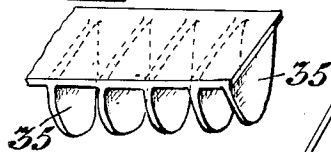


FIG. 1

FIG. 2



WITNESSES

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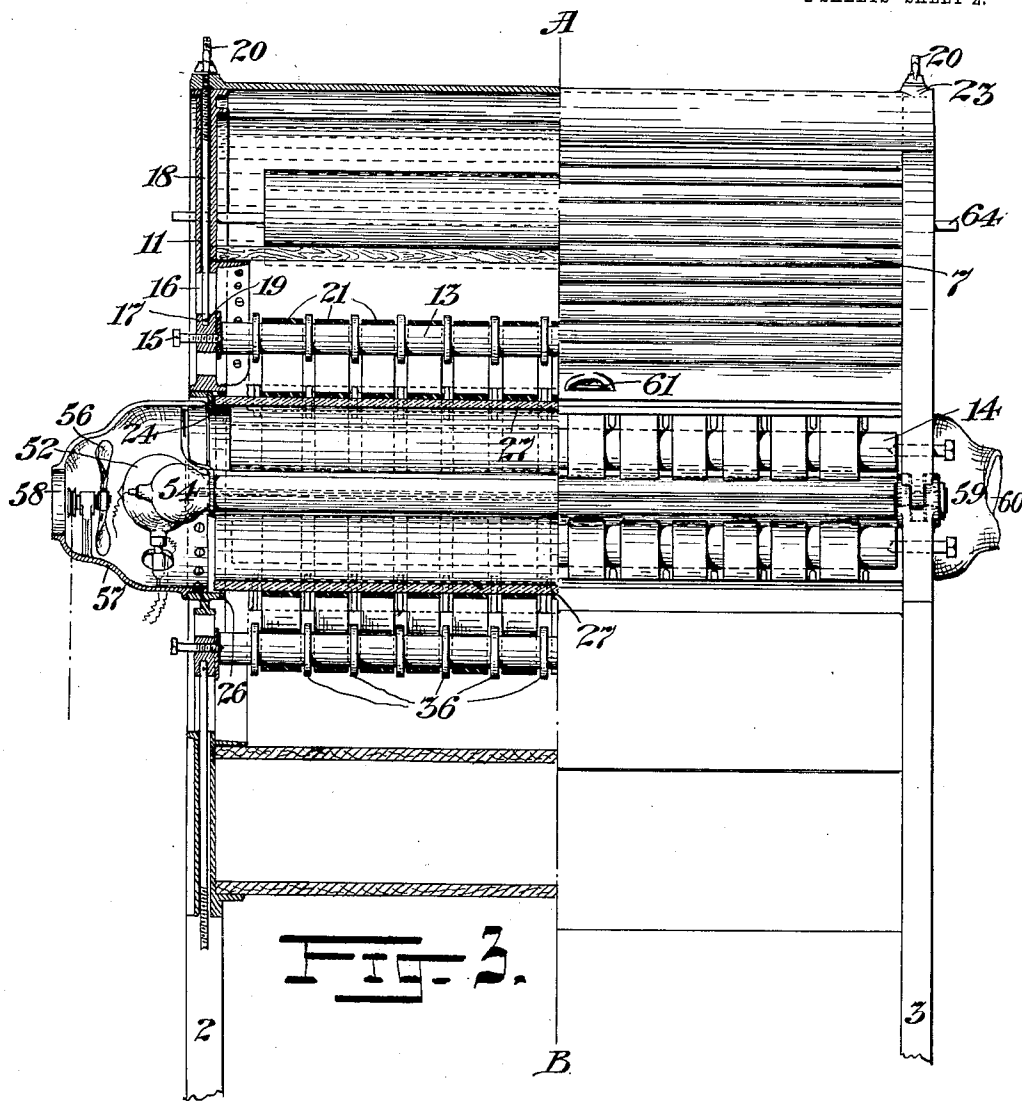
George H. Stockton
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UNITED STATES PATENT OFFICE.

CHARLES DE LUKACSEVICS, OF NEW YORK, N. Y.

BLUE-PRINTING MACHINE.

No. 910,832.

Specification of Letters Patent.

Patented Jan. 26, 1909.

Application filed December 20, 1907. Serial No. 407,302.

To all whom it may concern:

Be it known that I, CHARLES DE LUKACSEVICS, a citizen of the United States, and resident of New York, county of New York, State of New York, have invented certain new and useful Improvements in Blue-Printing Machines, of which the following is a specification.

My invention relates to novel devices for making blue prints or similar reproductions of drawings, sketches, negatives, or the like. For convenience, I shall hereinafter describe the sheets on which the reproductions are made as "printing sheets" and the drawings, sketches, negatives, or the like, which are reproduced as "transparencies." It will be understood that the transparencies may themselves be printed on paper or other material which is more or less thick, ranging from oiled paper to heavy cardboard, but no mistake will be made by referring to them as transparencies nevertheless.

The machine which I have invented is one in which the materials of the printing process, including the printing sheets and the transparencies, are moved along the surface of a transparent body behind which they are exposed to the light from one or more sources of illumination. By varying the speed, printing effects of various depths may be obtained, or the speed may be varied in order to compensate for different thicknesses or densities of the material of the transparencies. In order to print from oiled paper, for example, and from cardboard or photographic negatives on the same machine, varying rates of speed will be necessary, as will be readily understood. I provide means for thus varying the speed and I also provide means whereby varying speeds and varying directions of movement may be obtained on different sides of the same apparatus, without changing or adding to the number of lights used as the source of illumination. I may thus print on one side of the machine blue prints or other prints requiring comparatively little length of exposure, and on the other side of the machine, photographs, brown prints or black prints requiring longer exposures. It is also possible with my machine to so arrange the gears or their connections with the driving mechanism that the movement of the printing sheets and transparencies on opposite sides of the machine will either take place in such a direction as to

provide a continuous movement of the materials to be printed or in such a manner that the movements on opposite sides will be towards a common discharge point at the rear of the machine. In either case the feeding of the materials to be printed will generally take place from the front of the machine, but in the former case the discharge will also take place at the front, while in the latter case the discharge will take place at the rear.

By virtue of the capacity of the machine to feed the materials to be printed in a continuous circuit, very long transparencies may readily be printed in the form of blue prints or other prints, inasmuch as the feeding can be kept maintained until the entire transparency has been passed through, during which period the transparency will have been subjected to the influence of the light on both the upper and lower side of the machine, whereby a double effect is produced. This same double printing, so to speak, is, of course, produced equally well with short transparencies.

Still another important feature of my printing machine is that of providing means whereby the two band glasses forming the transparent body behind which the transparencies are exposed are situated opposite each other preferably so as to form an ellipse and that the support of one of the transparent bodies is hinged so that it can be moved away from the other one to expose the lamps located between the two transparent bodies and thus permit of the easy cleaning of the lamps themselves and of the surfaces of the transparent bodies. These transparent bodies are preferably in the form of band glasses having curved interior and exterior surfaces.

Another feature of the invention resides in the employment of a roll top frame covering the operating parts, protecting the same from the undue accumulation of dust, and at the same time providing a dark storing place for the blue print paper or other rolls of printing sheets.

To allow the escape of air from the immediate vicinity of the materials to be printed and thereby to facilitate the smoothing out of the tracings or other transparencies, I make the aprons which feed the transparencies forward of a considerable number of parts instead of making them of one piece. Part of my invention resides in providing means whereby the separate parts of the

apron shall be kept away from each other and conducted in straight lines across the faces of the transparent bodies and the intervening transparencies and printing sheets.

5 Still another feature of the invention is that of regulating the ingress of air into the machine and cooling the lighting chamber, to which end I provide a hopper at each side of the machine, each hopper being provided
10 with an opening, and one of the hoppers being adapted to contain a suitably operated fan. The fan is adapted to force air through the space between the transparent bodies, largely occupied by the lamps employed,
15 drawing in air through the opening in the hopper containing the fan and forcing it out through the opening in the other hopper. In this way the lamps are kept at a substantially even temperature, whereby the operation of the lamps is made as uniform as
20 possible.

I generally prefer to use so-called mercury vapor lamps of the Cooper Hewitt type and I usually employ two or three such lamps in the space between the transparent bodies.
25 In case three lamps are used, the negative terminals of the two outside lamps will preferably be placed at the side of the machine remote from the fan, while the positive terminal of the third lamp will be placed in line of direct draft close to the fan, inasmuch as the effects of the direct action of the fan are less felt at the positive electrode than at the negative.

35 My invention is illustrated in the accompanying drawings in which—

Figure 1 is a transverse section along the line A—B in Fig. 3, looking towards the left; Fig. 2 is a detail of the guides for the separate belts forming the apron; and Fig. 3 is partly
40 a front elevation and partly a sectional view of the completed machine.

The frame of the machine is shown at 1, the same being in the general form of a box or receptacle supported on standards, 2 and 3. At the front of the box or receptacle near the top thereof is a shaft or pivot, 4, to which the upper part of the machine is hinged or pivoted, as shown in dotted lines in Fig. 1.
50 This shaft or pivot also forms the journal for the driving mechanism, at one end of the machine, as appears from the same figure.

The upper part of the machine frame consists of curved end plates, 11, of wood or metal, formed along their curved edge into inwardly projecting flanges, 5 and 6, between which at either end of the machine is a runway for the slats or bars, 7, of a roll top device. Each end plate is strengthened internally by means of an angular brace or support, 8, attached to the ends of the curved piece 6. Secured by screws or bolts to the angle piece 8, which is of metal, are wooden plates, 9, 9, extending across substantially
65 the entire length of the machine, the same

being provided with hinged extensions, 10, 10, the object of which will be explained hereinafter.

The end plates 11 are adapted to support the bearings for three rollers, 12, 13, and 14, the connections at the end of the roller 13 being illustrated at the left in Fig. 3. Here the end of the roller 13 is represented as being adapted to receive the conical end of a screw, 15, which passes through the slot, 16, in the end piece 11, and also through a block, 17, as shown. Into the block 17 enters a vertical rod, 18, to which the block 17 is connected by means of a pin, 19, the said block being thereby made adjustable within the slot, 16, owing to the fact that the upper end of the rod 18 is screw-threaded and capable of being moved up and down in the end piece 11 and fixed in place by a thumb screw, 20.

It will be understood that the roller 13 is a tension roller and that the adjustability thereof is for the purpose of adjusting the tension of a belt or apron, made up of sections, 21, 21, and extending through the machine from side to side, passing at one end over the roller 12 and at the other over the roller 14. The successive belts 21 arranged side by side extend through practically the entire length of the machine as will be seen by reference to Fig. 3.

The upper part of the machine is shown in place in full lines in Fig. 1 and in the same figure is shown in dotted lines, as being turned toward the front of the machine to uncover the inner parts of the apparatus. This is done for the purpose of cleaning the working parts, as will appear further on.

The upper part of the frame 5 is covered, as shown in Fig. 1, by a curved plate, 22, having a boss, 23, for supplying a thicker bearing for the rod 18. This plate extends from end to end of the machine and is designed to keep out light and dust at such parts of the cover as are not so protected by the slats of the roll top.

Towards the lower part of the upper frame, at each end thereof, is a curved flange, 24, on which is supported a band glass, 25, curved in shape to correspond to the curve of the flange. On the lower frame of the machine is a similar curved flange, 26, supporting a similar piece of band glass, 27. The two pieces of glass, together, are arranged to face each other so as to form an ellipse, truncated at both ends, the open end portions being substantially filled by triangular blocks, 28, 28, preferably of wood. These blocks continue the outer surfaces of the transparent glass bodies so as to interpose no obstacle to the travel of transparencies and printing sheets in a continuous direction along the outer surfaces of the ellipse.

The lower frame, like the upper, is provided with rollers for the belts or apron, such rollers appearing at 29, 30 and 31. The roller

30 is a tension roller and is adjustable in the lower frame by means entirely similar to those which constitute the means of adjustment for the roller 13 in the upper frame.

The lower frame is also provided with metallic angle pieces, 32, similar to the angle pieces 8 in the upper frame and to the angle pieces 32 are secured by screws, bolts or other means wooden reinforcing pieces, 33, 33, each provided with a hinged extension, 34, 34.

The hinged portions, 10, 10, on the upper frame and 34, 34 on the lower frame carry guides, 35, 35, so arranged that each two succeeding guides stand on opposite sides of one of the belt sections 21. By this arrangement and by the further fact that each of the rollers 12, 14, 29 and 31 is provided with flanges 36, 36, which are additional guides for the belt sections, the sections are kept apart from each other and no danger of tangling the sections intervenes. In this connection, it should be stated that the belt sections on the lower side of the frame are marked 21, the same as on the upper part thereof.

It will be noted that the box or receptacle 1 in the lower frame is lined with reinforcing plates, 37, 37, one of which is provided as shown in Fig. 1 with a hinged extension, 38. This can be dropped down at any time for permitting the feeding of the transparencies and printing sheets, as will be readily understood.

A driving motor is shown at, 39 and intermediate reducing gears appear at 40, 41, 42 and 43, the connections being made by belts, 44 and 45, as shown. The gears 42 and 43 are intended to be illustrated as differential gears in the form of cones or stepped cones admitting of the application of the belt at different points and thereby changing the effect of the gears. The same construction appears at 46 where two more stepped cones may be attached to the shaft 4 facing each other, and either adapted to be clutched together or to be operated separately as the case may be. These cones are, respectively, connected by sprocket chains, 47 and 48, with sprocket wheels, 49 and 50, on the shafts of the rollers 12 and 29. By suitable adjustments of the gears, as will be readily understood, the rollers referred to may be operated either so as to form a continuous line of travel for sheets interposed between the belts or apron and the surfaces of the glass or so as to make them both rotate to carry the sheets in the same direction towards a common exit at the rear of the machine, this being made possible by the straight outer belt, 51, and the crossed inner belt, 52, as shown. Moreover, by adjusting the belts to different spaces on the cones, the speed of rotation of either or both the belts may be varied to suit given conditions.

The lamps for supplying light to the transparencies and printing sheets are shown at

53, 54, 55. The fan for cooling the interior lighted portion appears at 56. In Fig. 3, this fan, and the ends of the lamps are shown as being surrounded by a cap or hopper, 57, having an opening, 58, the opposite end of the lighted chamber being supplied with a similar hopper, 59, having an opening, 60. The air is drawn in at 58 and passes out at 60, cooling the lamps in the process. The central lamp 54 just opposite the fan is arranged with the positive end of the lamp next to the fan, while the other two lamps are arranged with their negative ends in proximity to the fan. The reason for this has already been set forth.

At 61 and 81 are shown hand pieces by means of which the roll top can be operated in reverse directions.

At 62 and 63 are shown reels on which printing sheets may be rolled and kept for cases of need. These reels are supported on shafts passing through the machine from end to end, one of said shafts being shown at 64.

In practice I usually draw down, say, from the reel 62 a printing sheet and pass it between the lower edge of the roll top at the left in Fig. 1 and the upper surface of the extension 10. The sheet is then turned around so as to pass under the belts 21 and between said belts and the upper surface of the upper band glass. At the same time I feed in through from the front of the machine under the bands 21, and under the printing sheet already referred to, the transparency which is to be reproduced. If the machine is so operating as to permit a continuous circuit to be made by the printing sheet and the transparency, then a second operator at the rear of the machine may turn down the extension 38 and feed the end of the strip when it comes along between the lower belt sections 21, 21, and the lower surface of the lower band glass. When the materials have passed through the machine and out at the front end thereof they will drop into the box constituting the lower part of the frame of the machine and there be collected. Instead of cutting the ends of the sheets by hand, I may do this by permanent or adjustable apparatus in the machine itself. Should the machine be operating so as to carry the transparency and printing sheets in the same direction there-through, then these sheets will fall into the box at the rear of the machine instead of returning to the front thereof.

It is manifest that with the construction above described in detail, the top of the machine can be turned back, giving access to the surfaces of the transparent supporting bodies and to the lamps, so that they can be readily cleaned as often as may be necessary. In the use of tube lamps, such as are mentioned herein, a frequent cleaning is of great value, as the lamps are run in an inclosed chamber under conditions which prevent the

dissipation of heat in normal quantities and the accumulation of dust upon the surfaces might result in a permanent attachment of the dust to the tubes and thus impair their usefulness as light transmitting bodies. Indeed, it is found in practice that the effects of dust upon the lamps under the conditions to which they are subjected in machines of this sort are such as to materially shorten the length of life of the lamps. Moreover, the interior of the glass parts of the chamber outside the lamps requires frequent cleaning for a similar reason, and also for the reason that in any case the accumulation of dust upon the surfaces is a disadvantage.

I claim as my invention:

1. In a blue printing machine, a pair of transparent plates having concave surfaces confronting each other, a source of light between the said plates, a pair of aprons carrying the materials for printing across the surface thereof, means for causing the aprons to travel in opposite directions across the plates, and means whereby the plates can be separated for cleaning the surface thereof and the lamps or sources of light between them.

2. In a blue printing machine, a pair of transparent plates having concave surfaces confronting each other, a source of light between the said plates, and means for accomplishing the act of printing outside the plates, one of the plate supports being hinged or pivoted, whereby easy access can be had to the space between the plates.

3. In a blue printing machine, a lighting chamber comprising a pair of transparent walls having concave surfaces confronting each other, in combination with a tubular light giving body within the chamber, and means whereby one of said walls may be moved away from the other to afford easy access to the interior of the chamber for cleaning the walls thereof and the lamp within the same.

4. In a blue printing machine, a pair of transparent plates having concave surfaces confronting each other, a source of light between the said plates, and means for making prints along the outer surfaces of said plates, the said plates being so formed and arranged as to constitute a geometrical figure such as an ellipse.

5. In a blue printing machine, a pair of transparent plates having concave surfaces confronting each other, a source of light between the said plates, and means for making prints along the outer surfaces of said plates, the said plates being so formed and arranged as to constitute a geometrical figure such as an ellipse, and one of the said transparent plates being mounted upon a support which is hinged or pivoted.

6. The combination with a blue printing machine, of a receptacle arranged above the same and constituting a cover therefor, said receptacle being pivoted to the machine frame and provided with a roll top, to afford access to the interior of said receptacle.

7. The combination with a blue printing machine, of a receptacle arranged above the same, and constituting a cover therefor, and rolls supported within said receptacle for holding the printing material, said receptacle having a bottom provided with a hinged section through which the material may be extracted.

8. In a blue printing machine, a pair of fixed transparent, concave plates confronting each other to form a chamber, a tubular source of light within the chamber thus formed, a hopper arranged at each end of said chamber, and a fan disposed in one of said hoppers adjacent the end of the tubular source of light, and adapted to force air through said chamber for cooling the same.

9. In a blue printing machine, a transparent plate, a source of light on one side of said plate, and an apron for carrying the materials for printing across the surface thereof which is remote from the source of light, the said feeding apron consisting of a plurality of relatively narrow belts placed relatively close together, rollers for the said belts provided with flanges for separating them and guides independent of said rollers for keeping the belts separated.

Signed at New York, in the county of New York, and State of New York, this 14th day of December, A. D. 1907.

CHARLES DE LUKACSEVICS.

Witnesses:

THOS. H. BROWN,
WM. H. CAPEL.