

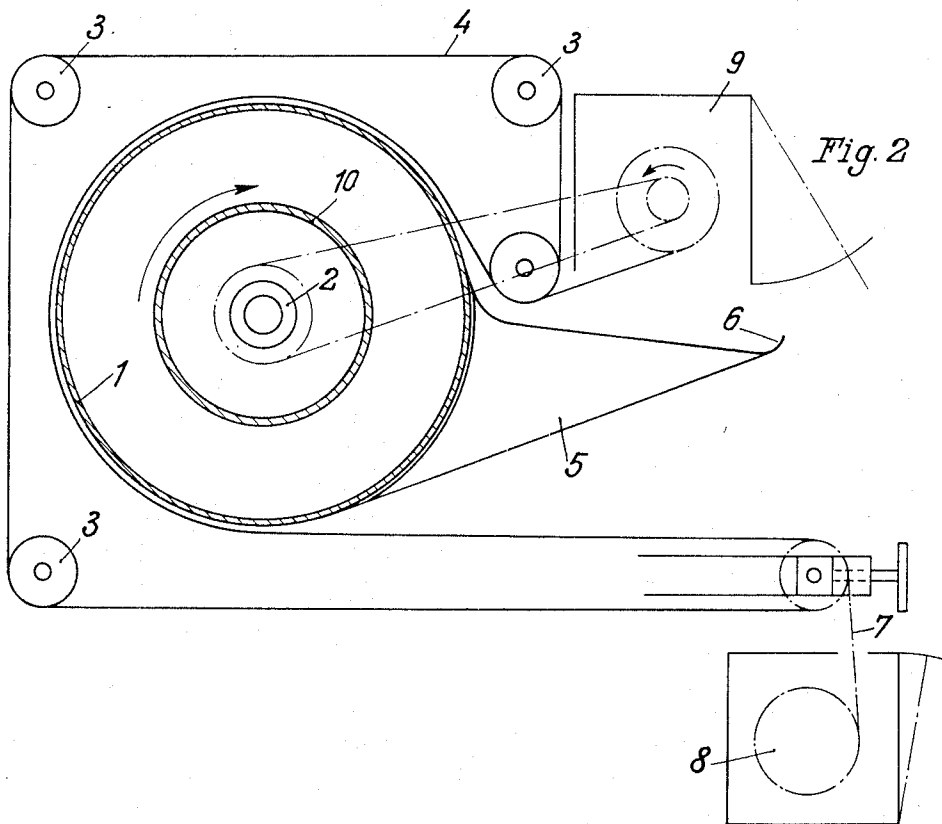
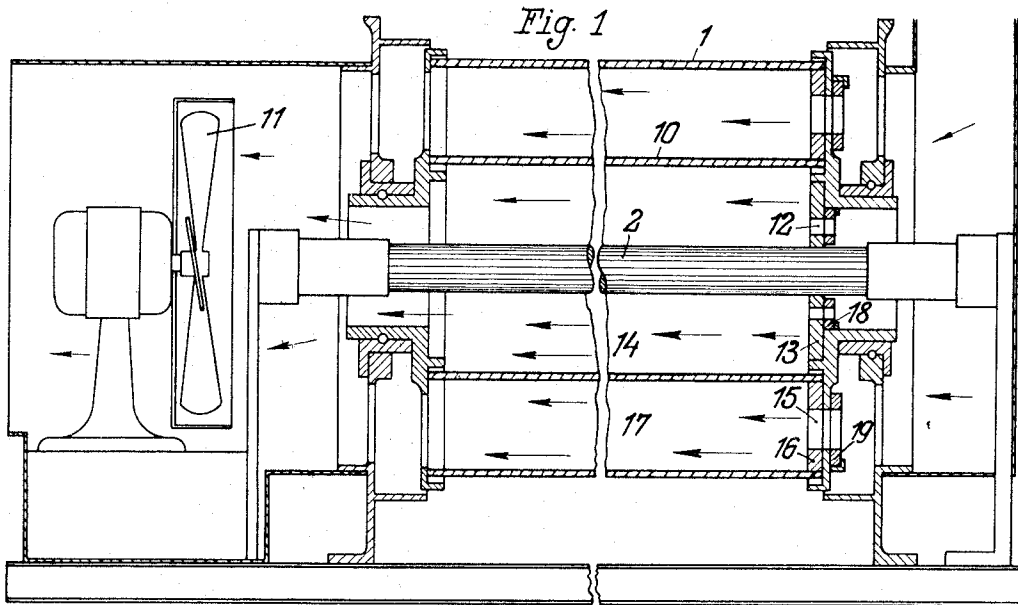
Oct. 28, 1941.

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2,260,486

COPY PRINTING MACHINE

Filed Feb. 11, 1939



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UNITED STATES PATENT OFFICE

2,260,486

COPY PRINTING MACHINE

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Application February 11, 1939, Serial No. 255,802
In Germany December 18, 1937

2 Claims. (Cl. 95—77.5)

This invention relates to a copy printing machine having a transparent, internally air cooled cylinder upon which the material to be copied is placed, and a high pressure illuminating tube arranged inside said cylinder. In cases where such high pressure illuminating tubes are kept burning for a considerable length of time in the interior of the cylinder copying-printing machine, a very strong heat radiation occurs, so that inter alia the outer walls of the cylinder, the drawing to be copied and also the light-sensitive copying paper are subjected to considerable heat.

In order to eliminate the drawbacks which may be traced to this circumstance, it has already been proposed to arrange a fan on the end wall of the copying-cylinder so as to provide an effective cooling. In this manner the heating of the copying cylinder can be reduced thus preventing a drying out of the copying paper and a reduction in its sensitivity. When working with diazo-type paper the most satisfactory toning is also obtained as the diazonium salts are illuminated at room temperature.

However, in copy printing machines of this kind, having high-pressure illuminating tubes the arrangement of the fan blades possesses a considerable drawback in that, in addition to cooling the outer wall of the copying cylinder, the high-pressure illuminating tube in the interior of the cylinder is also cooled. This cooling displaces the chromatic centre of gravity of the radiation and furthermore the activity of the illuminating tube is also unfavourably influenced, so that as a result the work requires considerably longer illuminating periods.

According to the invention the said drawback is eliminated in a simple way by arranging within the copying cylinder a second hollow cylinder encasing the high-pressure illuminating tube, there being also provided, between the cross-sectionally annular hollow spaces between the high-pressure tube and the hollow cylinder and between the hollow cylinder and the copying cylinder, apertures which are so proportioned that the air current passing through the inner annular hollow space cools the high-pressure tube to an extent such as to obtain maximum activity. The division thus effected of the air space between the source of light and the copying cylinder also makes it possible to regulate the working temperatures so as to be suitable both for the light source as well as for the light-sensitive copying paper and entirely independently of one another. For the purpose of assisting and accurately proportioning the air flow, it

is convenient to arrange in one of the end walls of the hollow cylinder a fan known per se in copying printing machines the axis of rotation of which is preferably arranged to coincide with the extended longitudinal axis of the copying cylinder. As the suction of such a fan is greater at the blade tips than in the centre of the fan, this arrangement produces a strong cooling effect upon the outer copying cylinder and only a moderate cooling effect upon the high-pressure illuminating tube in the interior of the hollow cylinder. For the purpose of effecting a still more effective regulating of the individual temperature requirements of copying paper and light source, apertures, the sizes of which can be varied by means of slides or the like, are provided in the end walls of the two cylinders. In this manner it is possible by correctly adjusting the size of the said apertures to produce the exact amount of moderate cooling required in the inner cylinder so as to prevent deleterious overheating of the high-pressure tube, and a stronger cooling of the outer cylinder, approximately to room temperature.

The accompanying drawing illustrates by way of example a constructional form according to the invention and in which:

Figure 1 is a longitudinal section through the device,

Figure 2 is a cross sectional view of the device.

The copy printing machine consists of a copying cylinder 1 having arranged therein a high-pressure illuminating tube 2, which is for example stationary. A high-pressure gas discharge tube, a high pressure metallic vapour tube (for example a mercury high pressure tube) or a high pressure gas-filled metallic vapour tube may be used as a source of light. The copying cylinder 1 is rotatably mounted. A tensioning cloth 4 is arranged to pass over rollers 3 and to lie tightly around a large portion of the periphery of the copying cylinder. The portion of the copying cylinder not covered by the tensioning cloth is covered by a detachable shutter 5 to prevent interference from light escaping at the sides, the said shutter also being designed with an upwardly extending flange so as to form a collecting trough 6 for single sheets of copying paper and drawings. The drawings to be copied are affixed to the copying cylinder after removal of the shutter 5, care being taken in this respect to copy in one operation only those drawings having the same transparency in order to obtain satisfactory prints. The copying paper is inserted either in the form of single sheets between the

drawing attached to the copying cylinder and the tensioning cloth, or in the form of a web 7 from a paper supply container 8, being finally wound upon a corresponding cylindrical core in the container 9 after it has been illuminated. The tensioning cloth 4 or the copying cylinder 1 or both may be rotated for example by means of a motor, so as to ensure continuous working of the device.

Within the copying cylinder 1 there is concentrically arranged a hollow cylinder 10 in such a manner that an uninterrupted flow of air can take place between the source of light 2 and the inner transparent cylinder 10, and between the outer copying cylinder 1 and the inner hollow cylinder 10. The latter may consist of glass or any other desired transparent substance. Use is preferably made of a material which allows the photo-chemically active radiation to pass through to the fullest possible extent. If desired, this property of allowing short wave radiation to pass through may be combined with a high power of absorption of long wave heat radiation. The copying cylinder and the hollow cylinder of the copy-printing machine may for example be vertically disposed, so that the cooling air draft is induced by the upward flow of the heated air in both of the annular spaces formed between the two cylinders.

In the constructional form of copying machine illustrated in the drawing in which the hollow cylinders are horizontally disposed, there is arranged co-axially with the copying cylinder 1 and in front of one of its end walls, a fan 11 which is adapted to generate a powerful draft through the entire device, the said draft being drawn, partly through the annular space between the copying cylinder 1 and the inner hollow cylinder 10 and partly through the second annular space between the illuminating tube 2 and the inner hollow cylinder. The force of each of these air currents can in this case be adjusted as desired by varying the size of the air inlet apertures 12 in the end wall 13 of the inner air space. 14. In the same manner the apertures 15 in the end wall 16 of the outer air space 17 may be opened to a greater or smaller degree. This adjustment may be effected for example by means of the slides 18 and 19 illustrated in Figure 1, the apertures of which can be brought to coincide more or less with the apertures in the cylindrical wall.

What I claim and desire to secure by Letters Patent of the United States is:

1. A copy printing machine comprising a transparent copying cylinder through which a cooling air current is passed and which contains a high pressure illuminating tube, a second hollow transparent cylinder enclosing the illuminating tube and arranged within the copying cylinder in such a manner as to form two cross-sectionally annular hollow spaces, one between the illuminating tube and the inner hollow cylinder and one between the two hollow cylinders, a fan arranged in front of one of the end walls of the copying cylinder and adapted to cool the latter space to a greater extent than the former one, the axis of rotation of said fan being preferably located in the extended axis of the hollow cylinder, and adjustable apertures arranged in one end wall of the copying cylinder, said apertures leading to the inner and outer annular spaces for the purpose of regulating the air flow in both of said spaces.

2. In a copy printing machine having a transparent copying cylinder and a high pressure illuminating tube and means arranged for sending an air current through the copying cylinder, the combination of a hollow transparent cylinder within the copying cylinder enclosing the illuminating tube and serving to divide the space between the copying cylinder and the illuminating tube into two annular hollow spaces, a fan for driving air currents through each of the two spaces disposed before one of the end walls of the copying cylinder with its axis of rotation lying substantially in the extended axis of the copying cylinder, a disc closing the opposite end walls of the copying cylinder and the end walls of the second hollow transparent cylinder, there being outer apertures in this disc lying in the area of the outer annular space and further inner apertures in this disc lying in the area of the inner annular space around the illuminating tube which are of smaller diameter than the first mentioned outer apertures, a ring arranged to be at least partly turnable before the outer apertures and a second ring arranged to be at least partly turnable before the inner apertures, both rings having apertures of the same diameter as the apertures in the said disc, these rings being suitable for regulating each of the air currents for the purpose of cooling the illuminating tube with a lower cooling effect than the copying cylinder.

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