

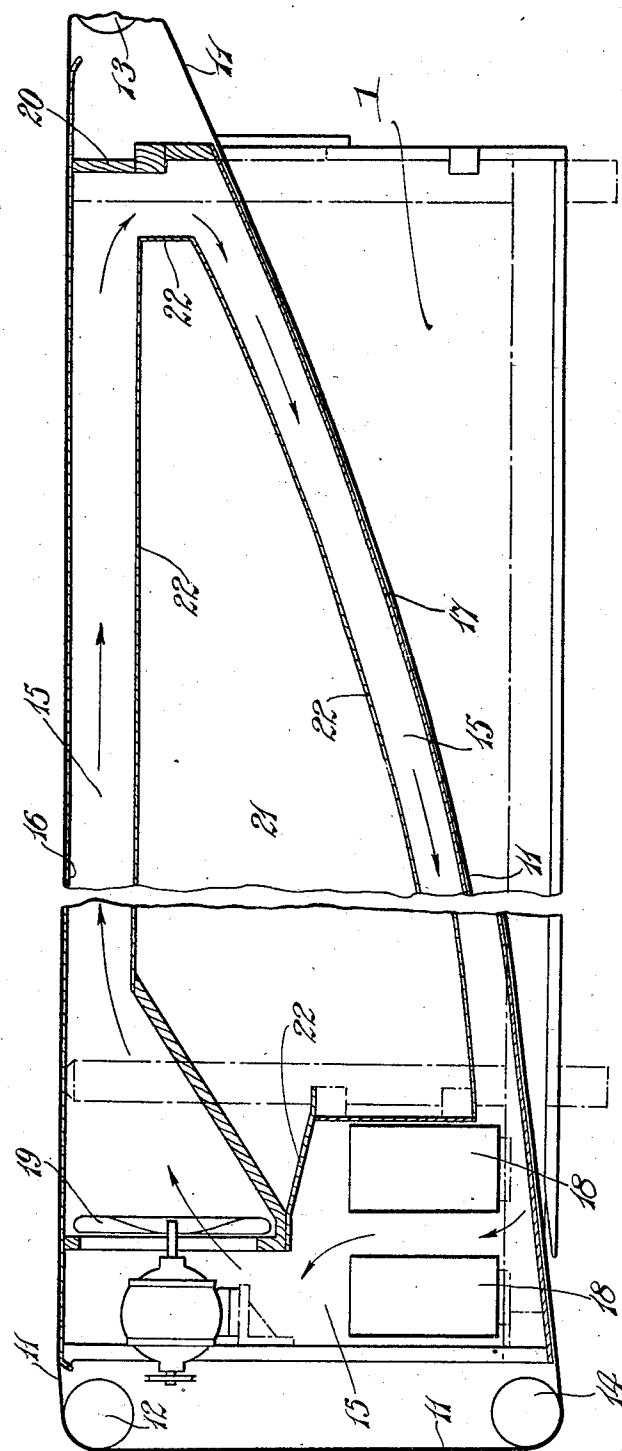
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COOLING APPARATUS

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## UNITED STATES PATENT OFFICE

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## COOLING APPARATUS

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This invention relates to a means for cooling and maintaining in a cool condition surfaces such as those used in duplicating or printing processes and for other purposes.

In the production and manipulation of gelatine and other colloidal films or layers for photo-mechanical and like duplicating processes it is found that the temperature of the working surface of the film or layer must be maintained lower than the particular temperature at which the colloid employed becomes tacky. With a view to maintaining the working surface at the necessary low temperature it has been proposed to reduce the temperature of a room in which the process is carried out, and it has already been proposed as an alternative to reducing the temperature of the room as a whole to distribute the colloidal film or layer upon a metal plate or sheet which rests upon ice or cold water or other cooling medium. Both of these methods, however, have serious drawbacks, for when a room is cooled by the admission of cold air this results in the rapid absorption of moisture from the working surface of the colloidal layer, which renders the surface ineffective for satisfactory duplicating or copying, despite the fact that the temperature thereof is maintained at the necessary low level. In a case where the colloidal layer is deposited upon a metal plate in contact with ice or water, the quantity of cooling material employed is unavoidably much greater than the minimum quantity which would bring about the necessary low temperature. Moreover, the surface area of the plate is much restricted and such installation is to all intents and purposes immobile.

The present invention has for an object to provide improved means for the rapid cooling of surfaces and for maintaining them at a lower temperature than the surrounding atmosphere without said surfaces themselves coming into direct contact with the primary cooling medium, of which latter a minimum quantity is employed.

According to the present invention means for cooling and maintaining cool a surface comprise an endless duct for the passage of air, the outer face of a part of the wall of

which duct constitutes a surface to be cooled, means for producing a flow of air around said duct, and a container for cooling medium located in the path of air flowing around said duct.

Preferably, that part of the wall of the duct the outer face of which constitutes a surface to be cooled is disposed substantially horizontally, whilst the duct itself is disposed therebeneath and is such that air flowing continuously therearound passes through the cooling medium, along the underside of said part of the duct wall from end to end, then in a reverse direction back to the cooling medium, and so on.

In the application of the improved means according to the invention for the production and manipulation of gelatine and other colloidal films or layers for photo-mechanical and like duplicating processes, that part of the wall of the duct the outer face of which constitutes a surface to be cooled is preferably disposed horizontally and is adapted to constitute a support for the horizontal part of an endless band on which there is deposited a layer of colloidal material which it is required to maintain at a temperature lower than that of the ambient atmosphere.

Preferably, in such a case the duct is of substantially triangular formation and is shaped as a whole so as to fit within the space enclosed by a continuous band which travels around three horizontal rollers, so disposed that the band travels for a short distance vertically, then horizontally for a considerable distance, and then downwardly at an angle. The duct is preferably arranged so that the band is in contact with the outer wall thereof whilst travelling horizontally and also whilst travelling downwardly at an angle.

The means for producing a flow of air around the duct may comprise one or more fans mounted within the duct near that roller from which the band travels horizontally, whilst there is also mounted in the duct below said fans one or more containers for ice or other cooling medium through which the air can pass from the downwardly inclined portion of the duct on its way to the fan or fans.

The invention is illustrated by the accom-

panying drawing, the figure representing a diagrammatic longitudinal section of the apparatus.

As shown, the improved means are fitted to an apparatus of known type comprising a casing 1 in which an endless band 11 of linoleum or the like, which has deposited thereon a layer of gelatine or other colloidal material in known manner, is mounted to travel over three rollers 12, 13 and 14, the arrangement being such that although the whole surface of the band 11 is employed for duplicating purposes, very little space is occupied, whilst any part of the band may readily be made accessible by rotating one of the rollers 12, 13 or 14 by hand to bring that part of the band between the rollers 12 and 13. In the ordinary way this particular part of the band would be supported upon a table or upon a plate resting upon ice or other cooling medium; according to the present invention, however, the substantially triangular space enclosed by the band 11 is occupied by a continuous duct 15 for air, the improved means according to the present invention being employed for cooling the upper horizontal wall 16 of the duct and also the lower downwardly inclined wall 17, so that the linoleum band 11 which is in contact with said walls 16 and 17 and the gelatine or other colloidal material deposited thereon are maintained at the necessary low temperature. The vertical limb 15' of the duct extending between the rollers 12 and 14 contains containers 18 for ice or other cooling medium forming passages through which air can pass, whilst in the upper portion of said vertical limb 15' there is mounted one or a number of fans indicated at 19; the other end of the duct is closed by a partition 20, whilst the space 21 enclosed by the inner walls 22 is left vacant.

The fan or fans 19 are such that when in operation air is caused to flow around the duct in the direction shown by the arrows, 45 passing from the containers 18 for the cooling medium to fans along the horizontal part of the duct and back along the downwardly inclined part of the duct to said containers 18.

It will be observed that with such an arrangement according to the invention a minimum of cooling material is required to maintain the surface at the necessary low temperature, for as the duct 15 is entirely enclosed the air passing to the cooling medium will be already at a temperature considerably lower than that of the ambient atmosphere. Thus, it will be observed that waste of the cooling medium employed is reduced so far as possible consistent with the necessary absorption of heat from the surface to be maintained cool.

The use of an apparatus such as that described above with reference to the accompanying drawing is applicable particularly to those tables designed for use in the prepara-

tion of so-called "true-to-scale" prints, but the invention is not limited to such an application, for it may be applied very readily for the cooling of so-called cold plates or slabs, such as those used in the manufacture of confectionery and by fishmongers and others.

It is to be noted that any known type of blower or pump may be used to maintain the air flow in one or a number of ducts, and also that the duct may contain baffles or filters in order that eddying flow may be produced, so causing an increased cooling effect, whilst in some cases it may be desirable to provide a "breather" or safety valve to prevent undue pressure within the duct or ducts. For example, valves may be provided whereby said pressure may be maintained in any desired manner, and those parts of the duct, except that which constitutes a surface to be cooled or which is in contact with the surface to be cooled, may be enclosed by insulating material to prevent the absorption of heat thereby.

What I claim is:—

1. An apparatus of the class described, comprising a casing formed with an endless duct open to the atmosphere at one end, rollers mounted outside the casing to receive a band of material to be treated, peripheries of the rollers being in a plane with the outer surfaces of the top and bottom of the casing, and means in the open end of the casing for introducing cool air to the endless duct to reduce the temperature of the top and bottom of the casing, whereby the contacting surfaces of a belt passing around the rollers are cooled.

2. An apparatus of the class described, comprising a casing formed with an air passage, of means for guiding a flat strip of material over the outer surface of the wall forming the passage, a container in the casing for a cooling medium for cooling the air, and means for forcing the cooled air through the passage, whereby the surface of a flat strip of material passing over the outer wall of the passage is cooled.

3. An apparatus of the class described, comprising a casing having a horizontal top and a bottom which inclines from one end of the casing to the other, said casing being open at its wide end, a continuous duct formed in the casing, means for introducing cool air to the duct, and means on the outside of the casing for supporting a band of material to be cooled in contact with the outer surface of the horizontal and inclined surfaces of said casing.

4. An apparatus of the class described, comprising a casing of substantially triangular form, a continuous duct formed in the casing, means for forcing cool air through the duct, rollers mounted outside the casing to receive a band of material to be treated, one of said rollers being mounted at the apex of the casing and two of said rollers being mounted at the larger end of the casing, the

peripheries of all the rollers being in alignment with the top and bottom outer surfaces of the casing to retain the material being treated in contact with said surfaces to be  
5 cooled by the cool air passing through the duct.

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