Dec. 9, 1941. T. MAKARIUS 2,265,566

METHOD FOR CONDITIONING PAPER

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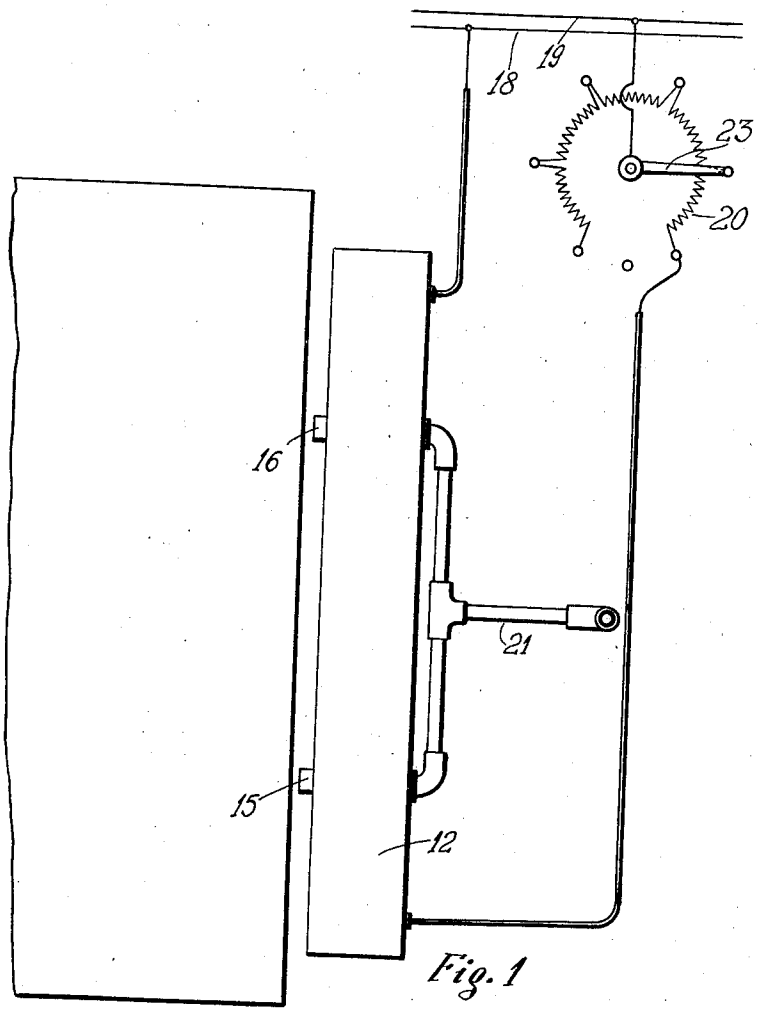

Fig. 1

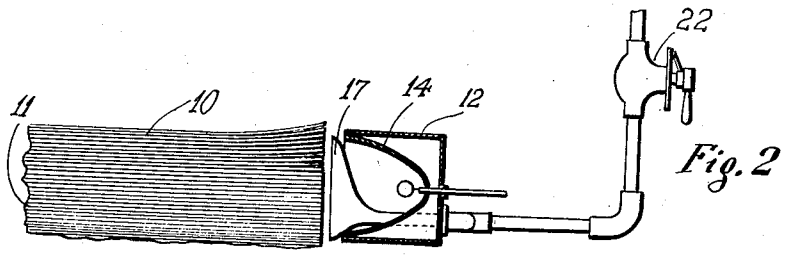

Fig. 2

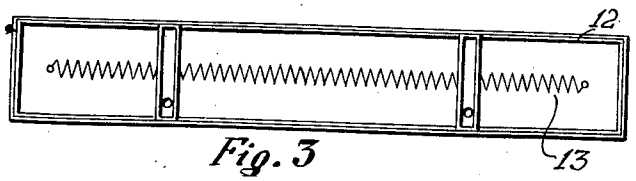

Fig. 3

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METHOD FOR CONDITIONING PAPER

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2 Claims. (Cl. 34—18)

This invention relates to the printing art, and more particularly refers to improvements in methods of conditioning paper, which has become affected by exposure to air, as it is about to be fed to a printing press.

In printing establishments, paper stock is usually stored in piles resting directly upon the floor or on low platform trucks, preparatory to being placed in front of a printing press where it may be handled by the paper feeding mechanism in the usual manner. When thus arranged in piles formed by a great number of superimposed sheets, the marginal portions of the sheets absorb more or less moisture from the surrounding air, according to the amount of humidity and the length of exposure. This causes the marginal portions to warp, due to elongation with respect to the body of the sheet, and results in wrinkles and lack of register when the sheets are fed to the press.

The depth of penetration of the moisture, that is, the width of the marginal portions affected, accordingly varies in each case, and the reconditioning of such portions before the sheet reaches the printing cylinder, in order to reestablish the original uniformity of texture and length of the sheet in the direction of feed, is most desirable.

To bring about this result, in some cases it has been suggested to direct heat against the sides of the top sheets of the pile, while they are resting on the feed platform of the press, the heat being generated by radiant heat reflectors arranged in proximity of the sides of the pile, and being regulated according to the depth of hygroscopic absorption. In other cases it has been suggested to blow heated air against the sides of the top sheets of the pile, the effect of the air being to separate the top sheet or two or three top sheets from the rest, by forming a cushion of air under it while the top sheet travels towards the printing cylinder, at the same time effecting the elimination of the surplus moisture throughout the entire width of the marginal portion affected.

However, practice has shown both of these methods to be ineffective in correcting the objectionable condition mentioned, for different reasons. When heat is directed against the sides of the pile of paper without air agitation, the drying effect is apt to be restricted to a relatively narrow edge portion of the sheets, so that a warped or elongated portion would still intervene between such dried edge portion and the body of the sheet, when the sheet reaches the printing cylinder, and this condition is actually worse than if no heat has been applied.

If the intensity of the heat is increased, in order to reach farther into the body of the pile, the entire width of the marginal portion affected by the moisture may possibly receive some of the heat and lose the surplus moisture; but in this case uniformity of texture is still lacking, inasmuch as the heat does not reach uniformly into the pile, and the portions of the paper closest to the edge may actually become so dry as to be brittle and easily broken off.

When heated air is directed against the sheets, one is still confronted with the difficulty of conditioning the paper in a uniform manner, because the air flowing between the sheets carries heat considerably beyond the marginal portions thereof requiring treatment so that besides removing moisture from the marginal portion, the heated air will also remove moisture from the body of the sheet, affecting its texture unfavorably and rendering the paper abnormally dry.

I have found that while it is desirable for heat to be applied against the marginal portions of the sheets, the sheets should be handled in a manner insuring the heat reaching the entire width of the marginal portion hygroscopically affected; at the same time, however, the heat should be so regulated that it does not reach beyond the width of said marginal portion, at least, not enough to affect the normal condition of the body portion of the sheet.

Accordingly, the main object of this invention is to provide a novel and improved method of conditioning paper, the marginal portions of which have been hygroscopically affected, whereby heat, the intensity of which can be regulated for depth of penetration, is directed against the marginal portions affected while the top sheet, or sheets, of the pile are raised by means of jets of cold air, the pressure of which can also be independently regulated; so that while the air may reach under the top sheet or sheets to points considerably beyond the marginal portions thereof requiring conditioning, the active zone of the heat directed against such marginal portions will be strictly limited in depth to that required by the specific condition to be corrected.

A further object is to provide a novel and improved method of the character specified in which the intensity of the heat and the pressure of the air directed against the marginal portions of the sheets can be independently regulated to said conditions to be corrected in each particular case.

Other objects and advantages of the present

invention will more fully appear as the description proceeds and will be set forth and claimed in the appended claims.

My invention is illustrated by way of example in the accompanying drawing, in which:

Fig. 1 is a partly diagrammatic fragmentary plan view of a paper conditioning apparatus embodying my invention;

Fig. 2 is a fragmentary vertical transversal section thereof; and

Fig. 3 is a face view of the means for directing heat and air under pressure against the marginal portions of the sheets on top of the pile.

Referring to said drawing, 10 designates the uppermost sheets of a pile 11, set in place ready for feeding to a printing press (not shown).

In proximity of each side of the uppermost sheets in the pile is placed an elongated casing 12, within which is mounted a longitudinally extending heating coil 13.

The heat generated by said heating coil is directed against the marginal portion of the sheets by means of a parabolic reflector 14, also mounted in said casing. At one or preferably two or more points spaced along the side of the sheets I provide nozzles such as 15, 16, connected to a supply of cold air under pressure.

Said nozzles have a relatively narrow mouth extending vertically to form an elongated outlet 17, directing a vertical sheet of air against the sheets at the top of the pile.

Current is supplied to the heating coil from a supply line 18, 19, and the current thus supplied is preferably controlled by means of a rheostat 20 inserted in the circuit.

The two nozzles 15, 16 are connected to a common air line 21, in which is inserted a regulating valve 22 by means of which the quantity and, therefore, the pressure of air delivered by the nozzles may be regulated.

It is obvious that by moving the arm 23 of the rheostat to different positions the intensity of the current supplied to the heating coil can be varied and consequently the quantity of heat generated by said coil will be varied accordingly. This makes it possible for the heat directed against the marginal portions of the sheets to be regulated according to the depth to which the paper has been affected by atmospheric conditions.

The air supplied by the nozzles 16, 17 will raise the marginal portion of the top sheet or sheets of the pile directly opposite, more or less according to the pressure with which the air strikes said sheets. As stated, the pressure of the air can be regulated by means of the valve 22 and will be increased or decreased according to the depth to which the heat should penetrate.

It is obvious that the regulation of the air pressure is not necessarily solely a function of the regulation of the heat, although both heat and pressure should vary according to the depth of penetration required.

The air pressure, however, will vary also according to the weight of the paper stock, while the amount of heat generated will vary not only according to the depth to which humidity has been absorbed by the paper stock but also according to the amount of moisture absorbed by the paper per unit of surface.

All these factors being unrelated, it is, therefore, obvious that an independent control of the air pressure and heat is highly advantageous in that it gives the system the required flexibility of control, making it possible to extend the corrective action of the heat throughout the zone affected by the humidity, at the same time restricting it to said zone.

The constructional details of my apparatus may, of course, vary from those shown without departing from the inventive idea. The drawing should, therefore, be understood as being intended for illustrative purposes only and not in a limiting sense.

I, accordingly, reserve the right to carry my invention into practice in all those ways and manners which may enter, fairly, into the scope of the appended claims.

I claim:

1. The method of restoring to normal hygroscopically affected marginal portions of paper sheets arranged in a pile, preparatory to and as they are being fed to a printing press, which consists in simultaneously directing radiant heat and jets of unheated air under pressure against the marginal portions of the uppermost sheets in the pile, thereby creating air spaces between said sheets giving access to the heat therebetween.

2. The method of restoring to normal hygroscopically affected marginal portions of paper sheets arranged in a pile, preparatory to and as they are being fed to a printing press, which consists in simultaneously directing radiant heat and jets of unheated air under pressure against the marginal portions of the uppermost sheets in the pile, thereby creating air spaces between said sheets giving access to the heat therebetween, and independently regulating the intensity of the heat and the pressure of the air directed against said portions.

THEODORE MAKARIUS.