

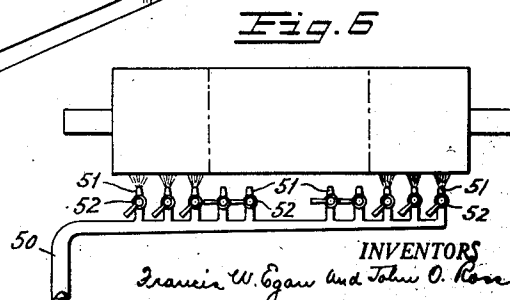
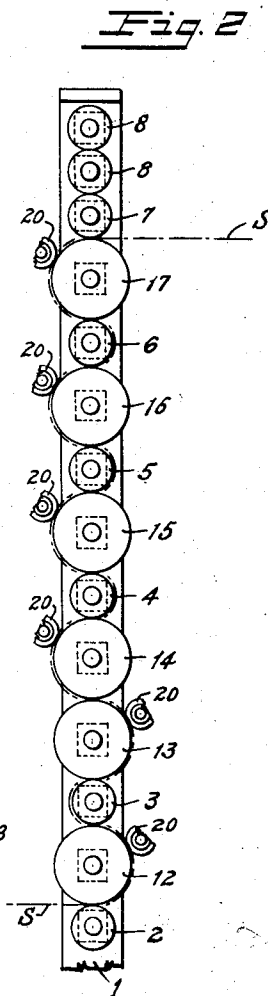
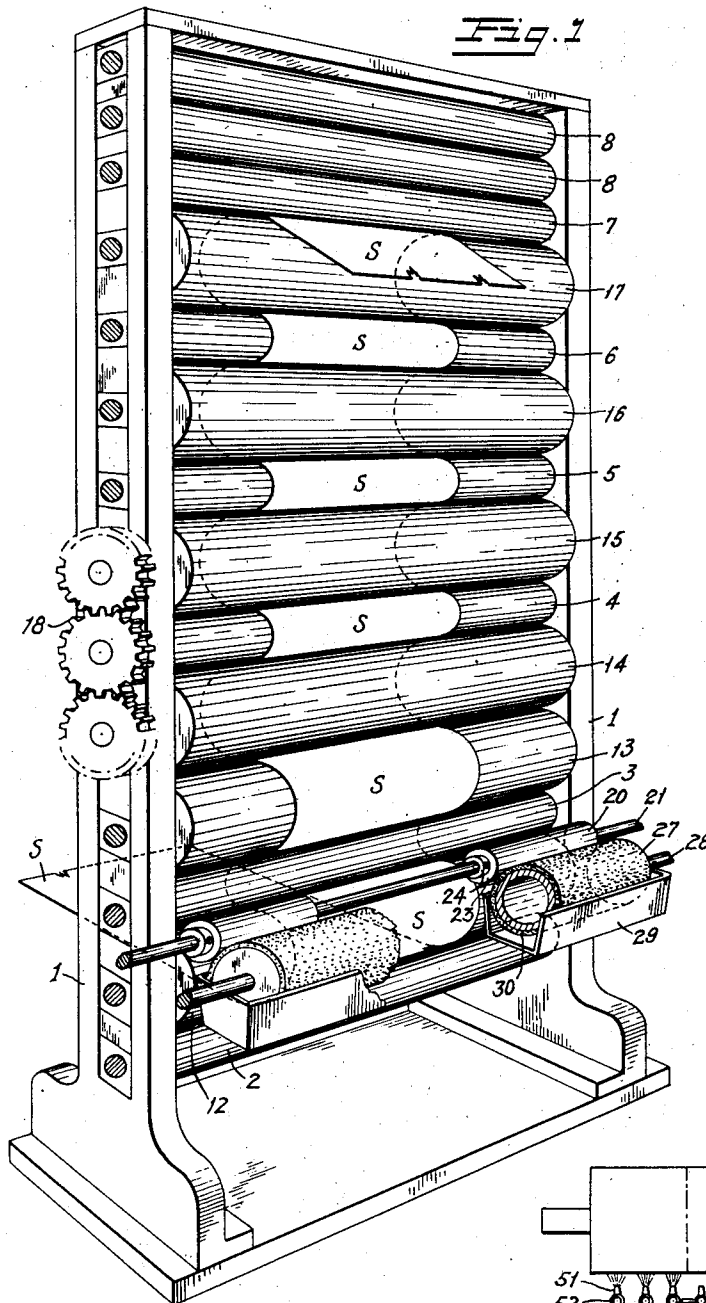
May 21, 1929.

F. W. EGAN ET AL
PAPER CONVERTING MACHINERY

1,714,261

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2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 3

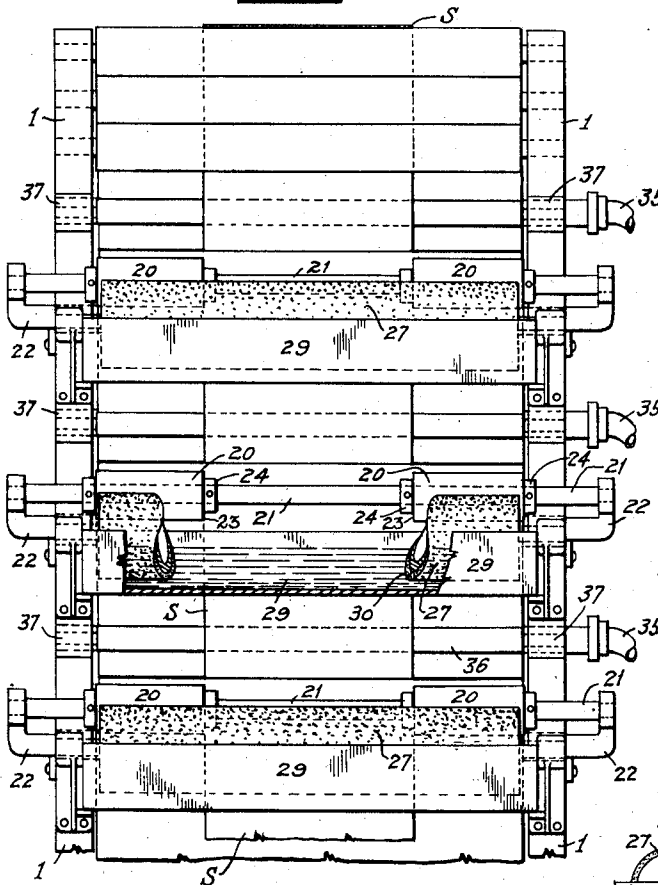


Fig. 4

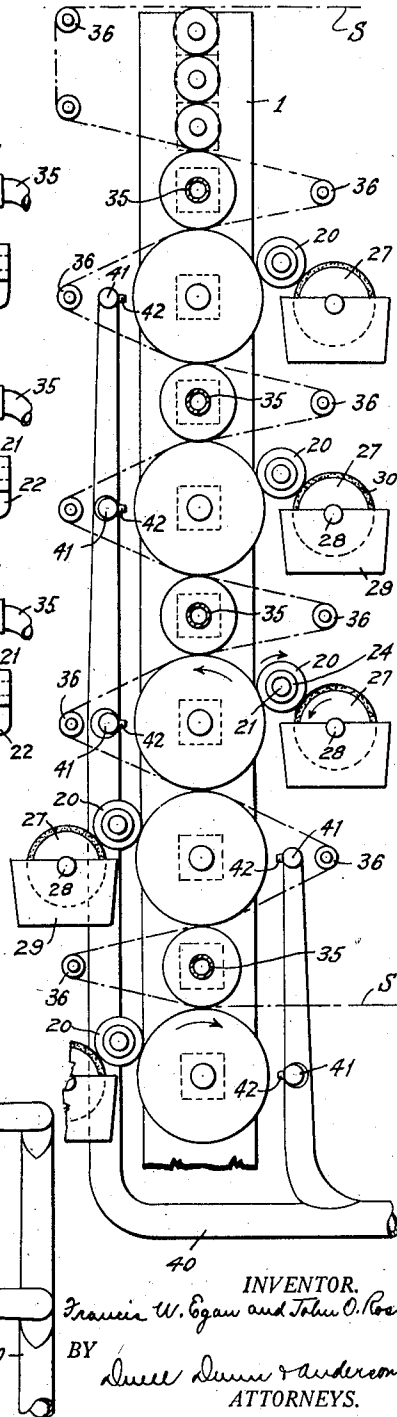
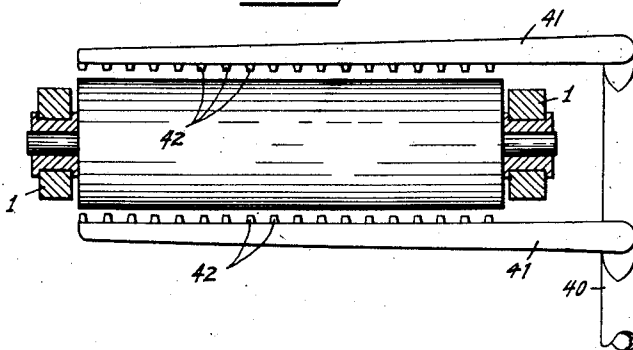


Fig. 5



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PAPER-CONVERTING MACHINERY.

Application filed November 11, 1927. Serial No. 232,583.

This invention relates to paper converting machinery. In the manufacture and converting of paper either by embossing designs upon the paper stock or in producing certain finishes, the stock is carried between rollers under heavy pressure in the presence of heat. One of these rollers may be of steel but the other is desirably made of a more yielding material, being commonly made of paper and designated as paper rolls. They may be made by heavily compressing disks of paper and retaining them under heavy pressure, about a shaft, the outer surface being accurately turned to cylindrical form to cooperate with the surface of the metal roller.

In some operations, the paper roll and the steel roll move with different surface speeds, and a heating effect is produced by the resulting friction. In other cases, the steel roll is hollow and is internally heated. For example, in embossing, the metal roller is constructed of steel with the desired design engraved upon it in reverse so that the stock as it passes between the steel roll and the paper roll is squeezed down into the surface of the paper roll by the projecting design. With many fabrics it is necessary to heat the steel roll in order to cause the design to remain upon the fabric.

In the manufacture of special grades of paper such for example as glassine, the steel rollers are not engraved. The effect is produced by heat and the pressure between the paper roll and the steel roll alone or accompanied by a slipping between them.

Difficulty has been experienced in maintaining the life of the paper rolls which have been found to disintegrate at the end portions much faster than at the center in spite of the fact that it is the center portion which receives the most wear, as frequently the machine is used with a stock or web of less width than the length of the paper rolls.

In accordance with this invention, it has been discovered that one of the important factors in disintegration is overheating and that this more rapid disintegration at the ends of the paper rolls is due to the still higher temperature at that place. At the points where the stock intervenes between the steel roll and the paper roll, it serves as an insulator to retard the heating of the paper roll by the steel roll but at the ends of the rolls at the sides of the stock where

the steel roll and the paper roll are in direct contact, the heating is relatively intensified. This protecting or cooling effect exerted by the strip is still more prominent where the strip is fed to the rolls in damp condition since the evaporation of the contained moisture itself serves to assist the cooling.

It is an object of this invention to utilize this discovery to prolong the life of the paper rolls and to this end, to equalize the temperatures between the exposed and unexposed portions of the paper roll so that the entire surface is maintained substantially at the same temperature.

Since, moreover, the life of the paper rolls is thus found to be so intimately a function of the temperature at which they are maintained, it is a further object of this invention to increase the life of the rolls by limiting their temperature throughout their entire width.

The invention accordingly comprises the several steps and the relation and order of one or more of such steps with respect to each of the others, and the apparatus embodying features of construction, combinations of elements and arrangement of parts which are adapted to effect such steps, all as exemplified in the following detailed disclosure, and the scope of the application of which will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description taken in connection with the accompanying drawings, in which:

Fig. 1 is a perspective view of a fourteen roll calendar stock machine embodying this invention in the manufacture of glassine paper.

Fig. 2 is a diagrammatic section of the device shown in Fig. 1.

Fig. 3 is a front elevation of a somewhat simplified apparatus embodying the invention, certain parts being broken away for clarity.

Fig. 4 is a diagrammatic side elevation of the device shown in Fig. 3 with one of the supporting side frames removed.

Fig. 5 is a plan view of a means for limiting the temperature of the entire roll.

Fig. 6 is a detail showing an alternative method of equalizing the temperature of the roll.

We have illustrated the invention herein in connection with a machine for the manufacture of glassine paper. From this illustration, its application to embossing or similar work will be obvious.

In the drawings, the numeral 1 designates a pair of upright frames in which are journaled a plurality of steel rolls 2, 3, 4, 5, 6, and 7, and a plurality of paper rolls 12, 13, 14, 15, 16 and 17. The order of these rolls may be varied to suit the nature of the work to be done. In the form illustrated, the steel and paper are alternated save that the third paper roll is superposed directly upon the second. It will be understood that as the paper stock S is wound back and forth between the rolls, the finishing effect is accomplished chiefly by the steel rolls and where the rolls are alternated, one surface only is treated. The direct superposition of two rolls of like kind as herein illustrated causes the treatment of both sides of the paper. A plurality of follower rolls 8 may be superposed upon the stack of treating rolls if desired.

As illustrated, in Fig. 2, the paper stock is carried in between the rolls 7 and 17, and back between each pair in succession being carried around the semi-circumference of each roll in turn. The rolls may or may not be geared together as shown at 18 either for movement with a uniform surface velocity or to afford the slippage desired.

These machines are frequently employed in the manufacture of a stock of less width than the paper rolls leaving a portion at each end of the paper rolls at each side of the stock in direct contact with a steel roll. This results in a tendency to overheat this exposed portion of the paper roll as has already been pointed out. In accordance with this invention, means are provided for equalizing the temperature between this exposed portion and the central portion protected by the paper.

In the practical embodiment illustrated, specific means are provided for cooling each end of the roll comprising an idler roll 20 mounted on a shaft 21. This roll 20 is slidably mounted upon the shaft 21 so that it may be positioned to have its inner edge 23 coincide with the outer edge of the glassine strip and it is retained in such position by collars 24 at each end of the idler roll. The idler roll 20 is in engagement with the surface of the paper roll and also with the surface of a moistening roll 27 journaled as at 28 within a trough 29 adapted to contain water. Thus as the paper roll rotates, it picks up water from the surface of the idler roll 20 which has been carried to the roll 20 by the roll 27. In this manner, there is deposited upon the paper roll a degree of moisture, the presence and evaporation of which is sufficient to maintain the temperature of the ends of the paper rolls substantially as low as that of the

protected portions. The roll 27 may be coated if desired with a water absorbent 30, and the quantity of water deposited on the paper roll may be determined by the character of the coating as well as by the pressure and the height of water in the trough.

In Fig. 3 is illustrated a machine of the same general nature but with fewer rolls, the details being herein more clearly shown. In this view, the steel rolls are made hollow and supplied with steam to their interior through a conduit 35, so that if desired the machine may be operated for certain purposes with hot rolls. This figure illustrates more in detail the manner of supporting the moistening rolls, and the moistening pans, the shafts 21 being shown as carried by brackets 22 attached to the main frame 1. In this form of device the stock S is supported by guide rolls 36 as it passes from one side of the machine to the other so that it does not pass around the semi-circumference of the roll. These guide rolls 36 are carried by brackets 37 supported from the main frame.

Since it is the high temperature which causes disintegration of the paper rolls, it is desirable also to employ means for lowering the temperature of the entire roll. A practical form of accomplishing this result is to provide a conduit 40 supplied with air at a temperature materially below that of the rolls, which is connected with a plurality of horizontal branch conduits 41, one such branch conduit being shown parallel and adjacent to each paper roll.

Where the equalizing rollers 20 and the branch conduits are both used upon the same roll, they may, if desired, be located upon opposite sides thereof for mechanical convenience, and this is practical where the auxiliary guide rolls 36 are employed. Each of the branch conduits is provided with a plurality of nozzles 42 through which air is discharged and distributed throughout the length of the roll. As illustrated the conduit 41 is within the bight of the paper roll formed between the opposite sides of the paper roll and one of the guide rolls 36, and this is a satisfactory arrangement where the quantity of air employed is not great. Under other circumstances it is preferable to provide the air blast upon the side of the paper which is opposite to the bight in order that the air discharged may have more free egress into the room.

In the embodiment illustrated in Fig. 6, a different cooling means is employed for equalizing the temperature. In this embodiment, there is provided a conduit 50 adjacent to and parallel to each of the paper rolls provided with jets 51 adapted to project fluid upon the surface of the roll, but means are provided to limit the number of these jets which operate to limit the area of the roll which is affected thereby. This may

be done automatically by direct control from the width of the paper stock itself so that the apparatus will automatically cool only the exposed portions of this strip but a simpler form has been chosen for this illustration in which each of the jets is individually controlled by a valve 52. The fluid distributed through the conduit 50 may be either cold water to be atomized into a spray or cold air, to keep the rolls cool, but is preferably cold moist air. I prefer to add moisture to the air as the detrimental effect of the excess temperatures is increased where the paper rolls become excessively dry. A cooling medium for the ends of the rolls which adds moisture within proper limitations is therefore more effective in its helpfulness than mere cold air alone.

In accordance with the above construction, it will be seen that by depositing upon the ends of the paper roll a degree of moisture such that the cooling effect of its presence and its evaporation is sufficient to compensate for the protecting effect of the strip in the center portion, no portion of the paper roll will be caused to disintegrate before the rest, and since the destruction of any portion of the roll renders the roll as a whole useless, this means prolongation of the useful life. Moreover, by cooling the roll as a whole the life is still further prolonged.

Since certain changes in carrying out the above process and in the constructions set forth, which embody the invention may be made without departing from its scope, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

Having described our invention, what we claim as new and desire to secure by Letters Patent, is:

1. The process of converting paper stock which comprises passing it between a finishing roll and a paper roll, wetting that portion of the paper roll not covered by the paper stock in its passage between said rolls and subjecting the whole of the outer surface of the paper roll to artificial cooling.

2. The process of converting paper stock which comprises passing it between a finishing roll and a paper roll and equalizing the temperature between different portions of the paper roll by moistening the portions of the paper roll over which the stock does not pass in its course between the rolls.

3. The process of converting paper stock which comprises passing it between a finish-

ing roll and a paper roll, subjecting the entire surface of the paper roll to a cooling effect and subjecting a portion of the paper roll to a moistening effect.

4. The process of converting paper stock which comprises passing it between a finishing roll and a paper roll, blowing air over the surface of the paper roll to limit its temperature and applying moisture to certain portions of the roll.

5. The process of converting paper stock which comprises passing it between a finishing roll and a paper roll, adding moisture to the paper roll to limit its temperature and varying the amount of moisture applied to portions of the paper roll in accordance with the width of the stock passing between the rolls.

6. The process of converting paper stock by means of a finishing roll and a paper roll, of greater length than the width of the stock which comprises, passing the stock between the rolls and equalizing the temperature between the rolls by subjecting the whole of the paper roll to moist air and equalizing the temperature between those portions of the paper roll protected by the stock and those portions exposed to the finishing roll by wetting the exposed portions.

7. The process of converting paper stock by means of a finishing roll and a paper roll, of greater length than the width of the stock which comprises passing the stock between the rolls and contacting a water wetted roll with the portions of the paper roll exposed to the finishing roll.

8. The process of converting paper stock by means of a finishing roll and a paper roll of greater length than the width of the stock which comprises passing the stock between the rolls, moistening the portion of the roll exposed to the finishing roll and blowing a stream of cool air over the surface of the paper roll.

9. A device of the character described, comprising, in combination, a plurality of rolls including finishing rolls and paper rolls, means for applying moisture to predetermined portions of the paper roll whereby every part of the surface of the paper roll is maintained at substantially the same temperature.

10. A device of the character described, comprising, in combination, a plurality of rolls including finishing rolls and paper rolls, means for cooling the paper rolls, and means for wetting portions of the paper rolls.

11. A device of the character described, comprising, in combination, a plurality of rolls including finishing rolls and paper rolls, means for limiting the temperature of the paper rolls and means for cooling different portions of the paper rolls in varying degrees.

12. A device of the character described,

comprising, in combination, a plurality of rolls including a finishing roll and a paper roll, means for cooling the entire surface of the paper roll to a certain degree, and means for cooling portions of the surface of the paper roll to a different degree.

13. A device of the character described, comprising, in combination, a plurality of rolls including finishing rolls and paper rolls, means for cooling the entire surface of the paper rolls, comprising a conduit adapted to project air over the entire surface, and rolls for moistening predetermined portions of the paper rolls.

14. A device of the character described, comprising, in combination, a plurality of rolls including finishing rolls and paper rolls adapted for use with a paper stock of less width than the length of the rolls and means for cooling portions of the paper rolls between which the stock passes to a certain degree and cooling the portions of the paper rolls exposed to the finishing rolls to a greater degree.

15. A device of the character described comprising, in combination, a plurality of rolls including finishing rolls and paper rolls adapted for use with a paper stock of less width than the length of the rolls and a third set of rolls for applying moisture to the exposed ends of said plurality of rolls.

16. A device of the character described, comprising, in combination, a plurality of rolls including finishing rolls and paper rolls adapted for use with a paper stock of less width than the length of the rolls, means for adding moisture to the exposed end portions of the paper roll to equalize the temperature with the remainder of the roll and means for maintaining the temperature of the paper roll below a predetermined limit.

17. A device of the character described comprising, in combination, a plurality of rolls including finishing rolls and paper rolls adapted for use with a paper stock of less width than the length of the rolls and a roller journaled to contact with the end portion of the surface of the paper roll and means for wetting the surface of said roller to cause the moistening of the end portions of said paper roll.

18. A device of the character described

comprising, in combination, a plurality of rolls including finishing rolls and paper rolls adapted for use with a paper stock of less width than the length of the rolls and a roller journaled to contact with the end portion of the surface of the roll, means for moistening the surface of said roller, and means for adjusting the longitudinal position of said roller to vary the length of its contact with the paper roll.

19. A device of the character described for the converting of paper comprising standards, a plurality of rolls journaled in such standards, certain of said rolls being paper rolls and certain of said rolls being steel rolls, means for heating said steel rolls and adjustable means for cooling the end portions of said paper rolls.

20. A device of the character described for the converting of paper comprising standards, a plurality of rolls journaled in such standards, certain of said rolls being paper rolls and certain of said rolls being steel rolls, means for heating said steel rolls and adjustable means for cooling the end portions of said paper rolls, comprising a shaft supported from said frame adjacent to each paper roll and rollers journaled on said shaft and adjustable longitudinally thereof and means for moistening the surface of said rollers.

21. The method of converting paper stock which comprises passing it between a finishing roll and a paper roll, and cooling one part of the paper roll to a certain degree and cooling the remainder of the paper roll to a greater degree.

22. In apparatus of the character described a finishing roll and a paper roll adapted to cooperate, means for passing paper stock of certain width between the rolls, means for cooling the paper roll over which the stock passes to a certain degree, and means for cooling the remainder of the paper roll to a greater degree whereby every part of the paper roll is maintained at substantially the same temperature.

In testimony whereof we affix our signatures.

FRANCIS W. EGAN.
JOHN O. ROSS.