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|------|-----------------------------------|-----------|--------|-------------------|---------|
| [54] | PROCEDURE FOR DRYING OF CELLULOSE | 2,750,680 | 6/1956 | Houdry et al..... | 34/86 X |
|------|-----------------------------------|-----------|--------|-------------------|---------|

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[51] Int. Cl. .... F26b 7/00

[58] **Field of Search** ..... 34/10, 12, 19, 86,  
34/90

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[57] **ABSTRACT**

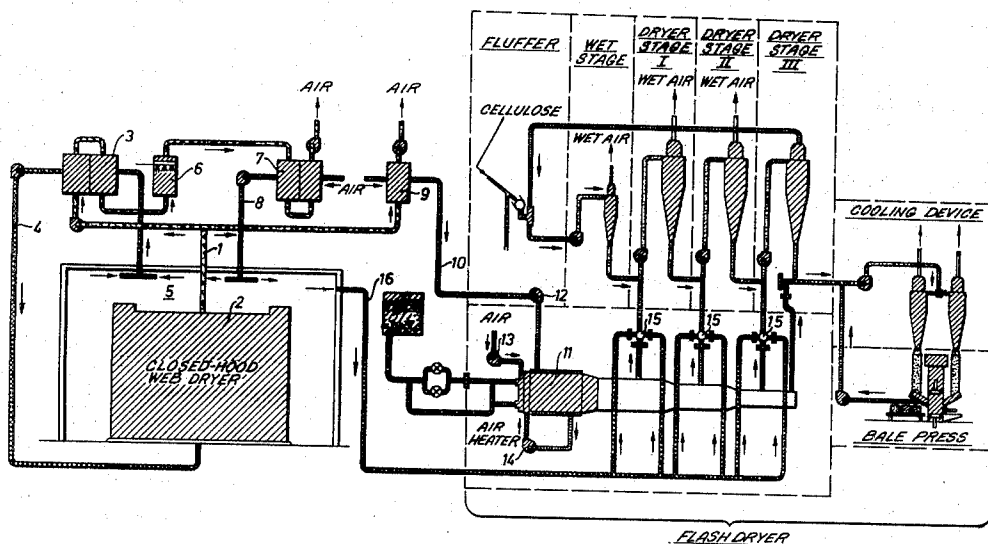
Procedure for drying cellulose in a plant consisting of a web dryer, combined with a parallel-working flash dryer in which disintegrated cellulose is caused to pass through a wet stage and through a series of dryer stages and finally taken to a bale press in which procedure the outgoing hot wet air from the web dryer is used for pre-heating replacement air and also is used for heating ventilation air which partly is discharged into the atmosphere and partly is conducted away for use in the flash dryer for heating the drying air for the various drying stages of said flash dryer.

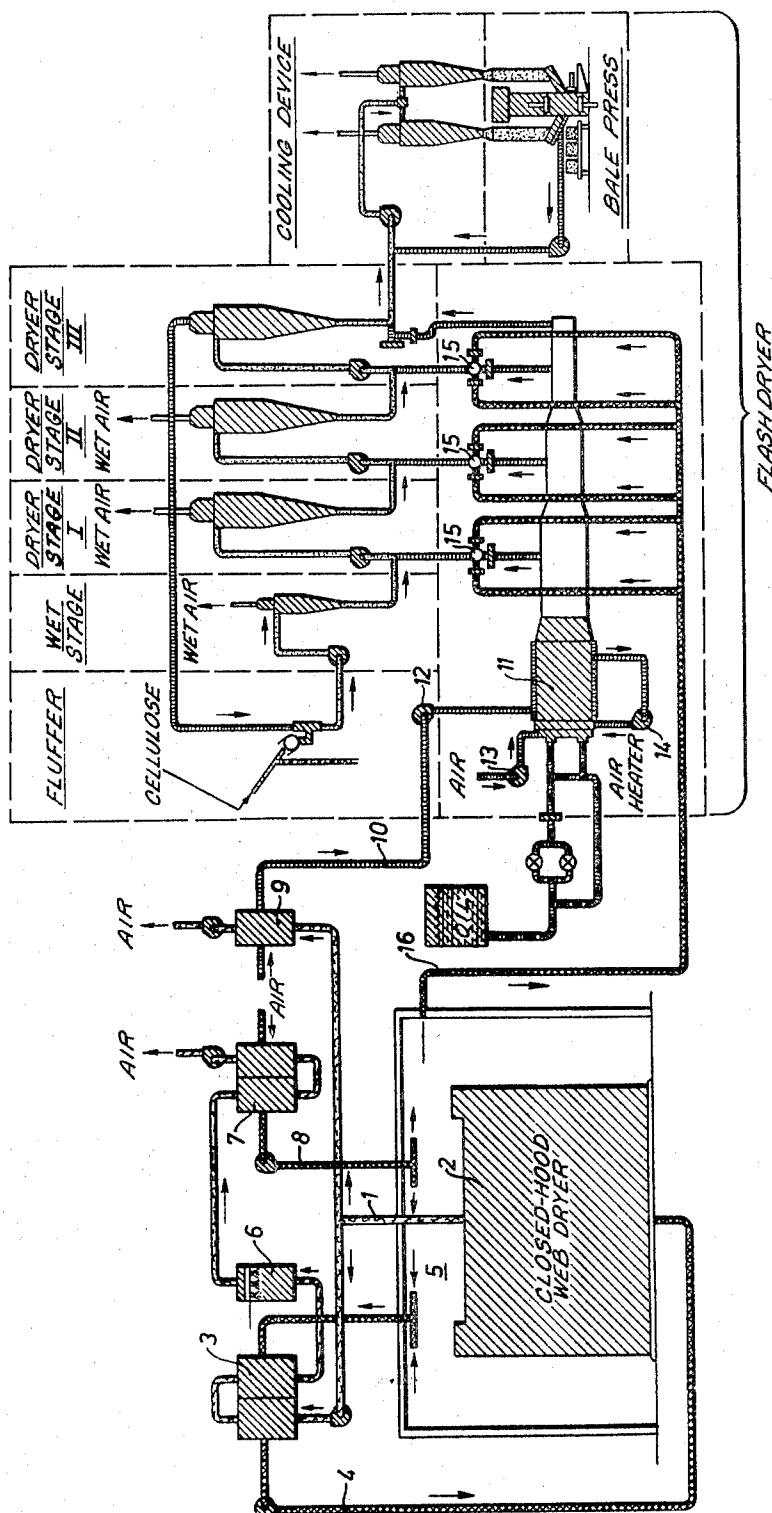
## 2 Claims, 1 Drawing Figure

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## PROCEDURE FOR DRYING OF CELLULOSE

This invention relates to a procedure for drying of cellulose in a plant consisting of a web dryer, e.g., a closed-hood steam-heated web dryer, placed in a machine shop, combined with a flash dryer equipped with an oil firing unit, in which flash dryer cellulose disintegrated, for example, by means of a fluffer is caused to pass through a wet stage and thereafter successively through a series of dryer stages, possibly followed by a cooling device, preferably cooling cyclones, and is finally taken to a bale press or sheet press for making into unit packages of dried cellulose.

The pneumatic drying method, "flash drying" of cellulose, has come into increasingly wide use owing to its low first cost and small manpower requirement compared with conventional drying of cellulose in web form. For this reason flash dryers are often installed in addition to large paper or cellulose dryers for use for marginal productions. This procedure is likely to be carried still further in the future. Owing to the high blow-out losses, however, the flash dryer has a higher specific heat consumption than a conventional dryer, which of course is a disadvantage.

Recovery of heat from the flue gases from a flash dryer is, however, costly on several grounds, as one must take into account pollution of the heating surfaces owing to fiber dust in the discharged air and a material must be chosen for the components which is resistant to the SO<sub>2</sub> formed on combustion of oil in the heating unit.

The object for the present invention is a new and improved procedure for achievement of a better overall heating economy in the drying of cellulose by means of repeated heat recovery. The procedure is characterized chiefly in that part of the outgoing hot wet air from the web dryer in the machine shop is caused, in the known manner, to pass first through a heat exchanger for preheating of replacement air to the web dryer, brought from the machine shop, after which the wet air is caused to pass through a hot-water boiler and is used in a heat exchanger for heating of ventilation air to be supplied to the web dryer machine shop, and is discharged into the atmosphere, while the remaining quantity of wet air is collected and led off for preheating drying air for use in the flash dryer. The air is heated in an air heater before being taken to the various drying stages, and is used as drying air for the various drying stages of said flash dryer after being mixed with fresh air for adaption to the desired drying temperature and quantity of drying air in each drying stage. To render the procedure still more attractive from the point of view of drying technique and to improve the heating economy still further, in accordance with an expedient embodiment of the invention the outgoing ventilation air from the web dryer machine shop can be used as the fresh air for such mixing.

The invention will now be described with reference to the attached schematic exemplifying drawing of a plant in which the procedure according to the invention is employed.

The outgoing hot wet air 1 from the web dryer 2 passes first through a heat exchanger 3, which preheats replacement air 4 for the web dryer. This replacement air is taken from the machine shop 5. The wet air then passes through a hot-water boiler 6 for use finally in a heat exchanger 7 for heating of ventilation air 8 for the

web dryer machine shop. The wet air is then evacuated into the atmosphere. In parallel with the heat recovery for the wet dryer a small quantity of wet air is taken from the latter to a heat exchanger 9 to heat drying air 10 for the flash dryer.

The hot gas unit 11, which is fired with oil, in the flash dryer obtains most of its air from the tertiary fan 12 and smaller quantities of air from the primary fan 13 and secondary fan 14. As shown, the fans 12 and 14 force air through the jacket of the air heater 11 to cool the heater and heat the air.

The air, which is at a high temperature after leaving the hot gas unit, is then distributed to the mixing chambers 15 of the various drying stages, in which it is mixed to the proper drying temperature with fresh air.

The outside atmosphere has earlier been used as fresh air, but in accordance with an expedient application of the invention, to raise the recovery still further, the outgoing ventilation air 16 from the web dryer machine shop is used as fresh air.

The quantity of heat recovered from the wet air for ventilation and hot-water boiler is determined by the need for hot water and ventilation in the mill. The quantity of air entering the web dryer is equal to the quantity of wet air leaving it and is thus given by the size of the dryer. It is desired that the temperature of the air entering the dryer shall be as high as possible to ensure low heat consumption. At a given maximum temperature an optimal performance is obtained having regard to capital costs and operating costs. The wet air leaving the heat recovery plant still contains a not insignificant quantity of heat.

By increasing the surface area of the heat exchanger an unchanged temperature of the drying air for the web dryer can be obtained. Furthermore, with relatively small changes, unchanged heating of hot-water and ventilation air can be obtained.

As fiber dust and SO<sub>2</sub> do not occur in the wet air from the web dryer, according to the procedure of the invention, it is not necessary to take any extra measures or to use better or more expensive material than normal in the heat exchangers, for which reason the installation shown has proved very much more profitable than conventional operating systems in plants of this kind.

What I claim is:

1. In a method for drying of cellulose simultaneously in both a closed-hood web dryer and, in parallel working arrangement therewith, a flash drying plant, for disintegrated cellulose, wherein said closed-hood dryer is mounted in a machine shop and is connected to exhaust one portion of its discharged wet air through three serially connected heat exchangers for removing the heat from said portion of the air from the closed dryer before exhausting said portion to atmosphere and to exhaust a second portion through a fourth heat exchanger, ducts for the supply of pre-heated ventilating air to the machine building, connecting ducts for the removal of used ventilating air from said machine building and transferring it to said flash drying plant, said plant comprising a plurality of drying stages for the drying of disintegrated cellulose pneumatically in a stream of heated gaseous drying medium, a heating means for heating said drying medium, said fourth heat exchanger being connected for supplying warmed air to said heating means, a disintegrating device for the cellulose to be dried in said flash drying plant, a wet stage for the pre-heating and dewatering of the disintegrated

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cellulose in a stream of drying medium recycled from the last drying stage before the introduction of said disintegrated cellulose to the first drying stage, means for cooling the dried cellulose leaving the last drying stage, and a compacting means for forming of cooled cellulose into standardized packages of dried cellulose, the improvement comprising the steps of:

conducting a first portion of the hot air from the closed hood web dryer and passing said air serially through the first of said serial heat exchangers, the second of said heat exchangers and the third of said heat exchangers and then venting said portion of hot air to the atmosphere, conducting fresh ventilating air through said third heat exchanger and supplying the heated ventilating air to the machine shop, passing water through said second heat exchanger to produce hot water, conducting a portion of the air from within the machine shop through said first heat exchanger to produce a hot drying medium and conducting this hot medium to the web dryer hood, conducting the remaining portion of the hot air from the closed hood web dryer through said fourth heat exchanger for supplying heat thereto so as to warm

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the air supply for said heating means of the dryer plant, heating said air in said heating means, thereby producing a heated gaseous drying medium for the drying stages,

conducting the used ventilating air away from the machine shop, and mixing said used ventilating air with the heated gaseous drying medium from said heating means and producing a plurality of streams having ratios of drying medium to exhaust air such as to give a predetermined temperature and drying medium flow rate for each of said plurality of drying stages of said flash drying plant.

2. A method according to claim 1 wherein said plant includes a separate mixing chamber for the drying medium of each stage, including the step of dividing said heated gaseous drying medium into a separate stream for each drying stage and introducing said stream into the associated mixing chamber, said ventilating air being conducted away from the machine shop and being divided into separate streams for introduction into said mixing chambers, each mixing chamber producing the proper drying temperature for its associated stage.

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UNITED STATES PATENT OFFICE  
CERTIFICATE OF CORRECTION

Patent No. 3,739,482 Dated June 19, 1973

Inventor(s) Bengt Berg

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In the heading before [52] U.S. Cl., the following should be added:

[30] Foreign Application Priority Data

April 16, 1970 Sweden.....5242/70

Signed and sealed this 16th day of April 1974.

(SEAL)  
Attest:

EDWARD M. FLETCHER, JR.  
Attesting Officer

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Commissioner of Patents