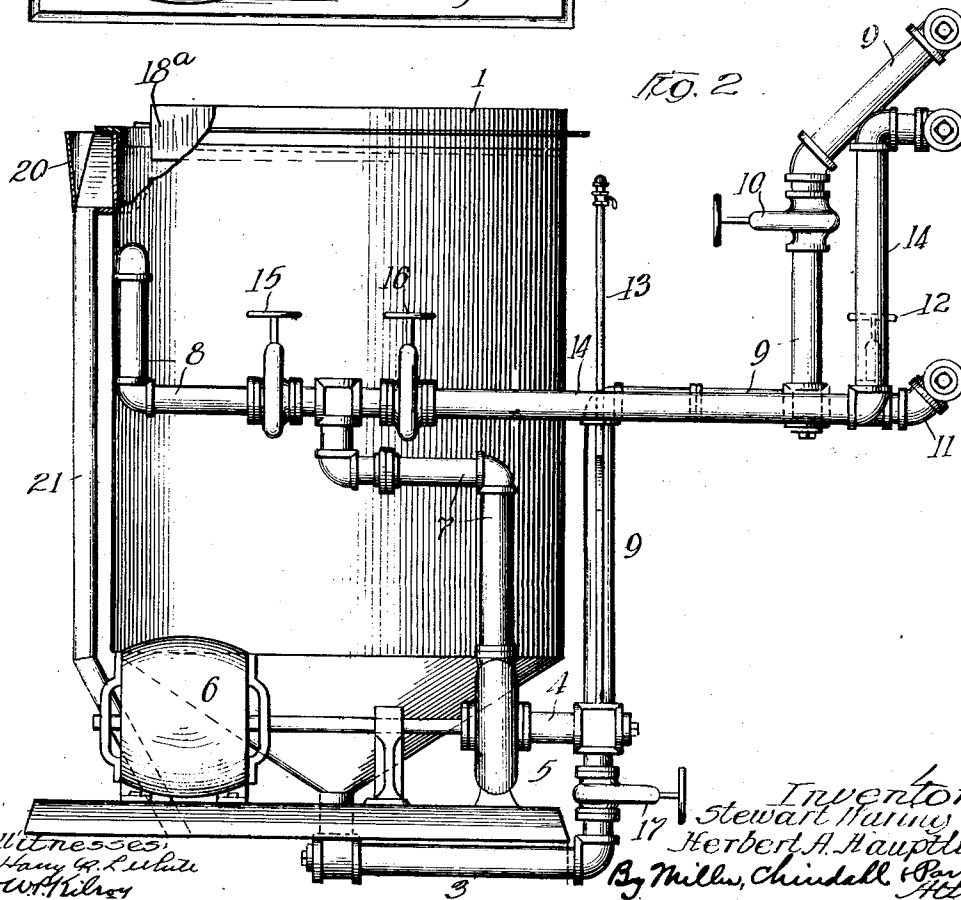
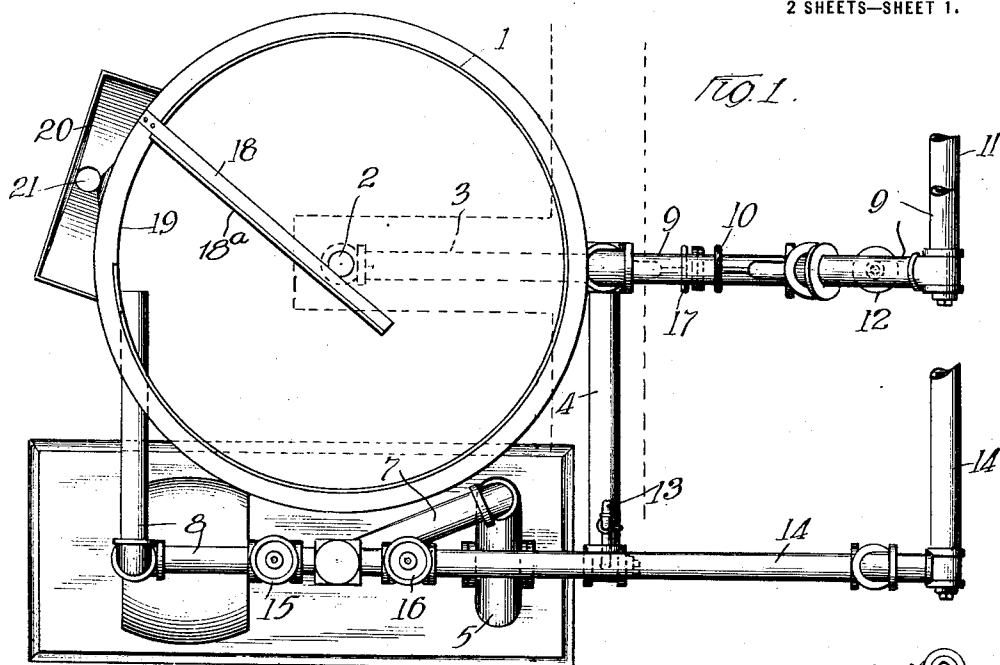


S. WARING & H. A. HAUPTLI.
 METHOD OF AND APPARATUS FOR DISINTEGRATING AND DECOLORING PAPER.
 APPLICATION FILED MAR. 22, 1917.

1,245,839.

Patented Nov. 6, 1917.

2 SHEETS—SHEET 1.



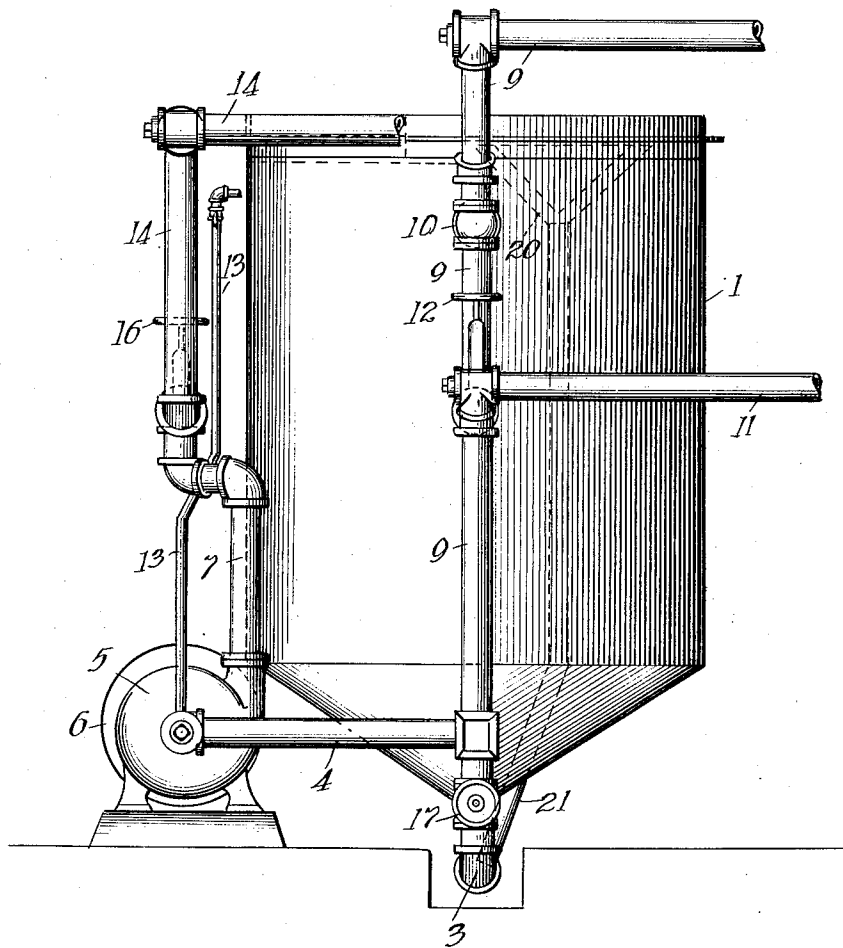
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Fig. 3



Witnesses:

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W. P. Kilroy

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 Stewart Waring
 Herbert A. Hauptli.

By Miller, Chindall & Parker
 Attys.

UNITED STATES PATENT OFFICE.

STEWART WARING, OF EVANSTON, AND HERBERT A. HAUPTLI, OF CHICAGO, ILLINOIS,
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METHOD OF AND APPARATUS FOR DISINTEGRATING AND DECOLORING PAPER.

1,245,839.

Specification of Letters Patent.

Patented Nov. 6, 1917.

Application filed March 22, 1917. Serial No. 156,570.

To all whom it may concern:

Be it known that we, STEWART WARING, of Evanston, Illinois, a citizen of the United States, and HERBERT A. HAUPTLI, of Chicago, Illinois, who was a citizen of the Swiss Confederation, but who has declared his intention of becoming a citizen of the United States, have made certain new and useful Improvements in Methods of and Apparatus for Disintegrating and Decoloring Paper, of which the following is a specification.

The object of this invention, briefly stated, is to convert paper, and particularly printed paper, in an inexpensive and expeditious manner into pulp suitable for use in the manufacture of paper. The invention has particular reference to the removal of ink and other printed coloring matter from the pulp. In all of the prior processes of which we are aware, the ink was removed from the pulp by means of prolonged washing, the washing being done after the paper had been reduced to a pulp, and often in an apparatus separate from that employed in disintegrating the paper. The washing operation not only consumed considerable time but failed to remove all of the ink. Our invention aims to effect the complete removal of the ink simultaneously with the operation of liberating the fibers of the paper stock, and to carry out both steps in a unitary apparatus.

In the accompanying drawings, Figure 1 is a top plan view of an apparatus embodying the features of our invention. Fig. 2 is a side elevation of the apparatus. Fig. 3 is an elevation looking from the right-hand side of Fig. 2.

While the invention may be practised by means of apparatus of various forms and constructions, the invention is herein disclosed in connection with an apparatus comprising a cylindrical upright tank 1 supported in any suitable manner and preferably provided with a conical bottom having an outlet 2. This outlet is connected by means of pipes 3 and 4 with the intake of a pump. Any suitable form of pump may be employed, the pump 5 herein shown being of the centrifugal type. The pump 5 may be driven in any desired manner, as by means of an electric motor 6. The outlet of the pump 5 is connected by means of pipes 7 and 8 with the upper portion of the tank 1, the

pipe 8 preferably being arranged to discharge the material tangentially into the tank so as to set up a rotary motion of the contents of the tank.

The paper stock to be treated may be introduced into the tank in any suitable or convenient manner. Herein we have shown a supply pipe 9 communicating with the pipes 3 and 4 as shown in Fig. 3. 10 is a shut-off valve in the pipe 9.

Water may be supplied to the tank 1 in any preferred manner, as by means of a water supply pipe 11 connected to the pipe 9. 12 is a shut-off valve in the water pipe 11.

If desired, any suitable means may be employed to heat the contents of the tank.

13 is a compressed air supply pipe leading from any suitable source of supply and connected to the pipe 4 so as to discharge compressed air into the liquid mass entering the intake of the pump 5.

Upon the completion of the disintegrating and deinking operation, the contents of the tank 1 may be discharged in any suitable way, as by means of a discharge pipe 14 connected to the junction of the pipes 7 and 8. In order that the discharge from the pump 5 may be directed into either of the pipes 8 and 14 at will, shut-off valves 15 and 16 are provided at opposite sides of the junction of the pipe 7 with the pipes 8 and 14.

17 is a shut-off valve in the pipe 3.

Foam and scum may be removed from the surface of the contents of the tank by a manual operation or with the aid of any suitable mechanical means. Herein is shown an angle iron bar 18 secured at one end to the tank and projecting horizontally over the tank, a skimming bar 18^a being fixed to the bar 18. The bar 18 is supported in such position as to direct foam and scum through an opening 19 in the side of the tank 1. The opening 19 is above the discharge end of the pipe 8. Below the opening 19 and upon the outer side of the tank is a trough 20 having a drain pipe 21 leading to any suitable point of discharge.

In practice, the paper stock to be treated is reduced to fragments of the desired size in any preferred manner. During this step of the operation or subsequently, hot or cold water, a suitable quantity of soap or soap-making ingredients, and such other chemicals as may be desired, are added to the

paper stock, the whole being usually introduced into the tank 1 through the supply pipe 9. It will be understood, however, that the paper fragments, the soap or soap-making ingredients, and the other chemicals, if any, may, if desired, be placed directly in the tank 1 or may be transported thereto by means of a conveyer. Sufficient water is admitted to the tank through the pipe 11 to bring the level of the contents of the tank close to the foam-outlet 19.

The tank 1 having been charged with the materials to be treated, the pump 5 is placed in operation, whereby a rapid circulation of the contents of the tank is set up. The fibers of the paper stock are thus liberated. The soap or soap-making ingredients in the mixture cause saponification of the oil or fatty constituents of the ink, whereby the carbon or other pigment is freed from the fibers. In order to remove the soap and carbon from the pulp, compressed air is introduced through the pipe 13 at a point between the outlet 2 and the pump 5. The water and the saponified stock thus become thoroughly impregnated with air during their passage through the pump. When the stock is discharged into the tank, the air rises to the surface, carrying up the soap in the form of bubbles. The carbon clings to the bubbles and is thus brought to the surface. In the rotation of the contents of the tank, the foam is skimmed off by the bar 18^a and directed through the opening 19 into the trough 20 whence it is discharged through the pipe 21. If desired, the foam may be treated for the recovery of the carbon and other valuable constituents.

Bleaching agents may be added to the contents of the tank at the beginning or at any suitable subsequent stage of the operation. If desired, ozone or any other gas of similar properties, may be supplied together with the compressed air through the pipe 13, the ozone or other gas serving to bleach the pulp.

When the stock has been reduced to pulp and all of the soap, ink and other coloring matter removed, the contents of the tank may be discharged by means of the pump 5 through the pipes 7 and 14, the valve 15 being closed and the valve 16 opened.

It will be seen that we have provided means for disintegrating, deinking and bleaching paper stock in a thorough and rapid manner, the disintegrating, deinking and bleaching operations proceeding concurrently and in a unitary apparatus. Practical use of our method and apparatus has shown that the ink is completely removed and that the resulting pulp compares favorably in strength and color with the original constituents of the paper.

As the soap and carbon are removed from the upper portion or surface of the moving

body of pulp, the pulp and clay or other loading material contained in the paper stock continue their circulation in the tank.

In certain of the following claims we have used the term "impeller" to denote an injector, a propeller, a pump or any other suitable means for inducing a circulation within the tank and the pipes 3, 4, 7 and 8.

We claim as our invention:

1. A process of disintegrating and deinking printed paper consisting in agitating a body of water containing a quantity of printed paper, saponifying the oily or fatty elements of the mixture, introducing air into the mixture during the agitating and saponifying operation, and removing the resulting foam.

2. A process of disintegrating and deinking printed paper consisting in agitating a body of water containing a quantity of printed paper, saponifying the oily or fatty elements of the mixture, introducing air into the mixture, and removing the resulting foam.

3. A process of producing paper pulp from printed paper comprising disintegrating the paper in water, saponifying the oils or fats carried by the paper, introducing compressed air into the mixture, and removing the resulting foam.

4. A process of deinking printed paper comprising placing the paper and a saponifier in a body of water, introducing compressed air into the water, and removing the resulting foam.

5. A process of removing coloring matter from paper comprising placing the paper and a saponifier in a body of water, introducing air into the water, and removing the resulting foam.

6. A process of removing coloring matter from paper comprising placing the paper in a body of water, loosening the coloring matter from the paper, introducing air into the water, and skimming the body of water.

7. A process of producing paper pulp from printed paper comprising disintegrating the paper in water, saponifying the oils or fats carried by the paper, introducing compressed air and a bleaching agent into the mixture, and removing the foam.

8. An apparatus for producing paper pulp from printed paper comprising a tank, an impeller, a pipe connecting the lower portion of the tank to the inlet of the impeller, a pipe connecting the outlet of the impeller to the upper portion of the tank, and means for introducing compressed air into the first-mentioned pipe.

9. An apparatus for producing paper pulp from printed paper comprising a tank, an impeller, a pipe connecting the lower portion of the tank to the inlet of the impeller, a pipe connecting the outlet of the impeller to a portion of the tank below the level of

the contents of the tank, said tank having a foam outlet at a point above the point at which the impeller discharges into the tank, and skimming means arranged to direct foam through said outlet.

10. An apparatus for producing paper pulp from printed paper comprising a tank, an impeller, a pipe connecting the lower portion of the tank to the inlet of the impeller, a pipe connecting the outlet of the impeller to the upper portion of the tank, said tank having a foam outlet at a point above the point at which the impeller discharges into the tank, skimming means arranged to direct foam through said outlet, and means for introducing compressed air into the contents of the tank.

11. An apparatus for producing paper pulp from printed paper comprising a tank, an impeller, a pipe connecting the lower portion of the tank to the inlet of the impeller, a pipe connecting the outlet of the impeller to the upper portion of the tank, said tank having a foam outlet at a point

above the point at which the pump discharges into the tank, skimming means arranged to direct foam through said outlet, and means for introducing compressed air into the first-mentioned pipe.

12. An apparatus for producing paper pulp from printed paper comprising a structure providing an endless conduit, said structure including a tank connected into the conduit, means for causing a circulation in said structure, and means for introducing compressed air into the liquid contents of the structure.

13. An apparatus for producing paper pulp from printed paper comprising a tank, means for causing a flow of the contents in the tank, means for introducing compressed air into the tank, and means for removing foam from the surface of the contents of the tank.

In testimony whereof we have hereunto set our hands.

STEWART WARING.
HERBERT A. HAUPTLI.