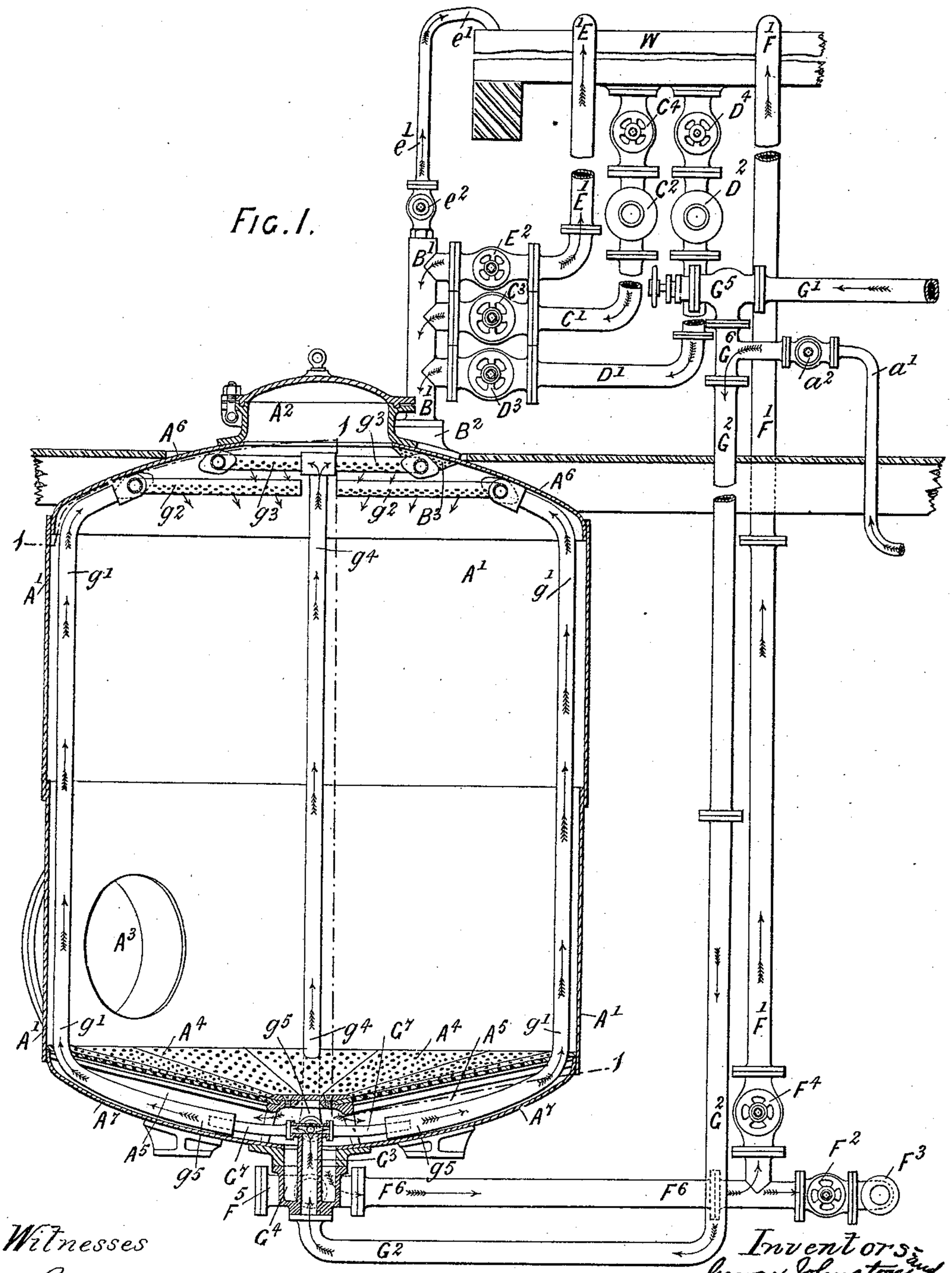
(No Model.) 2 Sheets—Sheet 1.

J. & G. JOHNSTON.

PROCESS OF TREATING FIBROUS MATERIAL FOR MAKING PULP.

No. 486,339. Patented Nov. 15, 1892.

FIG. 1.



Witnesses

George Baumann

John Revell

Inventors:

George Johnston and

James Johnston

By their Attorneys

Howson and Howson.

(No Model.) 2 Sheets—Sheet 2.

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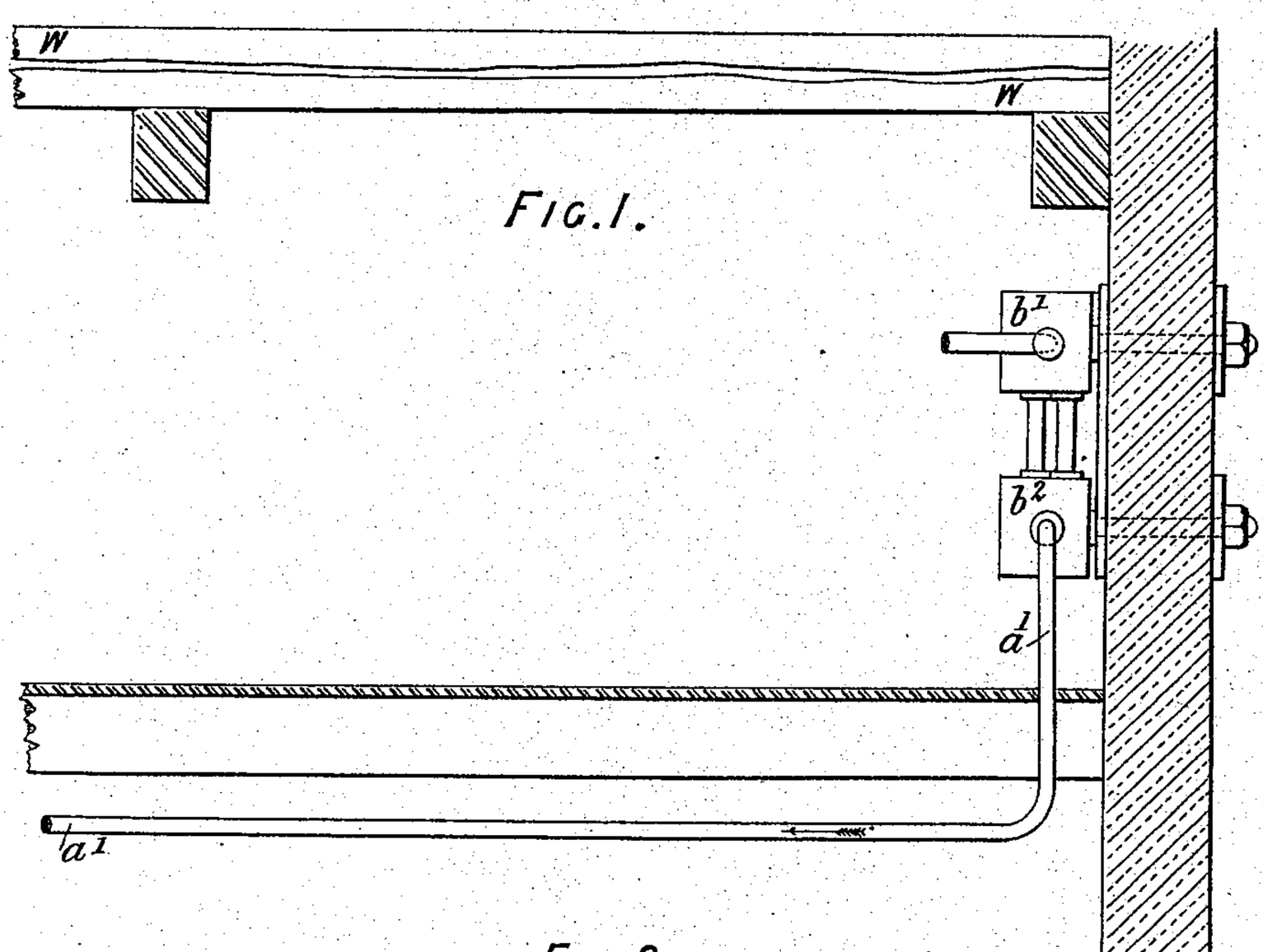

FIG. 1.

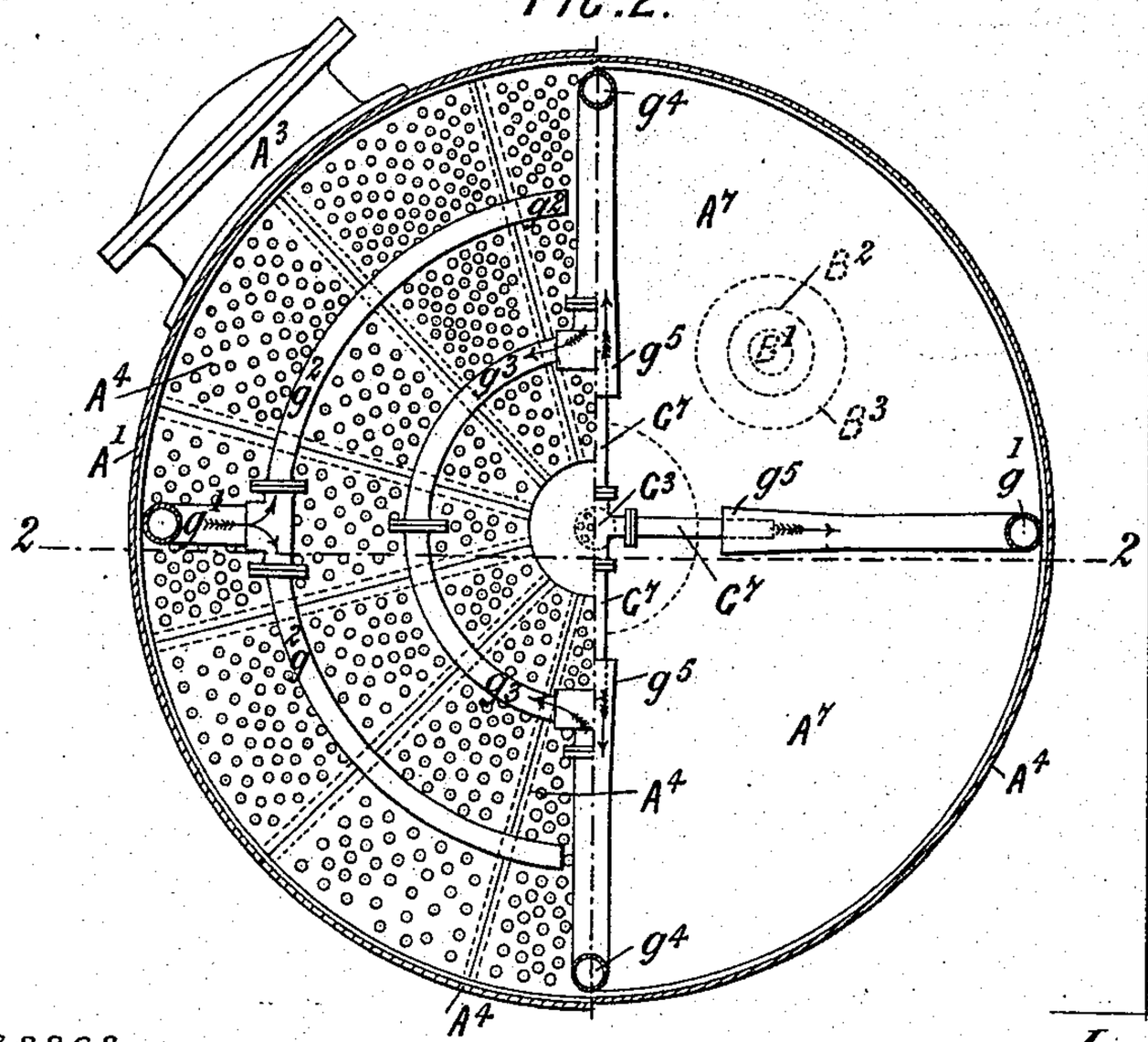

FIG. 2.

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UNITED STATES PATENT OFFICE.

JAMES JOHNSTON, OF PETER-CULTER, AND GEORGE JOHNSTON, OF DENNY, SCOTLAND.

PROCESS OF TREATING FIBROUS MATERIAL FOR MAKING PULP.

SPECIFICATION forming part of Letters Patent No. 486,339, dated November 15, 1892.

Application filed May 12, 1891. Serial No. 392,489. (No specimens.) Patented in England April 30, 1890, No. 6,644, and in Belgium February 25, 1891, No. 93,929.

To all whom it may concern:

Be it known that we, JAMES JOHNSTON, of Peter-Culter, in the county of Aberdeen, and GEORGE JOHNSTON, of Denny, in the county of Stirling, North Britain, paper-manufacturers, subjects of the Queen of Great Britain and Ireland, have invented Improvements in the Process of Treating Fibrous Material for Making Pulp, (for which we have obtained British Patent No. 6,644, dated April 30, 1890, and Belgian Patent No. 93,929, dated February 25, 1891,) of which the following is a specification.

Our invention has reference to a new process of treating esparto-grass and other fibrous materials for making paper, and relates more especially to the last part of the usual first treatment of such materials. This first process of treatment ordinarily consists in agitating the fibrous material, which is also undergoing a chemical treatment with strong alkalies, by high-pressure steam for a few hours and then blowing off the waste vegetable matter freed by this treatment into cisterns for subsequent recovery and use of the alkalies. Usually there are two such treatments.

The new process is carried on in the steam-boilers employed for treating these materials, as above described, after the strong and second lyes have been run off and the steam shut off or in separate boilers after removal from the former for the new treatment.

The improvements consist as follows: After the steam has been shut off and the second lyes have been removed and the boiler has been filled up with cold water strong currents of cold-pressure air from air-forcing pumps or engines are introduced into the boilers up through the fibrous material, so as to circulate through and agitate the material until it is thoroughly cleaned. This also oxidizes the fiber and washes off all the weak alkalies with the water, which would be drawn or blown off from time to time, as desired, and either allowed to waste or be forced up into a tank for subsequent use in the boilers.

In the accompanying drawings, Figure 1, shown partly on Sheet 1 and partly on Sheet 2, is a sectional elevation showing an ordinary esparto-grass or paper fiber high-pressure boiler, taken on the lines 2 2 in Fig. 2. Fig. 2 is a horizontal section taken on the irregular line 1 1 1 1 of Fig. 1.

In Fig. 1 the boiler is shown provided with its liquor, steam, and water pipe fittings. One half of Fig. 2 is taken above the top "rose" circulating-pipes g^2 g^3 and the other half taken below the false perforated bottom A^4.

Referring to the drawings, A′ is the shell of the boiler, formed of sheet iron or steel, and A^6 A^7 are the domed or capped top and bottom.

A^2 is the open top and lid for inserting the esparto grass or other fibrous material to be treated, and A^3 the door and lid for discharging or removing the esparto grass or fibrous material after being treated within the boiler.

A^4 is the perforated bottom, made of radial plates supported some distance up from the bottom A^7, leaving a space A^5 between these for the circulating of the water and alkali liquor.

B′ is a stand branch pipe for feeding in through a neck B^2 and rose B^3 in the top A^6 of the boiler A′. Opening into this branch B′ are four pipes C′, D′, E′, and *e*′. The pipe C′ and its branches C^2 lead from separate overhead tanks either alkali liquor or cold water. The branch D′ supplies hot water from the tank W, or, if desired, the weak after-liquor washings, which may be led to this tank W by the pipe F′, hereinafter explained. The pipes C′ and D′ are fitted with valves C^3 C^4 and D^3 D^4, respectively. In the drawings only one tank is shown, the others being behind the tank W.

E′ is a blow-off steam-pipe with cock or valve E^2 for blowing off the steam, when that is desired, into the cistern W.

e′ is a small steam-escape pipe for reducing pressure, and is fitted with a regulating-valve e^2. This pipe *e*′ leads the steam from the top of the stand-pipe B′ into the said cistern W. The arrows indicate the direction the fluid takes in these pipes. A steam-pipe G′, fitted with stop-valve G^5, leads the steam from the boiler to the T-branch G^6 and pipe G^2 down to and up the center cross-branch G^3 of a du-

plex annular chambered box G^4, opening into the center of the bottom A^7 of the boiler A'. The steam thus admitted from the four cross-branches G^3 by short continuations G^7 is led into the wide open mouths g^5 of the curved lower knees of the four uptake water-circulating pipes g' g' g^4 g^4. The two pipes g' g' are connected at the top to large semicircular rose-pipes g^2. The other two pipes g^4 g^4 (at right angles to the first pair g' g') are connected to a complete circular rose-pipe g^3 close under the domed top A^6 of the boiler A', but clear of the door A^2, for filling in the esparto-grass fiber. The ordinary operation of treating the esparto-grass in these high-pressure boilers A' is to fill the vessel half full, or so, with the prepared alkali liquor fed from an overhead cistern by the pipe C'. The steam, at about forty-five pounds pressure, is then turned on by the pipe G' and stop-valve G^5 and the esparto-grass fiber fed in through the top door A^2, the steam heating and circulating the liquor up through the pipes g' g^4 and top rose-pipes g^2 g^3 to completely saturate and soften and lower the fibrous material in the vessel. The vessel is now filled with more fibrous material and the lid bolted down, when full pressure is put on and the fibrous material treated with the hot circulating liquor for about two hours. The steam is then shut off and the fibrous material allowed to stand under the action of the liquor for about two hours until the pressure has fallen to about twenty pounds by the escape through the regulating pipe and tap e' e^2. The liquor is then blown off through the annular chamber G^4, surrounding the steam branch G^3, into the lateral branch and pipe F^5 F^6 and cock F^2 to a pipe at F^3, leading to any receiving tank or cistern, for subsequent treatment in recovering the alkalies. This cock F^2 is then shut off and the boiler A' filled with hot water by the pipe D' and taps D^3 D^4 and a little live steam again put on for about half an hour, when this weak solution of refuse-washings is blown off through the pipe F^5 F^6 and cock F^2 by the pipe F^3, preferably to the same tank as the strong liquor was previously blown into. The boiler A' is then filled with cold water from a usual cold-water cistern or a pump by the branch C^2 and pipe and tap C' C^3.

The process described thus far is the usual one, while by our improvements cold compressed air is led by a pipe a' and cock or valve a^2 from an air-compressing engine b' b^2 or an air blower or fan. The air, preferably at about forty-five pounds pressure, is led, as indicated by the arrows, into the T-branch G^6 down the pipe G^2 to circulate the cold water up through circulating-pipes g' g^4 and rose-pipes g^2 g^3 and down through the esparto-grass and perforated bottom A^4, a portion of the pressure-air being allowed to escape up through the regulating-cock and pipe e' e^2 to cause a variation of pressure and insure the circulation of the water. This treatment is continued for about an hour, when the water is then run or blown off through the pipes F^5 F^6 and valve F^4 up the pipe F' to a cistern or off through the cock F^2 and pipe F^3 to waste. This new washing treatment is repeated by filling the boiler A' with cold water again and putting on the air-pressure by the pipe a' and circulation of the cold water for about another hour, when this washing-water is blown off for subsequent use or to waste, as before described, and this new washing, cooling, and circulating treatment with water and compressed air can be repeated as many times as desired to get the esparto-grass thoroughly cleaned before being removed from the boiler A' by the door A^3 to be bleached or pulped. Although this new treatment of circulating cold water and compressed air through the material has been described and shown as performed in the usual steam-pressure boiler A' after the removal of the strong alkalies, this is not essential. The fibrous material may be removed after being treated in the usual manner (with alkalies and steam and hot water) to a separate vessel, constructed like A', and there receive the new air and cold-water agitating washing treatment described.

We claim as our invention—

The herein-described process of treating fibrous material for making paper-pulp, consisting in first subjecting the material to the usual treatment by strong alkalies and steam and then forcing air and cold water or other liquid through the material, substantially as set forth.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

JAMES JOHNSTON.
GEO. JOHNSTON.

Witnesses as to signature of James Johnston:

THOMAS ARCH. COATS,
WM. TAYLOR.

Witnesses as to siguature of Geo. Johnston:

W. R. M. THOMSON,
JOHN SIME.