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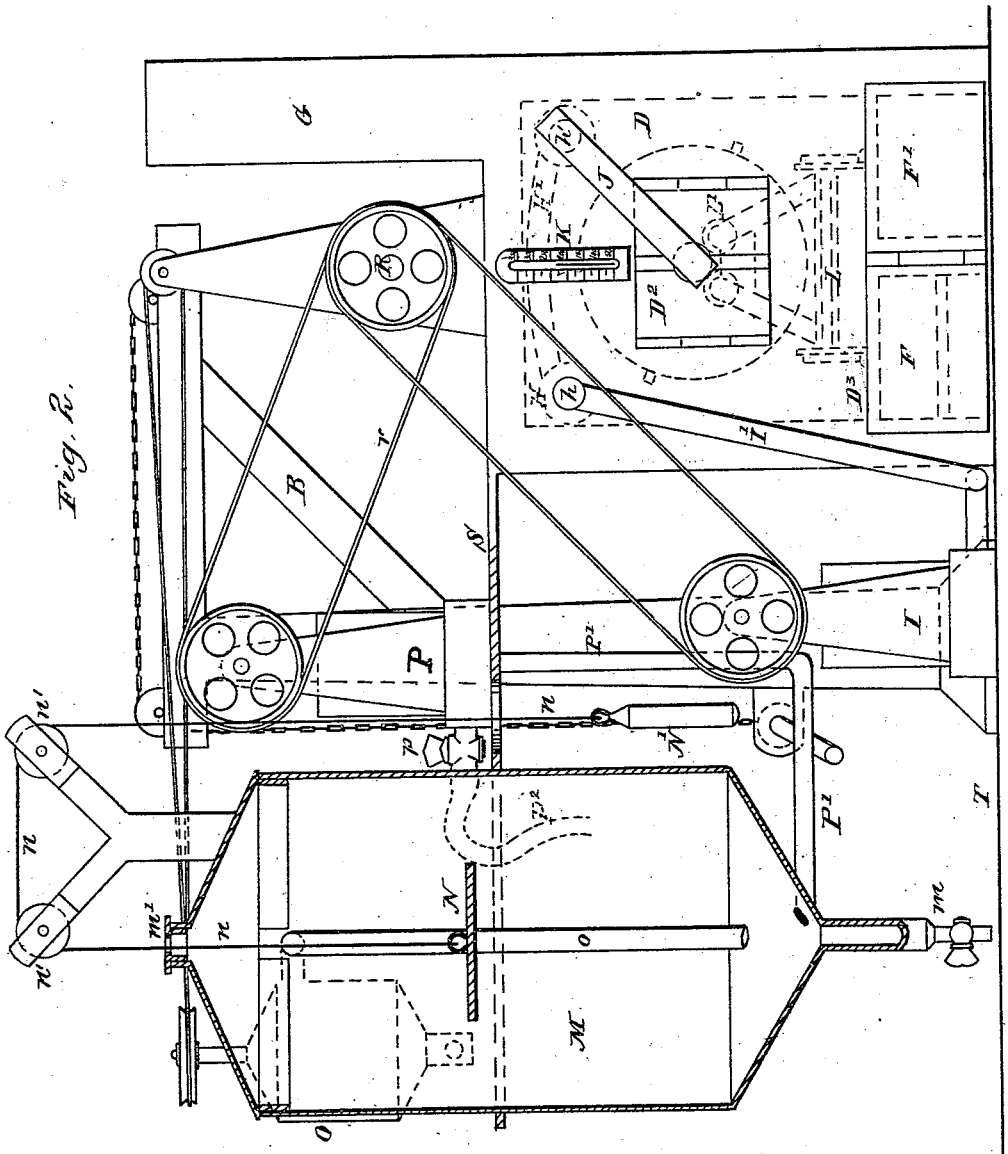
Apparatus for Treating Fibrous Materials.

No. 211,788. Patented Jan. 28, 1879.

Fig. 2.



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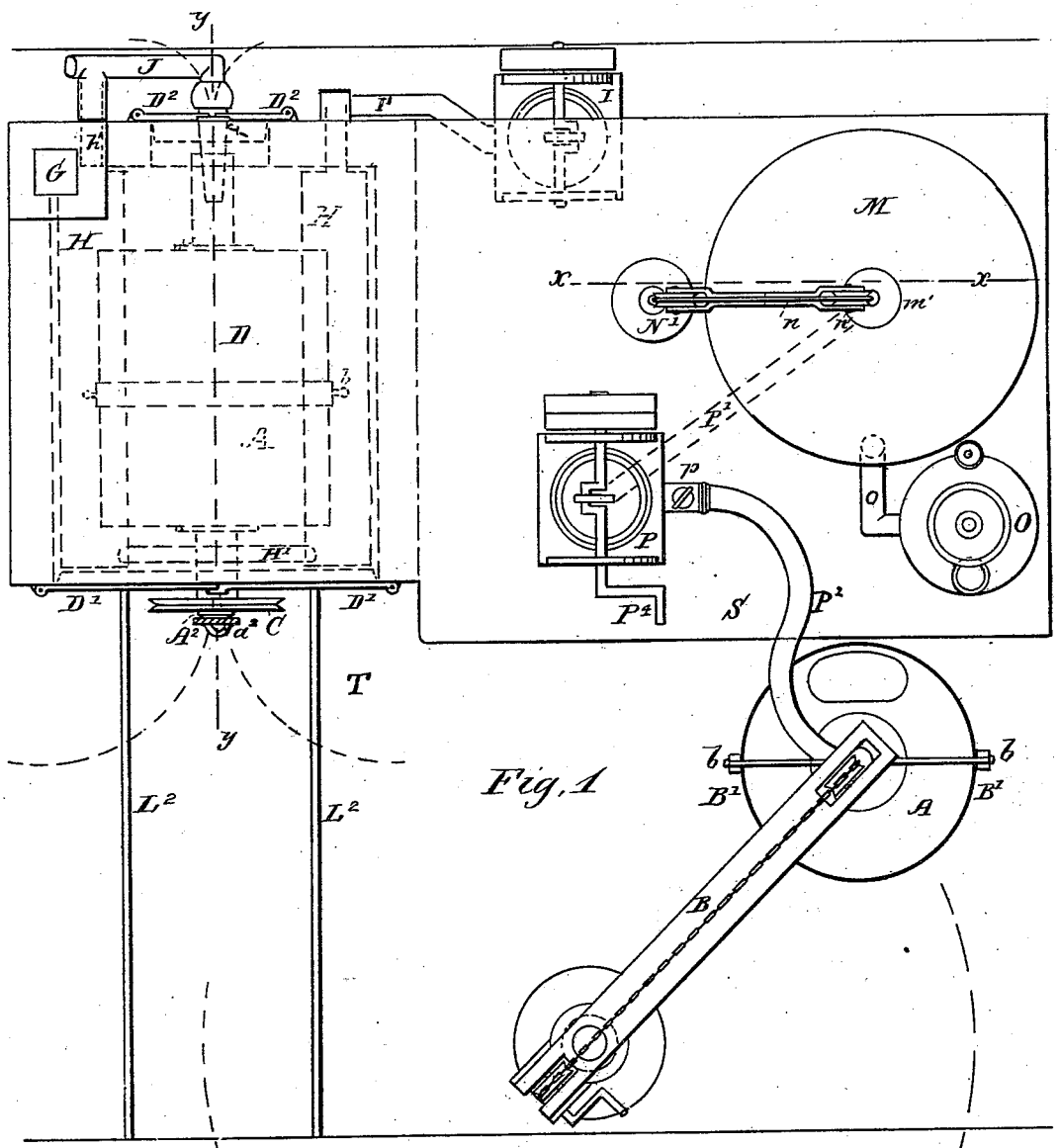

Fig. 1

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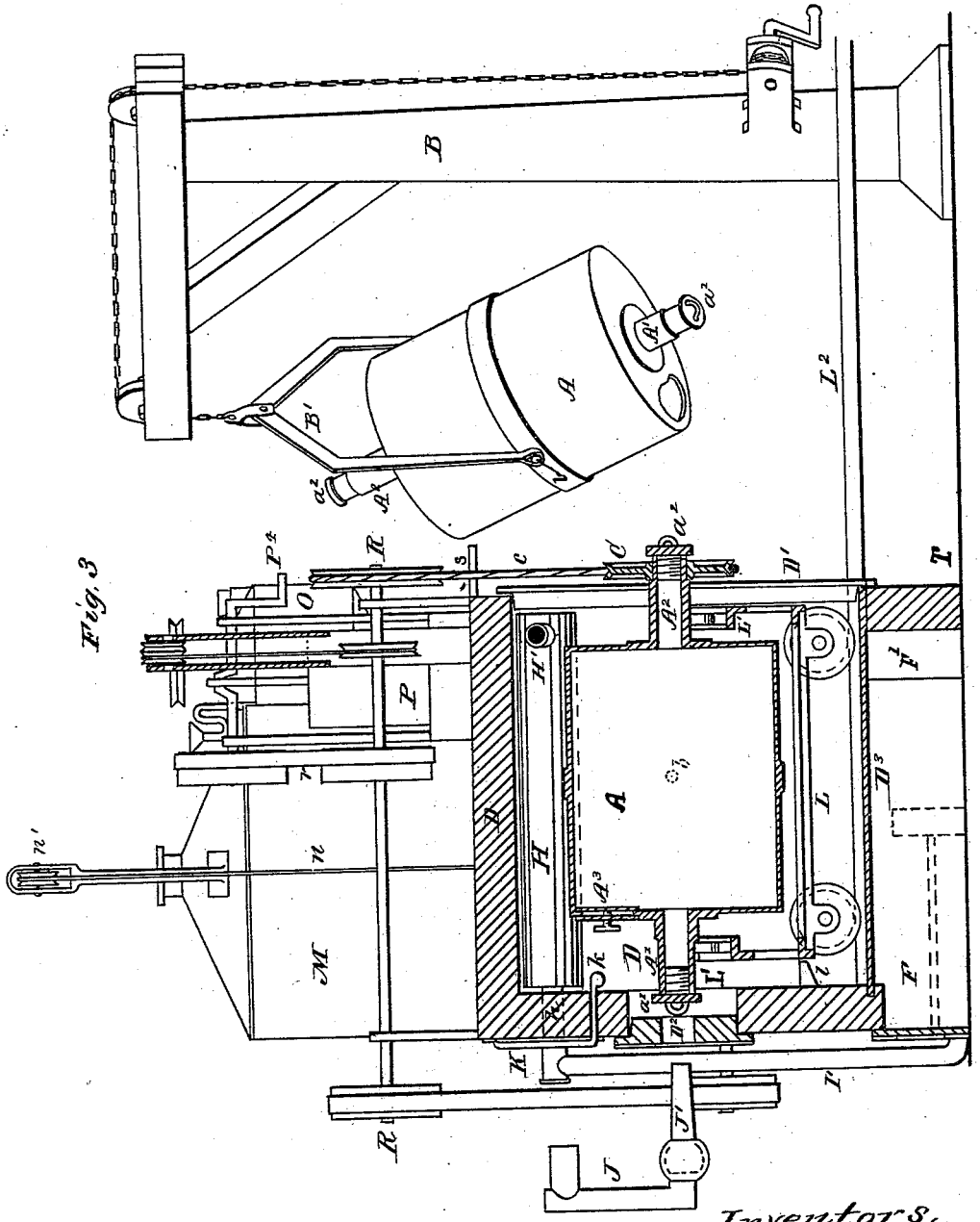
Fig. 3



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UNITED STATES PATENT OFFICE.

GEORGE M. RICE, 2D, AND ALFRED L. RICE, OF WORCESTER, MASS.

IMPROVEMENT IN APPARATUS FOR TREATING FIBROUS MATERIALS.

Specification forming part of Letters Patent No. **211,788**, dated January 28, 1879; application filed July 5, 1878.

To all whom it may concern:

Be it known that we, GEORGE M. RICE, 2d, and ALFRED L. RICE, of Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Apparatus for Treating Fibrous Materials; and we declare the following to be a description of our said invention sufficiently full, clear, and exact to enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification, and in which—

Figure 1 is a plan view illustrative of the nature and operation of our improved apparatus for treating fibrous materials. Fig. 2 is an elevation of the same, part shown in rear view and part in vertical section, at line *x x*, Fig. 1; and Fig. 3 is a vertical sectional view at line *y y*, Fig. 1.

This invention relates to apparatus to be employed in the art or process of separating animal from vegetable fibers in mixed fabrics, or the recovery, for reworking, of wool or other animal fibers in mixed rag stock, or the separation of wool from burrs by chemical action, and for other similar purposes, by the use of chlorine gas as the chemical agent for disintegrating the vegetable fibers or matter.

Our invention consists in the apparatus for use in the art aforesaid, constructed and organized substantially in the manner set forth in the following description, the particular subject-matter claimed being hereinafter definitely specified.

In the drawings, the part marked A represents the receiver for containing the fibrous materials to be treated. Said receiver (preferably made from sheet-iron or boiler-plate) is provided with hollow axial journals A^1 A^2, the passages in which are fitted with suitable screw-plugs a^1 a^2, whereby said passages can be opened and closed at pleasure.

In one of the heads, near the outer shell, is arranged the man-hole, through which to enter and withdraw the charge of material, and a cover or plate, A^3, is provided for closing or sealing the entrance. The receiver A is also furnished with trunnions *b b*, whereby said receiver can be swung up on the crane B, and be revolved at pleasure between the grappling-arms B′ for facilitating the operation of filling in, mingling, and discharging the contents.

The crane B may be of any suitable construction, the grappling-arms B′ being of sufficient length to allow the receiver A to revolve freely on its trunnions *b* without striking the journals A^1 A^2 against said arms.

C denotes a pulley to slip on and off the journal A^2 and to receive the driving-belt *c*, by which the receiver-cylinder A is revolved while in the heater. Gears may be used in lieu of belts and pulleys, if desired.

D denotes the heating-chamber, formed with walls and top of brick or other suitable material, and of a size to contain the receiver A, as shown. Said chamber D has large doors, D^1, at the front, and small doors, D^2, at its rear end, preferably made from double plates of sheet metal, with air-spaces between, hinged to swing outward, as indicated, and having central spaces or recesses for the pipes or journals A^2, as required.

The floor D^3 of the heating-chamber D consists of a metal plate or plates, beneath which there is a furnace, F, for fire, and suitable passages F′ traversing the under space for conveying the smoke along beneath the plates on its way to the chimney G.

In the upper part of the chamber D we arrange air-heating drums or cylinders H H, of sheet metal, connected with each other by a transverse pipe, H′, near their front ends, and having at their rear ends pipes *h h′*, which extend through the wall to the exterior to receive the connections of the supply-pipe I′ from the air-pump I or blowing-engine, and the delivering-pipe J for conveying the air into the receiver. The pipe J is made detachable and with a flexible or rotating joint or extension, J′, for making connection with the journal A^1 of the receiver, as hereinafter explained. Pipe J may be of rubber or other material, as desired. K indicates a thermometer properly engaged for high temperatures, and arranged with its bulb *k* within the chamber D and its index-plate on the exterior of the wall. Several such thermometers may be used in different parts of the heating-chamber, if desired. L denotes a car for mounting the receiver A. Said car is made with upright end frames having frictional bearing-rolls L^1

for supporting the journals A^1 A^2 of the cylinder A, and with truck-wheels to run on the tracks L^2, which extend into the chamber D, so that by opening the doors D^1 the car and receiver can be readily run into position within the heater D, or withdrawn from the chamber D to a position beneath the crane B or elevating mechanism. *l* indicates a buffer for stopping the car at the proper position. M denotes the reservoir or gas-holder for containing a supply of chlorine gas. This tank or holder M may be made of sheet-iron, wood, or other suitable material. In the present instance it is made of metal in cylindrical form with conical heads, and lined with a coating of asphaltum. At the bottom is a trap and cock, *m*, for collecting and drawing off any liquid or moisture that may condense on the sides of the tank, thus keeping the gas in dry condition.

At the top of the reservoir M there is a small opening, *m'*, for the passage of air into and out of the reservoir as the quantity of gas contained therein varies. Through said opening there is also arranged the cord or chain *n* of the indicator device, which consists of a plate, N, or other formed piece of suitable material hanging loosely within the central portion of the reservoir, and from which the cord *n* extends upward and over the guide-pulleys *n' n'* to the counter-weight N', hanging at the outside of the tank or reservoir. The plate N is counterbalanced to sink in ordinary atmospheric air and to float on the chlorine gas, so that the plate N remains at the surface level of the gas, and the height of the gas within the reservoir M is thus indicated by the position of said plate N or its counter-weight N'. A properly-graduated scale may be marked on the side of the tank M, or otherwise combined with the weight or cord, whereby the quantity of gas can be indicated in cubic feet, gallons, cubic meters, or other desired unit of measurement.

A spring device or clock mechanism may be combined with the cord *n*, if preferred, in lieu of the weight N', for taking up and letting out said cord and registering the quantity of gas as the float N rises and falls by the increase or diminution of gas within the reservoir.

O denotes the gas-generator, and *o* the pipe for conveying the gas from said generator to the lower part of the reservoir M. The generator O may be of any ordinary or suitable form for the generation of chlorine gas by the aid of ordinarily-employed substances and methods; hence the details of its construction and operation are herein omitted.

P denotes a gas-pump or mechanism for measuring and forcing the chlorine gas from the reservoir M into the receiver A. Said pump is connected with the lower part of the reservoir by the pipe P^1, and is provided with a leader or hose, P^2, for conveying the gas to the interior of the receiver A when the latter is swung up for charging, as indicated in Fig. 1. The leader P^2 is furnished with a suitable stop-cock, *p*, properly situated for closing its passage and preventing escape of gas when desired. A registering-meter may be employed in the gas-leader P^2 if desired, and by arranging the gas-reservoir at a sufficient height above the level of the charging-floor the gas will flow down by its own gravity. I prefer, however, to employ a forcing pump or mechanism, the movement of the gas being thereby more readily controlled. The pump P may be operated by the hand-crank P^4 or by belt *r* from the driving-shaft R.

The operation of our improved apparatus is as follows: The receiver A is swung on the crane B to the position where the charging or filling is to be performed, (see Fig. 1,) this being usually most convenient from a floor, S, at higher level than the main or furnace floor T. The end of the receiver in which the man-hole is located is turned uppermost, the man-hole cover removed, and the stopper a^1 in the hollow journal A^1 opened. The materials to be treated are then filled in through the man-hole A^3. When a sufficient charge has been introduced into the receiver, the man-hole is closed and its plate A^3 secured. The proper quantity of chlorine gas is then introduced into the receiver from the reservoir M through the leader P^2, which is connected with the opening of the journal A^1, after which the journal-opening is closed by the stopper a^1, so that the gas cannot escape from the receiver. The leader P^2 may be detached and the receiver revolved on the trunnions *b* at intervals during the introduction of the chlorine gas, to mingle said gas more thoroughly with the material, if desired. The closed receiver with its contents can be permitted to remain any desired length of time before heating, or it may be at once subjected to the heating process, in which latter case the crane B is swung around to the tramway L^2, and the receiver A is lowered to its position upon the supporting-car L, and the crane cast off. The car and receiver are then run into the heating-chamber D, the doors D^1 D^2 closed, and the pulley C arranged on the projecting end of the journal A^2, and the band *c* run on. The receiver is then revolved, while its temperature is raised by heating the chamber D until the desired elevated degree is reached, the state of temperature being indicated by the thermometer K.

When the chemical action within the closed receiver A has become sufficiently advanced, the passages of the journals A^1 A^2 are opened, screw-plugs a^1 a^2 being removed therefrom, the inner one by way of the doors D^2, and the end of the pipe J is inserted into one of said journals A^1, thus completing communication with the air-heaters H and blowing mechanism, which latter being set in motion forces a current of heated air from the drums H through the receiver A and its charge, thus removing or carrying off any fumes or vapors which may have resulted from the previous chemical action within the receiver, and at the same time

completing any chemical action dependent on the introduction of air.

A suitable pipe or hose may be connected with the journal A^2 for conveying the fumes or vapors into the chimney-stack G, or elsewhere, as desired.

After a sufficient quantity of air has been passed through the receiver, the openings of the journals are closed, the doors D^1 opened, and the car L, with the receiver, is withdrawn from the heating-chamber D. The receiver is then swung by the crane B to the discharging position, the man-hole plate A^3 removed, and the contents dumped or raked out into a suitable bin or other receptacle, the materials being in a dry condition and ready for being worked on picking-machines or for other mechanical treatment.

Two or more receivers or cylinders, A, may be employed to permit of one cylinder being charged during the time that another is within the heating-chamber D.

It will be understood that the pipes for conveying the chlorine gas should be of lead or some material upon which chlorine has but little or no chemical action.

We are aware that revolving cylinders with hollow journals have heretofore been employed, and also that a blast of heated air has been used with such cylinders in apparatus for rendering lard and tallow, &c.; and we do not herein make claim, broadly, to such features.

What we claim as of our invention, and desire to secure by Letters Patent, is—

1. In an apparatus for chlorinating mixed fibrous materials for the separation of animal from vegetable fibers, the portable vessel or receiver having side trunnions and hollow end journals with screw-stoppers, substantially as described, whereby said receiver is adapted for revolution in either direction, to be employed as a close gas-receiver or mingling-tank, a close heating-retort, and an air-blast drier, as set forth.

2. The apparatus for separating mixed fibrous material, substantially as hereinbefore described, consisting of the close portable and revoluble receiver, adapted to contain said fibrous material with chlorine gas, having the hollow journals provided with screw-stops, the furnace devices, as described, air-superheaters, and a chamber adapted for the temporary reception of the revoluble receiver, and the air-blast pipes adapted for detachment and connection with the receiver while within said heating-chamber, all organized and adapted to operate as and for the purposes specified.

3. The within-described apparatus for treating with chlorine gas mixed fabrics for the separation of animal from vegetable fibers, consisting of a close portable vessel or receiver for containing the fibrous materials and chlorine gas, a generator and reservoir, adapted for the production and delivery of dry chlorine gas, connecting-pipes, and forcing mechanism for conveying said gas into said close receiver, a heating furnace or oven, adapted to temporarily contain said receiver, and into and from which said receiver can be conveyed, as set forth, and a hot-air blast mechanism, arranged for connection and disconnection with the interior of said receiver while within the heater or oven, said devices being organized for operation as and for the purposes stated.

Witness our hands this 3d day of July, A. D. 1878.

GEO. M. RICE, 2d.
ALFRED L. RICE.

Witnesses:
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