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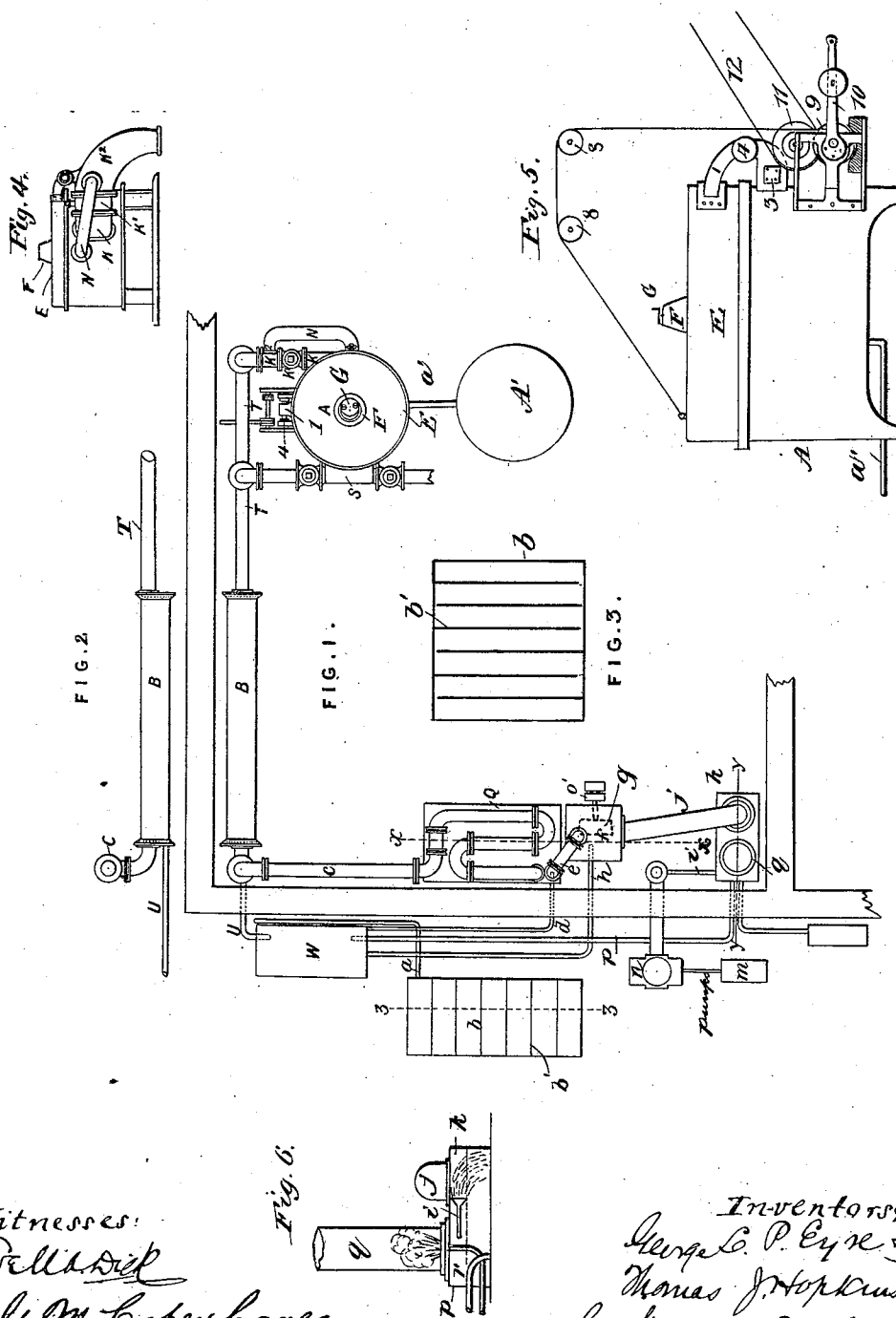
3 Sheets—Sheet 1.

G. L. P. EYRE & T. J. HOPKINS.

APPARATUS FOR TREATING WOOL OR LIKE SUBSTANCES.

No. 475,106.

Patented May 17, 1892.

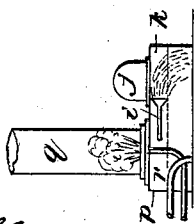


Witnesses:

W. M. Copenhaver.

G. M. Copenhaver.

Fig. 6.



Inventors:

George L. P. Eyre &

Thomas J. Hopkins

Luther Bailey
their attorney.

(No Model.)

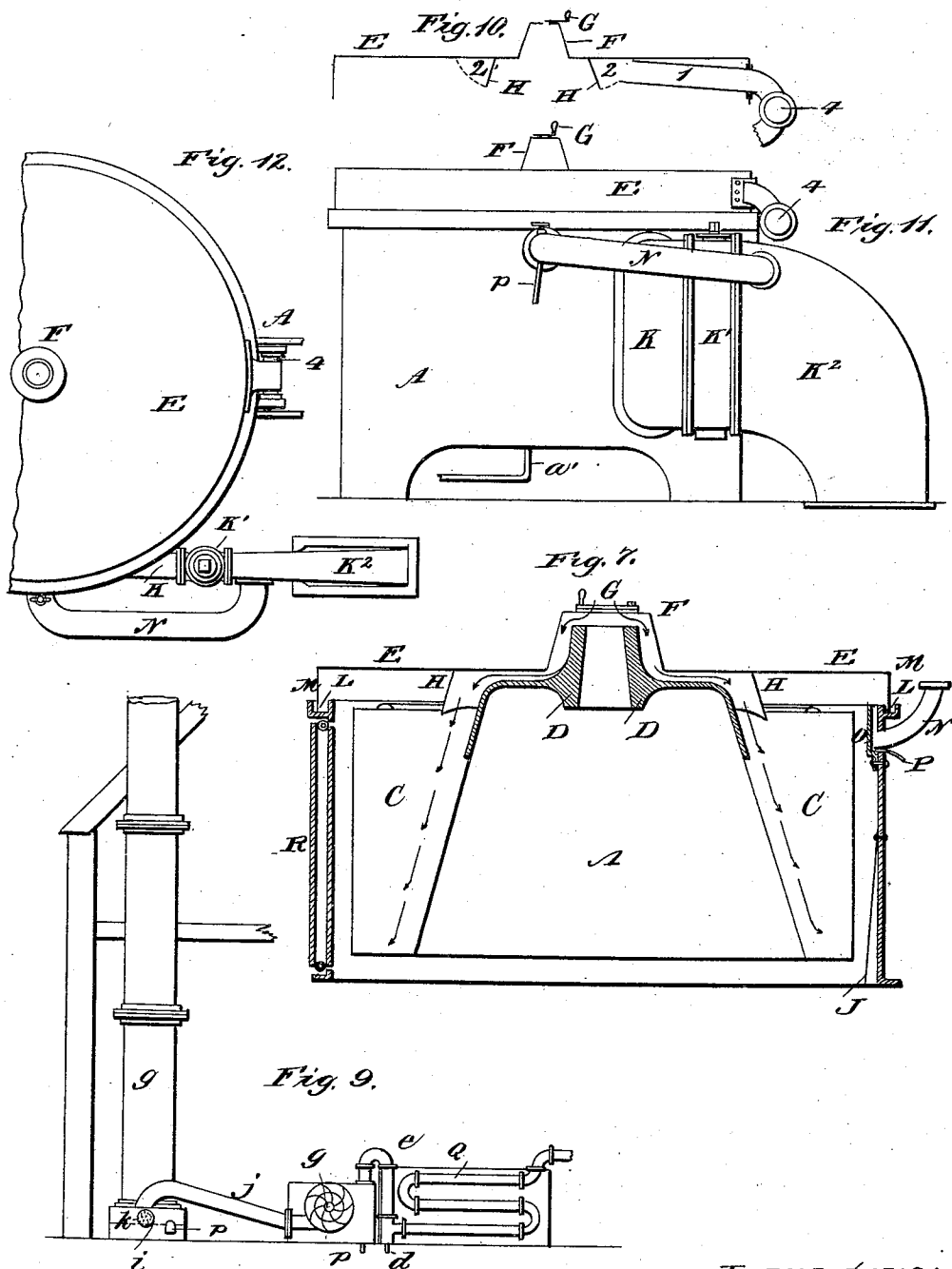
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Witnesses:

L. C. Hills.
Edwards

Inventors:
Geo. L. P. Eyre &
T. J. Hopkins
by Marshall Bailey
their Atty.

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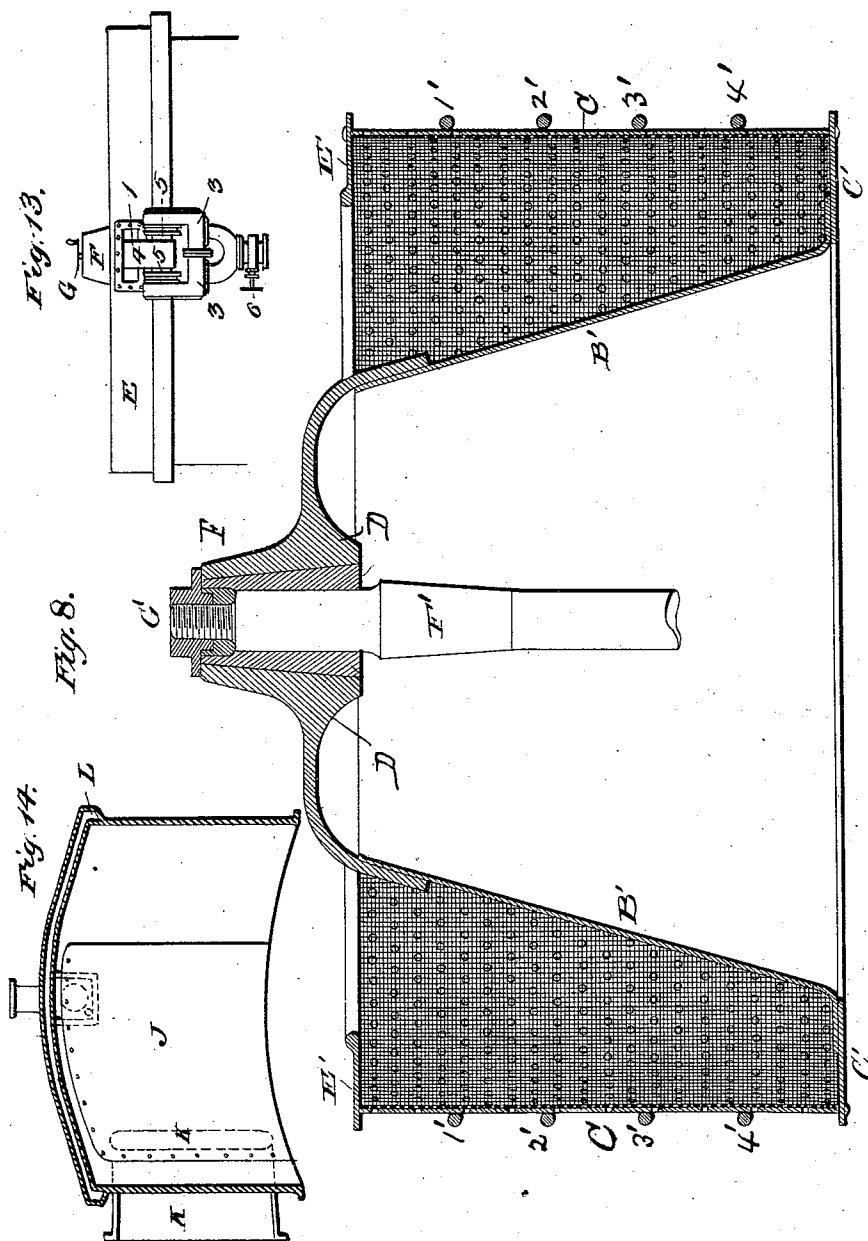
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Witnesses

L. C. Hills
E. L. Smith

Inventors:

G. L. P. Eyre
T. J. Hopkins
by Marshall Bailey
their Attorney

UNITED STATES PATENT OFFICE.

GEORGE L. P. EYRE, OF LONDON, AND THOMAS J. HOPKINS, OF TROW-BRIDGE, ENGLAND.

APPARATUS FOR TREATING WOOL OR LIKE SUBSTANCES.

SPECIFICATION forming part of Letters Patent No. 475,106, dated May 17, 1892.

Application filed December 10, 1889. Serial No. 333,297. (No model.) Patented in England December 27, 1888, No. 18,907.

To all whom it may concern:

Be it known that we, GEORGE LEWIS PHIPPS EYRE, solicitor, residing at 1 John Street, Bedford Row, London, in the county of Middlesex, England, and THOMAS JOHN HOPKINS, engineer, residing at Cradle Bridge Works, Trowbridge, in the county of Wilts, England, subjects of the Queen of Great Britain, have invented new and useful Improvements in Apparatus for Treating Wool and Like Substances, (for which we have obtained British Patent No. 18,907, dated December 27, 1888,) of which the following is a specification.

This invention relates principally to the extraction of oil and fat and oily and fatty matters from wool; but it is also equally applicable to the extraction of oily and fatty matters from woolen yarns or fabrics and such other fibrous material or mixtures of materials as are from their nature affected in color or quality, when known agents—such as bisulphide of carbon or similar solvents—are used for the purpose of extracting such oily and fatty matters, and are subsequently removed from the material under treatment by the slow process of admitting steam or using other means of raising the temperature to the respective boiling-points of such solvents and so driving them off by evaporation.

The object of this invention is to provide a suitable apparatus whereby oily and fatty matters may be extracted by the use of bisulphide of carbon or similar solvents of the greasy, oily, or fatty matters without employing heat and so causing injury to the materials operated upon, and by which process and apparatus the fatty matters and the solvent employed are removed from the materials under treatment, the solvent and the vapors given off therefrom being to as large an extent as practicable afterward recovered and used in subsequent operations, thus effecting great economy, while the noxious or poisonous vapors are prevented from escaping into the works or factory where the operation is carried on.

In order that our invention may be more fully understood and carried into practice, we will now proceed to describe the same with reference to the accompanying draw-

ings, in which similar letters and numerals are used to indicate corresponding parts in all the figures.

Figure 1 is a plan view showing the general arrangement of the different parts of an apparatus embodying our invention. Fig. 2 is a side view or elevation of the intermediate tank B. Fig. 3 is a vertical section through the tank *b*, taken on the line 3 3 of Fig. 1. Fig. 4 is an end elevation of the centrifugal machine or apparatus shown in top view in Fig. 1. Fig. 5 is an elevation, on a somewhat larger scale, of the centrifugal apparatus, showing the means for raising and lowering the cover thereof. Fig. 6 is a vertical section through the scrubber on the line *y y* of Fig. 1. Fig. 7 is a vertical sectional elevation of the centrifugal apparatus. Fig. 8 is a vertical section, enlarged, of the revolving casing or basket of the centrifugal apparatus. Fig. 9 is a sectional elevation on the line *x x* of Fig. 1 on an enlarged scale. Fig. 10 is a sectional elevation in outline of the cover of the centrifugal apparatus and through the supply-pipe 1. Fig. 11 is an end elevation of the centrifugal apparatus on an enlarged scale. Fig. 12 is a top plan view of Fig. 11. Fig. 13 is an elevation of the upper part of the centrifugal apparatus, showing the hinge of the cover thereof in front view. Fig. 14 is a sectional elevation of a part of the outer casing of the centrifugal apparatus.

The revolving cage or basket C of the centrifugal drying-machine is formed with a conical boss D, whereby it can be fixed upon the spindle F' in the well-known manner, and which spindle is rotated by any suitable motive power. The cover E of the centrifugal is made preferably of the shape shown in Fig. 7, the dome-shaped center F conforming to the shape of the boss D, so as to economize space and at the same time form a passage way for the air admitted into the machine for the final drying of the material under treatment.

L L is an annular trough around the top of the centrifugal-case for the reception of water, into which the rim M M of the cover is placed, forming the water seal.

In Figs. 10 to 13 are shown the means adopted for supplying a water spray or shower

to the material under treatment in the revolving centrifugal-basket while the machine is in motion. Fig. 10 is a sectional elevation of the cover of the machine, and shows the water-supply pipe 1 and the annular perforated spray-producer 2, the inner side of which forms the baffle H. In Figs. 5 and 13 is shown the hollow trunk 3 and the hollow trunnions and hinge 4. Fig. 13 is a front view of the spray arrangement, showing the gland and stuffing-boxes 5 5 for keeping the trunnions water-tight while acting as a hinge to the centrifugal-cover and the water-supply valve 6. The action of this part of the apparatus is as follows: By opening the valve 6 the water flows into the hollow trunk 3 and continues its course through the hollow trunnions 4, thence through the supply-pipe 1, Fig. 10, into the annular spray-producer 2, ultimately falling in a shower through the perforations in the annular spray-producer provided for that purpose. Fig. 5 also shows the friction-hoist for raising and lowering the cover E into and out of position. A suitable chain 7 is attached to the cover and passed over fixed pulleys 8, and its other end attached to a pulley 9, forming part of a friction-clutch 10, actuated by hand. A pulley 11 is rotated by an endless band 12, and the hoisting apparatus is brought into gear with the pulley 11 by means of the clutch 10.

G is the air-valve formed in the center of the dome F, and through which said valve the air passes into the interior of the cover through the passage-way between the boss D and the dome F, and is deflected by the annular baffle H, thus causing the air to pass down the inside of the reticulated or perforated cage or basket C—i. e., the side nearest the spindle—as indicated by the arrows in Fig. 7.

The basket or revolving part of the centrifugal machine is constructed as follows: In Fig. 8 the crown or dome D D is of cast-steel, to which is riveted the cone or body B' B'. To the bottom of this is riveted the sole-plate or bottom ring C' C', which is riveted to and supports the perforated cylinder C C. The upper rim of the cylinder is strengthened by the rim-plate E' E' and at suitable distances from top to bottom by the hoops or rings 1' 2' 3' 4'. The cylinder is also lined inside with wire-netting to prevent the escape of the material or materials under treatment through the perforations of the cylinder. The whole of the basket may be made of wrought iron or steel and preferably galvanized. The basket is mounted on the spindle F', and is secured thereto by the nut G'. The whole is underdriven by means of a pulley and belt or any suitable driving-gear. By reason of the centrifugal force developed by the rotating cage or basket the air will escape toward the circumference of the cage and will thoroughly permeate and effectually dry the material in the cage or basket C as it passes therethrough. The air thrown off from the circumference as the cage C rotates is led

by the collector-plate J, fixed upon the interior of the side of the centrifugal machine, through the outlet K (see Figs. 7 and 14 and 11 and 12) and direct to the condenser Q, or through the pipe T, intermediate tank B, and pipe c, as shown in Fig. 1. The outlet K extends nearly from the top to the bottom of the centrifugal and is closed or opened to the condenser Q by means of the stop cock or slide K' or any suitable valve communicating with the outlet-tank K², which is in connection with the intermediate tank B or with the condenser Q direct. The collector-plate is preferably a piece of thin sheet metal bent to the shape shown in Fig. 14 and fixed to the inside of the machine, as shown, and serves to draw the air down and through the material under treatment. The upper part of the centrifugal-case is provided with a displacement-pipe N, covered with a shield O, fixed on the inside of the centrifugal-case. A pipe P, leading from the bottom of the recess formed by the shield and discharging outside the case, is also provided. The agent employed is introduced at the bottom of the centrifugal-case A through the pipe a' from the reservoir A' and allowed to rise therein, percolating through the reticulated cage or basket and saturating the material under treatment until it fills the machine, the displaced air or vapor being driven off through the pipe N and led direct to the condenser Q, or through the pipe T and intermediate tank B and pipe c, as shown in Fig. 1. Any of the agent passing over the top of the shield O is carried off by the draining-pipe P and collected in a suitable receiver or led direct by other pipes to a reservoir, from whence it is pumped or otherwise passed into the still or into the pipe conveying the bulk of the agent from the centrifugal to the said reservoir. When the water is introduced for the purpose of cleansing the material, the action of this part of the apparatus is the same.

R is an ordinary sight-gage on the side of the centrifugal-case. To avoid complication, the pipes leading the agent out of the centrifugal machine, as also the pipes leading the water thereinto and the still for evaporating the agent led off from the bottom of the centrifugal after it has saturated the materials under treatment and separated or dissolved the oily or fatty matter contained therein, are not shown in the drawings, as they are of the ordinary construction and will be well understood without illustration. All the inlet and outlet pipes connected to the centrifugal machine are provided with suitable shut-off valves, which are manipulated according to the stage of the process.

In Figs. 1, 2, 3, 6, and 9 we have shown the means adopted for condensing the vaporized agent evolved during the process and passing off through the displacement-pipe N. The cleansing-water is run off from the centrifugal through the pipes S and T into the intermediate tank B, (see Figs. 1 and 2,) from

whence it passes through the pipe U into the catch-tank W. The bottom of this intermediate tank B is below the level of the pipe T, as shown in the elevation, Fig. 2, for the purpose of checking the rush of the water from the centrifugal and also to allow the agent to sink to the bottom, from whence it is carried into the catch-tank W by the pipe U before the water contained in the intermediate tank.

This pipe U discharges at the bottom of the said catch-tank, so that the contents of the intermediate tank will be deposited at the bottom of the catch-tank, the water, by reason of its less specific gravity, rising to the top. The overflow of water from the catch-tank may or may not be carried by the pipe *a* into the final tank *b*, fitted with any suitable number of vertical diaphragms or partitions *b'*, alternately open at the bottom and top, as shown in Fig. 3, and beneath and over which partitions the water passes and in so doing deposits the potash and other insoluble matters held in suspension and carried off with the cleansing-water from the wool or other material under treatment to be afterward dealt with.

The displaced air and vapor given off in the process is carried by the pipes N and T through the intermediate tank B, from whence it passes by the pipe *c*, turned up at right angles to the intermediate tank B, as shown in Fig. 2, into the condenser Q, which consists of ordinary sinuous or coiled tubes surrounded by water. A pipe *d* is connected to the end of the condensing-tubes for the purpose of carrying off the agent, which has been liquefied, and discharging the same into the bottom of the catch-tank W. The remaining vaporized agent is drawn through the branch pipe *e* into the tank or receptacle *f* by means of the exhausting-fan *g* (see Figs. 1 and 9) working therein. This fan is driven by a band passing over the pulley *o'* or by any suitable motor. The tank or receptacle *f* is provided with a pipe *h*, through which the liquefied agent passes into the catch-tank W. The remainder of the vaporized agent passes through the pipe *j* to the scrubber-tank *k*. The vapor is here met by a spray of cold water issuing through the nozzle at the end of the pipe *i*, taken from the Deane pump, as shown at *m* and *n*, Fig. 1 or this may be taken from any water-supply. The water and the liquefied vapor are then carried off by the pipe *p* to the catch-tank. The remaining uncondensed vapor, if any, is now allowed to pass by the uptake *q* above the roof of the building, a steam-jet *r* being provided, if necessary, to facilitate the discharge.

In operating our improved apparatus we place the material to be treated in the cage or basket of the centrifugal or in smaller cages or baskets placed therein, and the cover being adjusted carbon bisulphide or similar solvent (hereinbefore designated as the "agent") is admitted through suitable pipes leading into the top side or bottom of the outer case of the machine until the machine is filled,

the displaced air or other vapor being allowed to pass off by means of a suitable vent or displacement pipe. In its passage through or around the material the agent dissolves, separates, or removes the oily and fatty matters contained therein, and it is then allowed to run off through suitable pipes leading from the bottom of the outer case of the machine into a reservoir or tank. When the bulk has run off, the cage or basket is revolved so as to throw off from the material as much as possible of the oily and fatty matters and the agent mixed therewith, which runs into the aforementioned reservoir or tank, and from thence the resulting liquid is pumped into the tank A', situated above the centrifugal, to be used again in subsequent operations until supersaturated with such oily and fatty matters, when it is pumped into or otherwise passed into a still. Here heat is applied, preferably by a steam-coil pipe or steam-jacket, and the agent recovered by distillation by means of suitable distilling apparatus in the ordinary manner, leaving the oily and fatty matter in the still to be afterward dealt with. When the mixed agent and oily and fatty matters have run off from the centrifugal machine, water under pressure or otherwise is admitted into the machine in the same manner as the agent for the purpose of cleansing the material and of washing out any agent or mixed agent and oily and fatty matters which may remain in the material under treatment, and the resulting liquid is allowed to run off in an intermediate tank, where the agent falls by its gravity to the bottom and is carried off by a pipe into a final catch-tank. After this resulting liquid has run off the revolving basket is again set in motion, and then water is admitted to the inside of the centrifugal through the spray arrangement, which is fixed to the inside of the lid or cover for the purpose of aiding in the dispelling of any remaining agent from the material under treatment, and at the same time it condenses the vapor formed in the centrifugal while in motion, leaving the machine by the outlet, which is closed or opened by means of the stop-cock provided for that purpose on the side of the casing and communicating with the intermediate tank last aforesaid, and when the spray has been sufficiently applied it is turned off, and the revolving basket continues in action until the material is sufficiently dry. To assist this last operation, a fan or blower may be employed or other suitable means may be adopted for producing a current of air. During the process the displaced air and any vapor given off by the agent and the air used in drying are led by suitable pipes or tubes either through the intermediate tank last referred to or to a condensing apparatus, the uncondensed residue being drawn by a fan working within a tank or by an exhaustor to a scrubber or receptacle, into which a jet or spray of water is discharged, so as to throw down any remaining vaporized agent. The remainder of the

vapor being now practically free from the agent passes into an uptake or chimney, discharging into the open air above the building, the discharge being facilitated by a steam-jet or similar means, if found necessary. The condenser-fan and scrubber discharge the recovered agent into the catch-tank.

All the reservoirs or tanks used for the storage or reception of the agent are preferably constructed with manholes and hermetically-sealed covers, and each opens into a vent-pipe carried above the roof of the building to lead off the air displaced from the tanks by the entry of the agent therein.

As a further mode of recovering any of the agent which may be left in the wool or other material after it is removed from the centrifugal machine into the washing-machine, an automatic agent separator or trap is affixed to or communicates with the outlet-pipe of the washing-machine, so as to carry off the agent, which by its greater specific gravity separates itself from the water in its passage from the washing-machine. This trap consists of a pipe or casing with a longitudinal diaphragm from side to side for a part of its length, with an outlet-pipe above and below the diaphragm at one end and an inlet-pipe at the other end.

This invention and arrangement of mechanism or machinery herein described can also be applied to fabrics or other materials containing greasy matters for the purposes indicated, in combination with the employment of agents other than bisulphide of carbon, but having the same or analogous properties.

What we claim is—

1. In a machine or apparatus for the treating of wool and like substances, the combination of a centrifugal device consisting of a revolving perforated cage or basket, the surrounding casing having the outlet K, and the collecting-plate J for directing the air thrown off by the centrifugal action of the revolving cage or basket into such outlet, substantially as described.

2. In a machine or apparatus for the treating of wool and like substances, the combination, with a centrifugal device, of a casing therefor having a cover provided with a valved air-opening, a baffling-plate H, surrounding such opening, a spray-producing device arranged outside of and adjacent to the said baffling-plate, and a fluid-supply pipe leading to the said spray-producing device, substantially as described.

3. In a machine or apparatus for treating wool and the like, the combination, with a centrifugal device, of a casing surrounding it, a cover therefor, a hollow liquid-tight hinge for the cover, a liquid-supply pipe leading to this hinge, and a liquid-pipe leading from the hinge into the said casing, substantially as described.

4. In an apparatus for the treating of wool and the like with a solvent agent, the combination of a closed casing in which the wool is treated, an exit-pipe therefrom for the liquid with which the wool is treated, the intermediate tank B, into which the said exit-pipe enters above the level of its bottom to facilitate the settling therein of the agent, the pipe W, leading from the bottom of such tank, through which the settled agent may be drawn off, and another pipe c, leading from the upper portion of the said tank to a condensing apparatus, substantially as described.

G. L. P. EYRE.

THOMAS J. HOPKINS.

Witnesses to the signature of George Lewis Phipps Eyre:

AUSTIN CLARKE,

27 Liverpool Street, King's Cross, London, W. C.

GEORGE PERCY SKELSEY,

153 St. John Street Road, London.

Witnesses to the signature of Thomas John Hopkins:

W. WALBY,

Market House, Trowbridge, House Agent.

JOHN HENRY BATTS,

Trowbridge, Timber Dealer.