951,559.

J. H. DUNCAN.

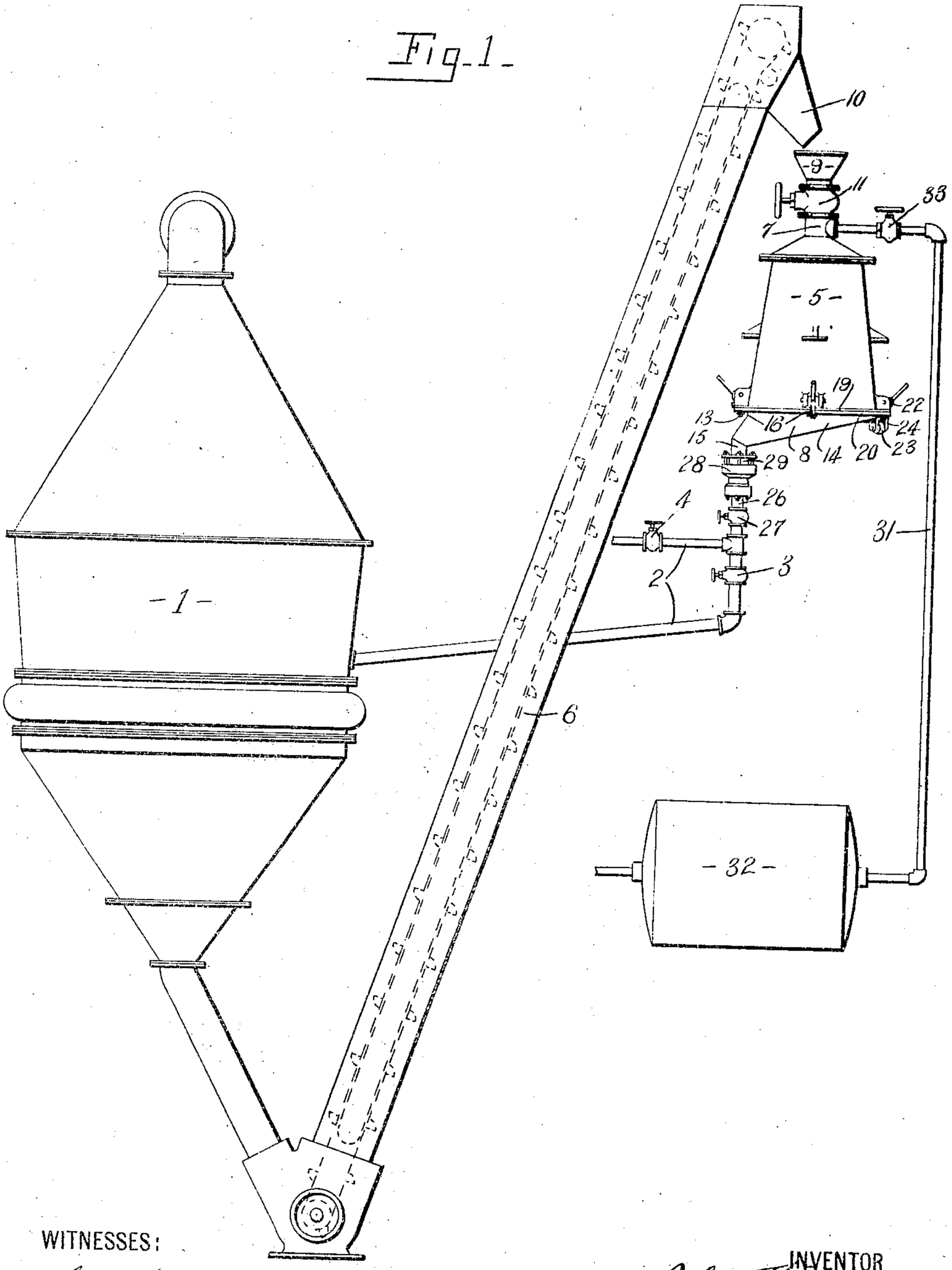
DRYING APPARATUS.

APPLICATION FILED AUG. 18, 1908.

Patented Mar. 8, 1910.

2 SHEETS—SHEET 1.

Fig. 1.



WITNESSES:

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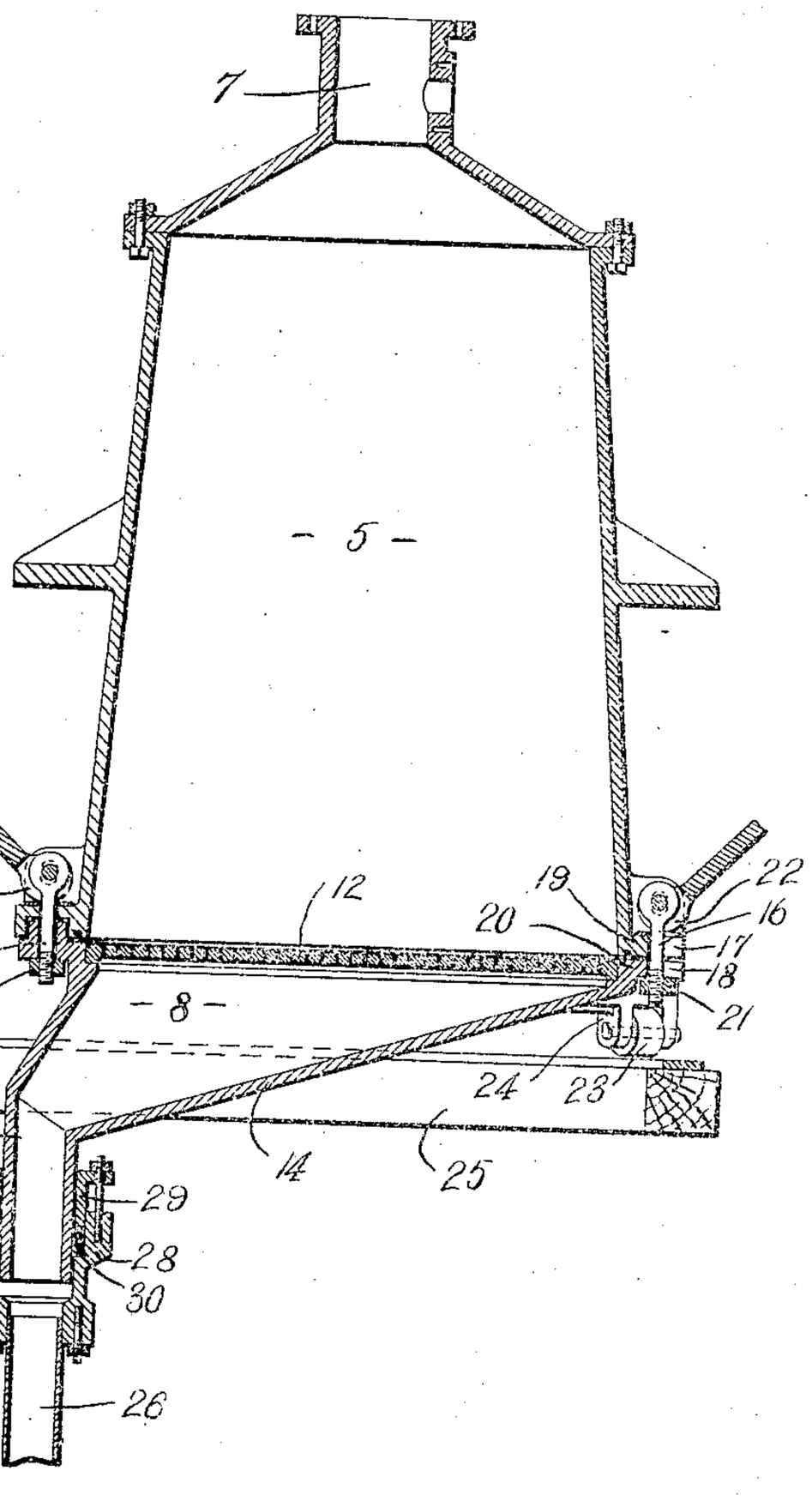
2 SHEETS—SHEET 2.

Fig-2-



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UNITED STATES PATENT OFFICE.

JOHN H. DUNCAN, OF ITHACA, NEW YORK.

DRYING APPARATUS.

951,559. Specification of Letters Patent. Patented Mar. 8, 1910.

Application filed August 18, 1908. Serial No. 449,026.

To all whom it may concern:

Be it known that I, JOHN H. DUNCAN, of Ithaca, in the county of Tompkins and State of New York, have invented a certain new and useful Drying Apparatus, of which the following is a specification.

My invention has for its object the production of a simple and efficient apparatus for drying precipitates, particularly applicable for drying salt; and it consists in the combinations and constructions hereinafter set forth and claimed.

In describing this invention, reference is had to the accompanying drawing in which like characters designate corresponding parts in all the views.

Figure 1 is an elevation of my apparatus, the supports for the vacuum pan, drying receptacle, and other parts being omitted. Fig. 2 is a vertical sectional view of the drying receptacle.

As illustrated, this apparatus for drying precipitates comprises a vacuum pan, and a drying receptacle for the precipitate, the drying receptacle being connected to the vacuum pan so that the saturated liquor is drawn from precipitate in the drying receptacle into the vacuum pan.

1 is a vacuum or evaporating pan in which the liquor to be evaporated, as brine, is placed.

2 is a pipe in which suction is produced, this pipe being connected to the pan 1 to normally produce a vacuum therein, and to a suction pump, not illustrated. Said pipe 2 is provided with valves 3 and 4 spaced apart along the pipe, and is connected to the drying receptacle hereinafter described. The vacuum or evaporating pan 1 may be supported in any suitable manner and may be of any desirable form, size and construction, and as the construction of said pan and its support forms no part of this invention, further description or illustration thereof is deemed unnecessary.

5 is a drying receptacle for the material, as salt crystals, precipitated in the pan 1, and 6 is means for conveying the precipitate from the pan 1 to the drying receptacle. The conveying means 6 may be of any desirable form, size and construction.

The drying receptacle 5 is supported in any suitable manner, is preferably bell-shaped or larger at its lower end than at its upper, and is formed with a neck 7 at its top and with a movable bottom 8. Said neck 7 is provided with a hopper 9, arranged beneath the exit 10 of the conveying means, and with a valve 11. Said receptacle is also provided with a substantially horizontal perforated partition 12. As shown this partition 12 is carried by the movable bottom 8 in order that when the bottom is moved out of its normal position, the partition will also be carried therewith, for permitting the salt or other precipitate to be removed from the receptacle.

The movable bottom 8 swings laterally out of its normal position on an upright pivot 13, the axis of which is located outside of, or eccentric to, the receptacle 5, and said bottom is formed with downwardly-converging walls 14 arranged below and spaced apart from the partition 12 and with an outlet 15 at the lowest portion thereof, the axis of the outlet being substantially coincident with the axis of the pivot 13. Said bottom is held in its closed position by fastening members or clamps 16, each of which is extended vertically through alined cut-outs 17, 18 formed, respectively, in an outwardly-extending flange 19 at the lower end of the major part of the receptacle 5 and in the margin 20 of the movable bottom, each fastening member 16 having a shoulder as a nut 21 at its lower end, which engages the lower face of the margin 20 of the bottom 8, and each member 16 being connected at its upper end to a cam 22 which bears on the upper face of the flange 19 and which operates to move said member 16 endwise. The pivot 13 is also provided with a nut 21 at its lower end and with a cam 22 at its upper end. The bottom is also provided with rollers 23 which are carried by brackets 24 and which engage an arc-shaped track 25 when the bottom is moving into or out of its normal position this track 25 being concentric with the pivot 13. The outlet 15 of the bottom is connected to the vacuum pan 1 in order that the saturated liquor in the receptacle may be drawn through the perforated partition 12 and returned to the vacuum pan 1 by the vacuum in said pan; and as here illustrated, said outlet 15 is connected by a pipe 26 to the suction pipe 2, between the valves 3 and 4 in the suction pipe, this outlet pipe 26 being provided with a valve 27. The joint between the outlet 15 and the outlet pipe 26 is of such construction as to permit the outlet 15 to turn or swivel in the outlet pipe 26, and as shown the out-

let 15 extends into the enlarged end 28 of said outlet pipe 26 and a gland 29 and a bushing 30 is located between the outlet 15 and the inner face of said outlet pipe. Means as a pipe 31, which is connected to a compressor tank 32, is provided, for conducting a drying fluid, as compressed air, to the receptacle 5, said pipe being provided with a valve 33 for controlling the flow of air therethrough, and being connected to the drying receptacle 5 at the top thereof.

In operation, when the receptacle 5 is being filled with the precipitate, the valves 3 and 4 in the suction pipe are opened in order that a vacuum may be maintained in the evaporating pan 1, the valve 11 in the neck 7 of the receptacle 5 is opened, and the valves 27 and 33 located, respectively, in the outlet pipe 26 of the receptacle 5 and in the compressed air pipe 31, are closed. When the receptacle 5 is filled, the valve 11 is partly closed, the valve 27 in the outlet pipe 26 is opened, the valve 3 in the suction pipe 2 between the vacuum pan and the outlet pipe 26 is left open, and the valve 4 in the suction pipe 2 is closed, thereby permitting the moisture and saturated liquor to be drawn from the drying receptacle 5 into the vacuum pan 1 by the vacuum in said pan. The saturated liquor having been drawn off from the receptacle 5, the valve 27 in the outlet pipe 26 remains open, the valve 3 and the valve 11 are closed, and the valves 4 and 33 located, respectively, in the suction pipe 2 between the outlet pipe 27 and the vacuum pump, and in the compressed air pipe 31, are opened, so that compressed air, which usually has been previously heated, passes into the receptacle 5 and through the precipitate therein, thus drying the precipitate, and then passes out of the receptacle 5, through the outlet pipe 26, to the vacuum pump. After the drying operation is completed, the movable bottom is swung laterally and the dry precipitate is dumped into carts or other conveyers.

My apparatus is particularly advantageous in that the saturated liquor is returned to the vacuum pan directly from the drying receptacle, and further in that the salt or precipitate can be dried and prepared for shipment, much more quickly and economically than by methods heretofore in use.

What I claim is:—

1. The combination of a vacuum pan, a pipe in which suction is produced, connected to said pan for creating a vacuum therein, a valve in said pipe, a drying receptacle for the material precipitated in said pan, means for conveying the precipitate from the vacuum pan to the drying receptacle, and an outlet pipe for the liquor drawn from the precipitate in the receptacle, said outlet pipe connecting the drying receptacle and the suction pipe, and communicating with the suction pipe at a point between said vacuum pan and said valve, substantially as and for the purpose set forth.

2. The combination of a vacuum pan, a drying receptacle for the material precipitated in said pan, said receptacle having an outlet, means for conveying the precipitate from the vacuum pan to the drying receptacle, and means for conducting a drying fluid to the receptacle, substantially as and for the purpose described.

3. The combination of a vacuum pan, a pipe in which suction is produced, connected to said pan, a drying receptacle for the material precipitated in said pan, means for conveying the precipitate from the vacuum pan to the drying receptacle, an outlet pipe for the liquor drawn from the precipitate in the receptacle, said outlet pipe connecting the drying receptacle and the suction pipe, and means for conducting a drying fluid to the receptacle, substantially as and for the purpose set forth.

4. The combination of a vacuum pan, a pipe in which suction is produced, connected to said pan for creating a vacuum therein, a valve in said pipe, a drying receptacle for the material precipitated in said pan, means for conveying the precipitate from the vacuum pan to the drying receptacle, an outlet pipe for the liquor drawn from the precipitate in the receptacle, said outlet pipe connecting the drying receptacle and the suction pipe, and communicating with the suction pipe at a point between said vacuum pan and said valve, and means for conducting a drying fluid to the receptacle, substantially as and for the purpose specified.

5. The combination of a vacuum pan, a pipe in which suction is produced, connected to said pan for creating a vacuum therein, valves in said pipe, the valves being spaced apart, a drying receptacle for the material precipitated in said pan, means for conveying the precipitate from the vacuum pan to the drying receptacle, an outlet pipe for the liquor drawn from the precipitate in the receptacle, said outlet pipe connecting the drying receptacle and the suction pipe, and communicating with the suction pipe at a point between the valves, and means for conducting a drying fluid to the receptacle, substantially as and for the purpose described.

6. The combination of a vacuum pan, a pipe in which suction is produced, connected to said pan for creating a vacuum therein, valves in said pipe, the valves being spaced apart, a drying receptacle for the material precipitated in said pan, means for conveying the precipitate from the vacuum pan to the drying receptacle, an outlet pipe for the liquor drawn from the precipitate in the receptacle, said outlet pipe connecting

the drying receptacle and the suction pipe, and communicating with the suction pipe at a point between the valves, a valve in the outlet pipe, and means for conducting a drying fluid to the receptacle, substantially as and for the purpose set forth.

7. In an apparatus for drying precipitates, a drying receptacle having an outlet for the liquor drawn from the precipitate therein, a pipe in which suction is produced, connected to the outlet of the receptacle, and means for conducting a drying fluid to the receptacle, substantially as and for the purpose set forth.

8. In an apparatus for drying precipitates, a drying receptacle having a perforated partition, an outlet at one side of the partition, a pipe in which suction is produced, connected to the outlet, and means for conducting a drying fluid to the receptacle, said means communicating with the receptacle at the other side of the partition, substantially as and for the purpose specified.

9. A drying receptacle for precipitates, having a movable bottom formed with downwardly-converging walls, and also having a vertical upright outlet at the lowest portion of said wall, and a perforated partition carried by the bottom and spaced apart from the converging walls, substantially as and for the purpose described.

10. A drying receptacle for precipitates, having a bottom movable laterally out of its normal position about an upright axis located eccentric to the receptacle, and said bottom being formed with an outlet having its axis arranged substantially coincident with the axis of said bottom, substantially as and for the purpose set forth.

11. A drying receptacle for precipitates, having a bottom movable laterally into and out of its normal position, about an upright axis located eccentric to the receptacle, said bottom being formed with downwardly-converging walls, and with a vertical upright outlet at the lowest portion of said walls, the outlet having its axis arranged substantially coincident with the axis of the bottom, substantially as and for the purpose specified.

12. The combination of a vacuum pan, a pipe in which suction is produced, connected to said pan, valves in said pipe, the valves being spaced apart, a drying receptacle for the material precipitated in said pan, said receptacle having an inlet at its top, a movable bottom having an outlet, and a perforated partition arranged between said inlet and said outlet, a valve in said inlet, means for conveying the precipitate from the vacuum pan to the inlet of the receptacle, an outlet pipe connecting the outlet in the bottom of the receptacle and the suction pipe, and communicating with the suction pipe at a point between the valves in said suction pipe, a valve in the outlet pipe, and means for conducting compressed air to the drying receptacle, said means communicating with the receptacle above the perforated partition, substantially as and for the purpose described.

In testimony whereof, I have hereunto signed my name in the presence of two attesting witnesses, at Ithaca, in the county of Tompkins, in the State of New York, this 29th day of February, 1908.

JOHN H. DUNCAN.

Witnesses:
CLARENCE D. TARBELL,
GEO. S. TARBELL.