(No Model.)

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CARBURETOR.

No. 262,991. Patented Aug. 22, 1882.

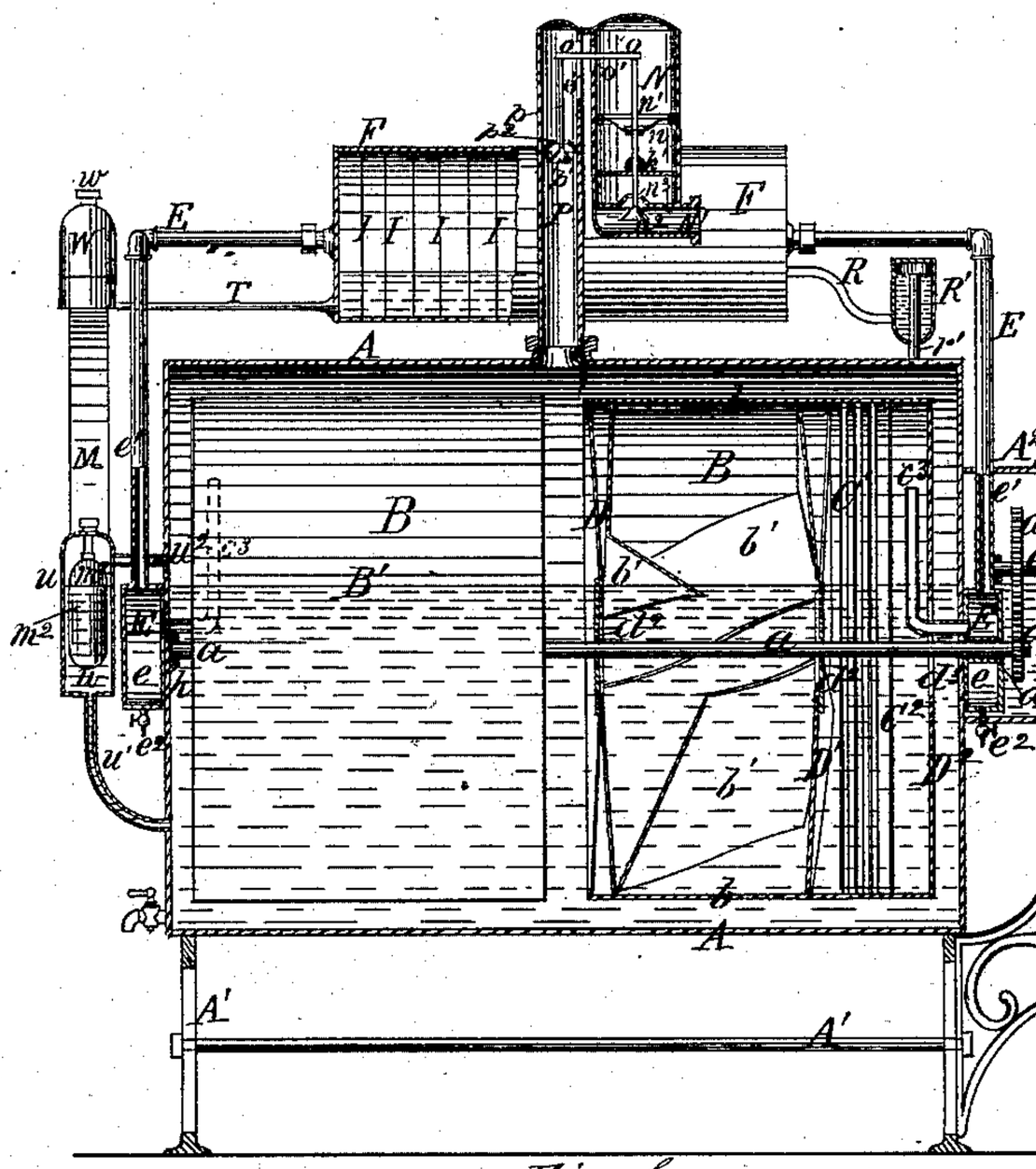

Fig. 1.

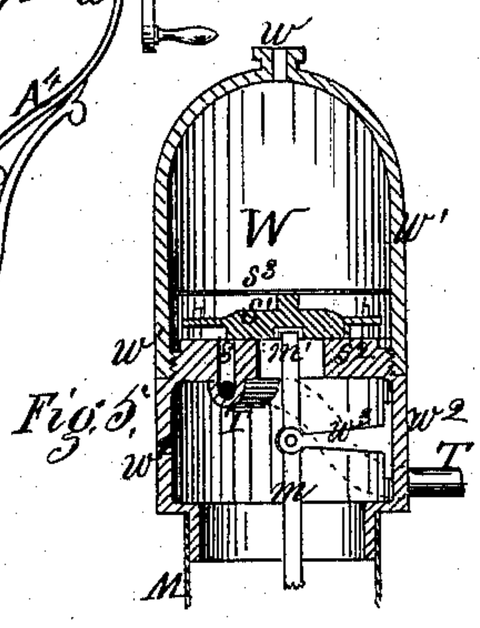

Fig. 5.

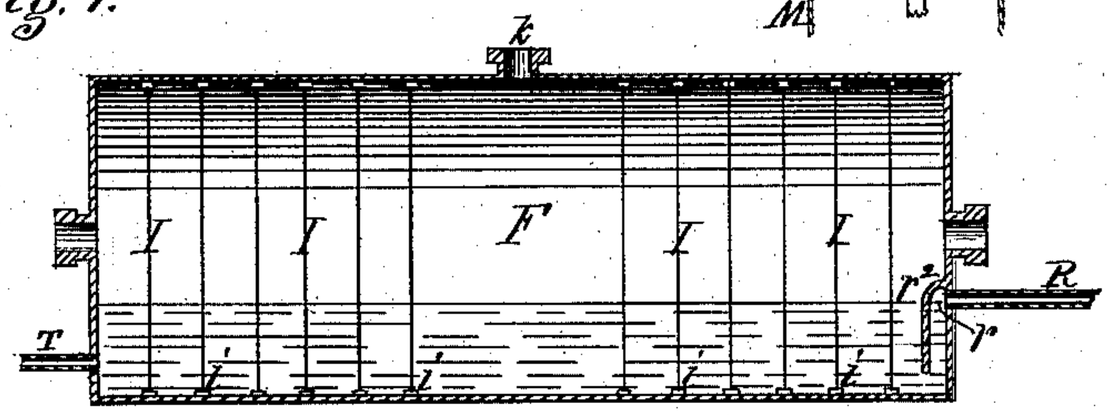

Fig. 4.

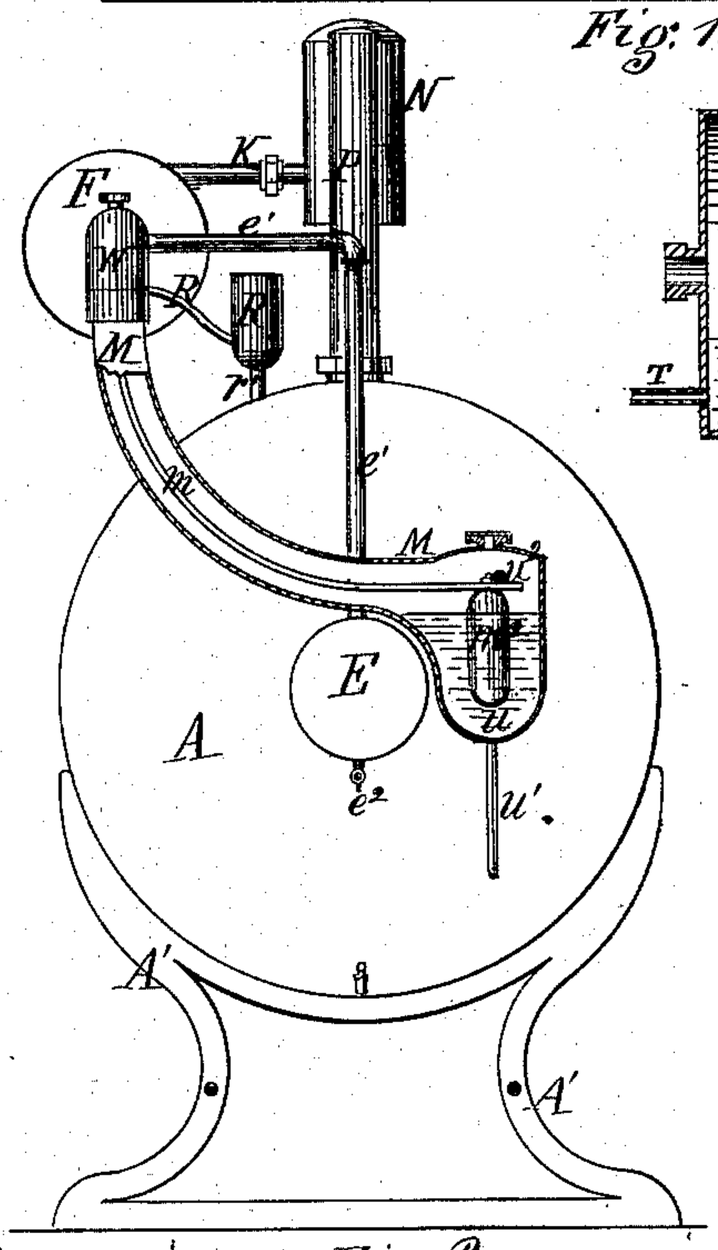

Fig. 2.

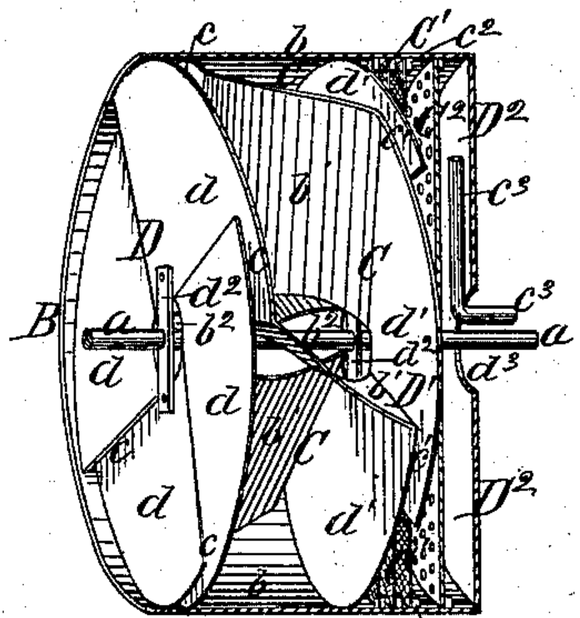

Fig. 3.

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CARBURETOR.

SPECIFICATION forming part of Letters Patent No. 262,991, dated August 22, 1882.

Application filed January 9, 1882. (No model.)

To all whom it may concern:

Be it known that we, ROLAND H. SMITH, JOSHUA GOLDTHORP, and WILLIAM J. FAWCETT, all of Pittsburg, county of Allegheny, State of Pennsylvania, have invented or discovered a new and useful Improvement in Carburetors; and we do hereby declare the following to be a full, clear, concise, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—like letters indicating like parts—

Figure 1 is a longitudinal vertical sectional view of our improved carburetor. Fig. 2 is a rear end view in elevation. Fig. 3 is a perspective view, partly in section, of one of the inner drums. Fig. 4 is a vertical sectional view to an enlarged scale of the recarburetor or upper carbureting-chamber; and Fig. 5 is a vertical sectional view to an enlarged scale of the valve device for regulating supply of hydrocarbon material or gasoline.

Our invention relates to apparatus for carbureting air for illuminating purposes and supplying the same for use under pressure; and it consists in certain combinations of carbureting-chambers with apparatus for producing pressure therein and devices for regulating automatically the supply of hydrocarbon material, and also supply and discharge of air, as hereinafter described and claimed.

In the drawings, A represents a carbureting-chamber, by preference cylindrical in form, made of any suitable sheet metal and supported by any convenient frame or foundation A′. Within this chamber is journaled a shaft, *a*, on which are secured two rotary drums, B B, similar in construction, and arranged on the shaft with a little space between their adjacent ends. In Fig. 1 we have shown one of these drums in elevation and one in vertical section, and in Fig. 3 one is shown by a perspective view, the outer shell, *b*, being in section in order to expose the interior. These drums are employed to produce air-pressure within the apparatus, and their construction is somewhat similar to the drums in rotary meters. Each drum is inclosed by a cylindrical shell, *b*, and heads or disks D D′ D². The heads D D′ are constructed somewhat like the cutting-blades of an earth-auger, consisting of separate segments *d* or *d′*, which are slightly spiral in position or inclined to a plane at right angles to the axis, and are overlapped, as illustrated in Fig. 3, thus producing wedge-shaped openings *c* and *c′* between the segments for entrance and discharge of air. The interior of the drums is divided radially by plates *b′* into separate chambers C. These plates *b′* have a spiral form and inclination around the shaft *a*, extending from the rear edge of one segment, *d*, to the forward edge of the next succeeding segment, *d′*, in the opposite end or head. We have shown four segments in each head and four spiral division-plates, thus dividing each drum radially into four separate chambers. This number is not material, however, as it may be increased or diminished at pleasure. The drums are secured on the shaft by straps *d*², which are soldered or otherwise fastened to the segments of the heads D D′ and perforated in the axial line of the drums to receive the shaft *a*. The center or core *b*² of the drums is open for free passage of hydrocarbon liquid, which is supplied as hereinafter described and maintained at sufficient height in chamber A to cover such core or central passage. The level at or about which we prefer to maintain the liquid in this chamber is represented by the letter B′, Fig. 1. The inclosed space above the liquid is occupied by air, supplied as presently described. The two drums are constructed substantially alike, except that they are made as rights and lefts, having inlet-openings *c* at the forward angle of chambers C and outlet-openings *c′* at the following or rear angle diagonally opposite the inlet, thus taking air at their adjacent ends and passing it in opposite directions toward the ends of the main chamber A. These drums are also secured on the shaft in such relationship that they take air alternately and discharge it alternately—that is, the openings *c c′* in one drum alternate with or divide the spaces between the openings *c c′* in the other drum. By this means a constant pressure is maintained in the service-pipe, one or the other of the drums being operative at all times in maintaining such pressure. Assuming these drums, in operation, to be rotated over from right to left, air will enter the openings *c* between the

segments *d*, filling the chambers C above the liquid. As the rotary movement continues the entrance-passage *c* will be closed or sealed by dipping under the surface of the liquid, and the inclosed air will be passed over the surface of the liquid and forced out of the succeeding openings *c'*.

The shells *b* extend beyond the heads D', their outer ends being closed by disks or heads D^2, the central openings, d^3, of which are below the surface of liquid. Also, transversely across the drums, between heads D' and D^2, are stretched one, two, or more cloths, C', of cotton or other fabric or porous material, adapted to retain or become saturated with the liquid, and in such condition to permit passage of air under pressure as it is discharged from openings *c'*. As the air is thus passed over the liquid and through the cloths it becomes charged (more or less) with inflammable vapors. For convenience in securing the cloths C' in place, they are stretched on hoops c^2, which fit closely in the interior of shells *b*. By causing the air-supply to pass through the saturated cloths instead of over or around them its entire body is exposed uniformly to the liquid, and in the finely-divided condition required for passing through the cloths it takes up a large and uniform quantity of vapor. The pressure imposed by the drums is an important factor in this connection, as it insures the passage of the air through the cloths to effect such carburation. Outside these cloths are secured guards or perforated plates C^2, one in each drum, to prevent the cloths under the pressure to which they are exposed from covering and choking the escape-pipes, and between these plates and the heads or disks D^2 are downtake escape-pipes C^3, which, passing under the surface of the liquid through openings d^3, discharge the carbureted air outside the chamber A into dry-wells E, one at either end of the apparatus. These wells consist of an enlarged end or box, *e*, extending below the mouth of pipes c^3, and an uptake-pipe, *e'*, leading to an upper recarbureting-chamber, F. The degree of pressure imparted to the carbureted air by the rotary drums B B depends in part upon the rate of use compared with the capacity for supply and in part upon the effective power applied to rotate the drums. Rotary power is applied as follows:

One end of shaft *a* is carried through the well *e* into an inclosed gear-box, A^2, a tubular passage, *a'*, being made through the well, as in Fig. 1, to prevent liquid from entering the well. A pinion, a^2, on the extended end of the shaft gears with a larger wheel, a^3, on shaft a^4. The position of shaft a^4 is above the level of liquid, and it is journaled in the walls of the box in any convenient way. One end is extended outside the box and packed in any suitable way, as indicated at a^5, to prevent accidental escape of liquid or vapor. The extended end of this shaft enters a socket, a^6, in the end of a spool or drum, A^3, the shaft a^7 of which is journaled on bracket A^4. A ratchet, *v*, fixed on shaft a^4, and pawl *v'*, pivoted to the upper bar of the bracket, prevent backward motion of the gear as the cord a^8 is wound on the spool by crank A^5. Also, a ratchet, v^2, secured to the inner face or end of the spool, and a spring-pawl, v^3, pivoted to the adjacent face of ratchet-wheel *v*, communicate motion from the spool to the gear as the cord is unwound. The cord is passed over the usual pulleys used in such apparatus, and carries at its end a counter-weight sufficient in heft to impart the desired degree of rotary power to the drum. The rate at which the weight will run down and the drums B be rotated will depend upon the rate of consumption of carbureted air, and the pressure of carbureted air in the apparatus will depend upon the rate of use and the effective power of the weight. These elements may readily be adjusted by any skilled mechanic, so as to secure the desired pressure in the service-pipe.

As carbureted air enters the dry-wells E under pressure it rises through pipes *e'* and enters chamber F. In this vertical movement free liquid, which may be carried out of chamber A, will settle to the bottom *e*, from which it may be drained by cocks e^2. Across the chamber F is stretched a number of cloths, I, using hoops *i*, on which the cloths are tacked. This chamber is also partially filled with hydrocarbon liquid, so that the cloths become saturated therewith. The carbureted air, entering at the ends, passes through these saturated cloths, and thereby becomes fully charged with the vapors of the liquid.

If desired, the cloths I may be mounted by any suitable frame-work either transversely on or more or less spirally around a shaft passing through the longitudinal axis of the chamber, and rotary motion be given them by belting from this shaft to the shaft a^4. Ordinarily, however, stationary cloths, as shown, will answer every purpose; but in order to secure the best results we prefer to use quite a number of such cloths, arranged at a little distance apart, as shown in Fig. 4.

At or near the center of chamber F is a discharge-port, *k*, Fig. 4, leading by pipe K, Fig. 2, to a governor or regulator, N. Across the case of this regulator, above the inlet *k'*, is secured a diaphragm, *n*, in the center of which is fixed a vertical stem, *n'*, having a valve, n^2, on its lower end, adapted by upward movement of the diaphragm and stem to close the port in seat n^3, and thus arrest passage of carbureted air to service-pipe N', which latter leads off from the bottom of the regulator. The valve is held open by the weight of the valve and stem; or, if this is not sufficient, the stem may be loaded by additional weights, as desired. If pressure of carbureted air or gas below the diaphragm exceeds such weight, the diaphragm will be raised and the port n^3 wholly or partially closed, thus preventing pressure in the service-pipe from rising above a pre-

determined or normal degree. This same governor is also made to regulate the air-supply to the chamber A, as follows: A bar, *o*, fixed rigidly to the upper end of stem *n'*, projects through slotted openings *o' o'* into the vertical air-inlet pipe P. In the end of bar *o*, within pipe P, is fixed a vertical stem, *p*, carrying a valve, *p'*, which, by the movement of diaphragm *n*, opens and closes air-passage through port p^2. Thus a tendency to excess of pressure in the service-pipe is counteracted not only by diminishing the flow of carbureted air, but also the supply of fresh air to chamber A is diminished accordingly, and an equilibrium of air-supply is maintained through the whole apparatus.

In order to provide a self-regulating device for supplying hydrocarbon liquid to both chambers A and F, we supply chamber A from chamber F by a pipe, R, leading from F at a point, *r*, corresponding to the desired height of liquid therein. The port *r* is by preference guarded by a shield, r^2, extending downward into the liquid. (See Fig. 4.) The pipe R opens into a trap or bowl, R', from which a pipe, *r'*, leads to chamber A. In order to prevent a siphon action in this pipe-connection, the pipe *r'* is carried up into the bowl, as in Fig. 1, so that its upper open end may be on a level with the port *r*.

Chamber F is supplied through a pipe, T, leading to an elevated tank or other source, affording sufficient pressure to overcome the carbureted-air pressure in the chamber. In order to regulate such supply we pass it by port *w* into a valve chamber or case, W, and thence through a valve-governed port, *s*, to pipe T and chamber F. We prefer to make use of a slide-valve, *s'*, to open and close the port *s*, the seat s^2 of which is raised, (see Fig. 5,) so that it may easily be "ground in" to refit the valve when worn. The cap *w'* of this chamber is screwed to the periphery of seat s^2, and the seat is cast integral with the lower rim, w^2. By unscrewing the cap *w'* access may be had readily to the valve, when desired. The valve is held to its seat by a stop-spring, s^3, secured to the inner walls of the cap, and motion is given the valve to open and close the port by a bent lever, *m*, pivoted to post w^3. The upper end of this lever passes through the valve-seat and enters a recess, *m'*, in the face of the valve.

Below the valve-case the lever is inclosed in a case, M, which extends downward in a curved direction corresponding to the curve of the lever. The lower end of this case is enlarged into a chamber, *u*, which is supplied with liquid from chamber A by pipe *u'*. A float, m^2, attached to the lower end of the lever, rests in the liquid in chamber *u*.

As liquid in chambers A and *u* rises above a certain level (the normal height) the valve-port *s* will be wholly or partially closed and the supply to chambers F and A be reduced or arrested. As liquid is exhausted from chambers A and *u* the float falls and the supply-port *s* is opened. In order to insure such downward movement of the float and preserve an equilibrium of pressure thereon, communication is afforded by pipe u^2 from case M to chamber A above the level of liquid. By preference this pipe opens into case M directly over the lever, near its lower end. (See Fig. 2.)

The manner of operating this apparatus will be understood from the above description. Very little attention is required in use, the principal work being to provide in the feed-reservoir a supply of gasoline or hydrocarbon liquid such as is ordinarily employed for kindred purposes, and to wind up the weight when necessary.

It is obvious that if a sufficient number of cloths C' be used in drums B B the air may be sufficiently charged with vapor therein and the chamber F be used wholly or principally as a gas-holder, or may even be omitted altogether; or, on the other hand, chamber A may be filled to or about the level B' with water, the cloths C' be omitted, and the chamber and drums B B be employed for supplying pure air under pressure to carbureting-chamber F; also, various modifications may be made in the details of the apparatus without departing from our invention. For example, instead of perforated plates C^2, wire or lattice guards may be employed, the principal object being to prevent the adjacent cloths, when saturated and stretched, from being carried over the mouth of pipes c^3 by the air-pressure; also, other forms of divisions *f'* and openings *c c'* in drums B may be employed, such that the drums may take air from the interior of chamber A at the forward angle and discharge it under pressure outside of chamber A from the rear or following angle.

Instead of making open communication around shaft *a* from chamber A to gear-box A^2, the shaft-passage through A may be packed in any convenient way, and in such case the gear-box may be omitted; but for convenience of construction we prefer the form shown. The opposite end of shaft *a* may be journaled in any suitable bearing, *h*; also, one drum, B, may be used in chamber A instead of two, as shown; but in such case we prefer to make it larger and with more chambers C.

We claim herein as our invention—

1. The combination of chamber A, two inclosed rotary drums, B, having closed outer ends, D^2, spirally-divided chambers C in their adjacent ends, with inlets *c c* and outlets *c' c'* to such chambers, which are arranged in succession or alternate in the two drums, cloths C', stretched transversely across the passage through the drums between chambers C and ends D^2, pipes c^3 and E, and common reservoir F, substantially as set forth, whereby uniform pressure and supply of carbureted air is maintained in the reservoir.

2. The combination of chamber A, interior rotary drum, B, having spirally-divided cham-

bers C in one end, with openings *c c'* for inlet and outlet to the chambers, as described, a disk, D^2, for seating the opposite end of the drum, one or more cloths, C', mounted transversely across the drum between chambers C and end D^2, outlet-pipe c^3, adjacent to end D^2, and guard C^2, between the cloths and outlet-pipe, substantially as and for the purposes set forth.

3. A rotary drum, B, having one sealed end, D^2, and spirally-divided chambers C in the other end, with inlet-openings *c* in the outer end of such chambers at their forward angle and outlet-openings *c'* in the inner end of such chambers at their following angle, in combination with one or more cloths, C', stretched across the drum between chambers C and end D^2, outlet-pipe c^3, surrounding chamber A, shaft *a*, and power mechanism outside of chamber A for rotating the drum, substantially as described, whereby air is taken from chamber A, forced under pressure through the cloths, and discharged outside chamber A.

In testimony whereof we have hereunto set our hands.

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