

A. F. DOREMUS.
CENTRIFUGAL DRYING MACHINE.

No. 430,632

Patented June 24, 1890.

Fig. 1.

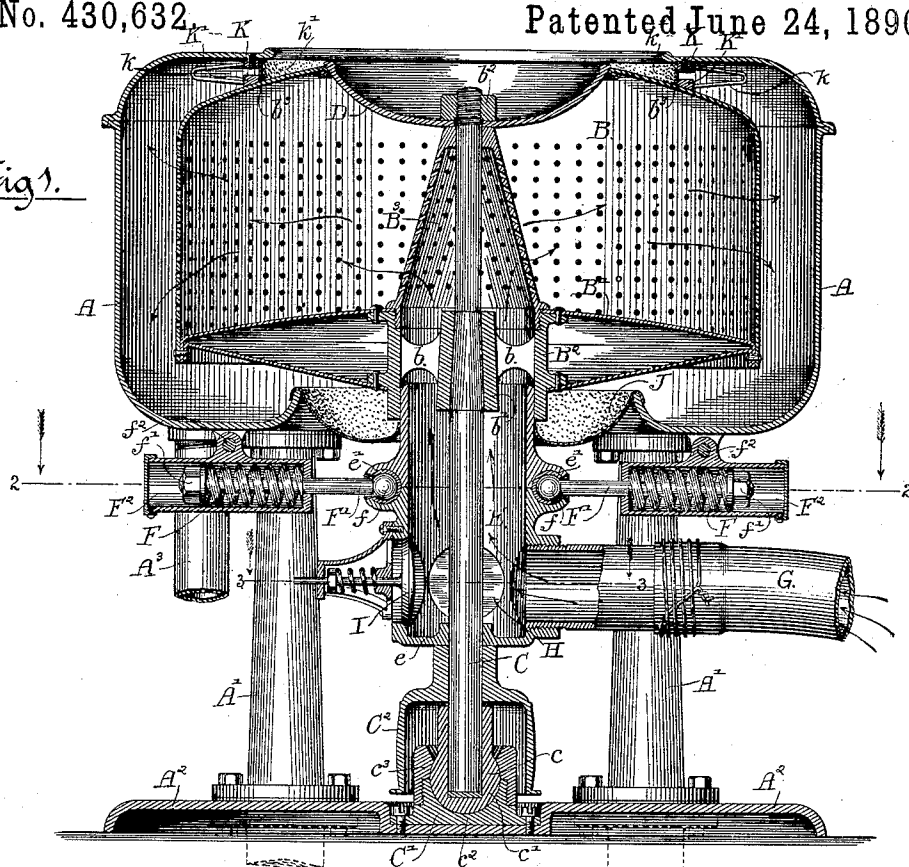


Fig. 2.

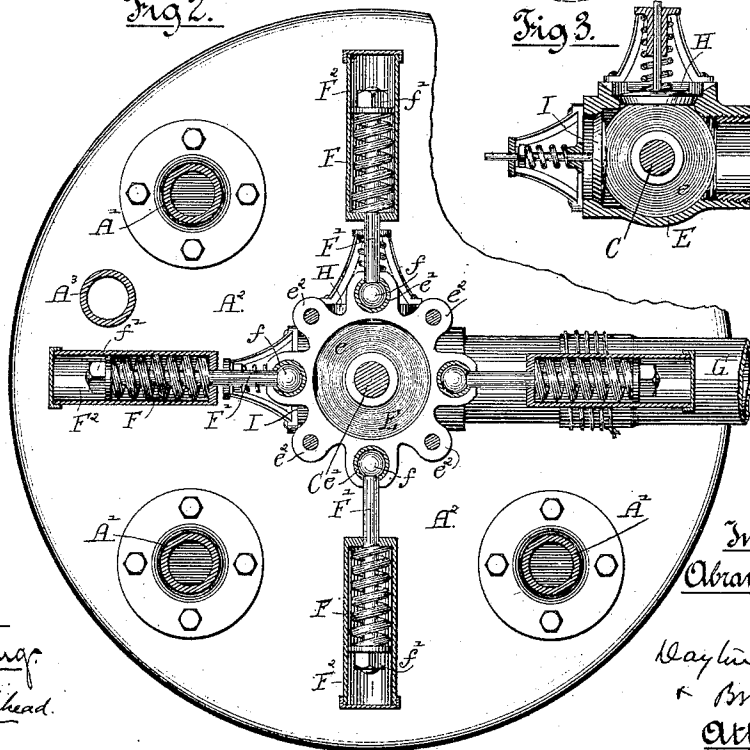
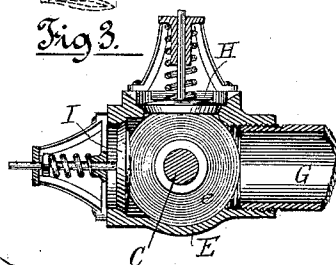


Fig. 3.



Witnesses

Wm. J. Hemming
Louis H. Whithead.

Inventor
Abram F. Doremus
by
Waylin. Poole
& Brown
Attorneys.

(No Model.)

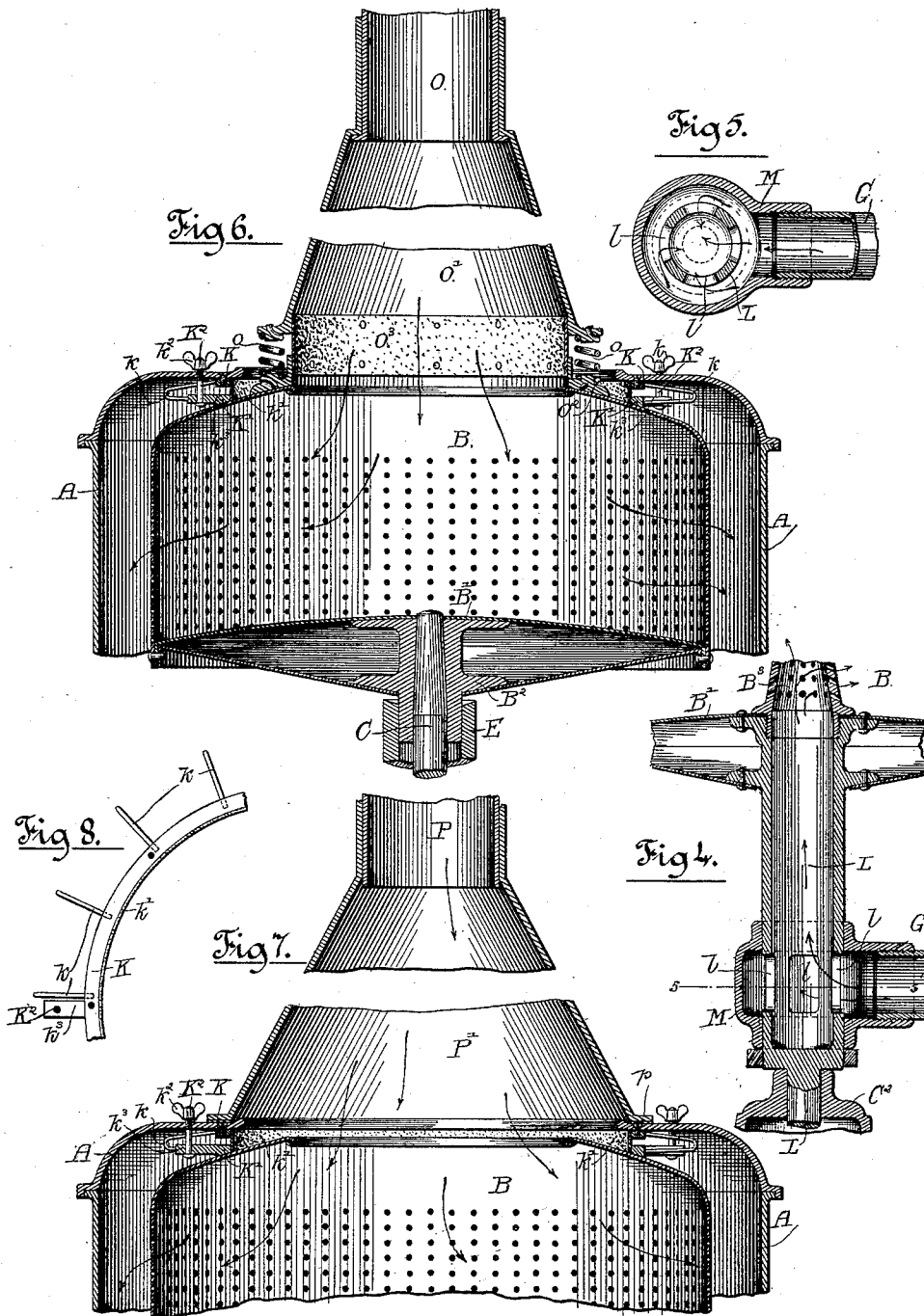
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Louis M. F. Whitehead.

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Inventor

Abram F. Doremus

by - Clayton, Poole & Brown.

Attorneys

(No Model.)

3 Sheets—Sheet 3.

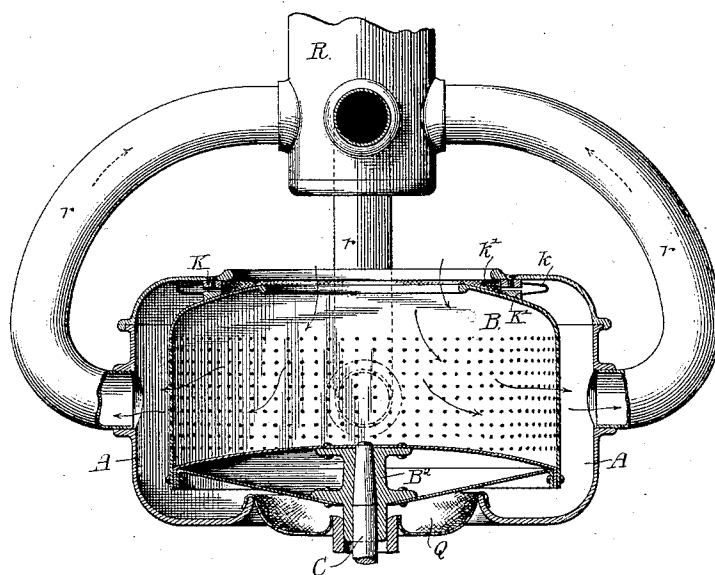
A. F. DOREMUS.

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Fig 9.



Witnesses

Louis W. Whitehead.

Wm. J. Henning.

Inventor

Abram F. Doremus

by Daylin. Poole + Brown

Attorneys.

UNITED STATES PATENT OFFICE.

ABRAM F. DOREMUS, OF CHICAGO, ILLINOIS.

CENTRIFUGAL DRYING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 430,632, dated June 24, 1890.

Application filed January 22, 1889. Serial No. 297,114. (No model.)

To all whom it may concern:

Be it known that I, ABRAM F. DOREMUS, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Centrifugal Drying-Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to a novel apparatus for drying clothing and other articles or substances wherein the free water is abstracted from the articles by the use of a centrifugal machine, and moisture is further removed therefrom by the employment of a blast of air which passes through the article while within the centrifugal machine or extractor. The invention consists in the matters hereinafter described, and pointed out in the appended claims.

In the drawings, Figure 1 is a central vertical section of a machine embodying my invention. Fig. 2 is a plan section thereof, taken upon line 2 2 of Fig. 1. Fig. 3 is a detail section thereof, taken upon line 3 3 of Fig. 1. Fig. 4 is a detail vertical section showing a hollow supporting-shaft. Fig. 5 is a cross-section of the same, taken upon line 5 5 of Fig. 4. Figs. 6 and 7 are detail sections showing other forms of the apparatus. Fig. 8 is a detail plan view of the part shown in Fig. 7. Fig. 9 is a detail sectional view showing another form of the apparatus.

As shown in Figs. 1, 2, and 3, A is the external stationary casing of a centrifugal machine, said casing being supported by means of standards A' A' from a horizontal bed-plate or base A².

B is the revolving perforated basket of the extractor, which is located within the casing A in the usual manner and sustained upon a central spindle C, which is supported at its lower end in a bearing C' upon the base A². Said spindle is herein shown as mounted at its lower end in a box or brass c, the lower end of which is provided with a spherical enlargement c', which engages a socket formed between the two boxes c² and c³ of the stationary part of the bearing C'. This construction in the bearing affords free move-

ment of the upper end of the shaft C and the basket, so as to enable the latter to turn about the center of gravity of the basket and load therein, as is common in similar machines as heretofore made.

C² is a drive-pulley secured to the shaft C and extending over the bearing C' in a manner heretofore common and well known. The bottom B' of the basket B, instead of being attached directly to the shaft C, as usual heretofore, is connected with a short vertical tube B³, which is made considerably larger than the exterior of the shaft, and is sustained from the latter by means of radial arms b, which are attached to a central hub b', secured upon the shaft. The bottom B' of the basket is made double, of two pieces of sheet metal, in a manner heretofore common, the inner margins of the upper and lower parts of the bottom being bolted or riveted to flanges upon the tube B³ in the manner illustrated.

B³ is a hollow perforated cone fitted or secured at its lower edges to the tube B³ and engaged at its upper end with the upper end of the shaft C, which latter extends nearly to the top of the basket.

D is a concave plate or disk, which is placed within the central opening at the top of the basket for the purpose of closing the same, said disk being held in place by engagement with the upper end of the shaft C, which latter is inserted through the disk and is provided with a nut b², by which the disk is clamped against the upper end of the cone B³.

E is a stationary tube surrounding the shaft C above the pulley C². Said tube E is closed at its lower end by means of a wall e, which is provided with a central aperture, through which the shaft C passes and within which it closely fits. At its upper end the tube E is open and fits at its margins closely against the tube B³, by which the basket is supported.

F F are a series of springs which act upon radial rods F', which are connected at their inner ends with the tube E. Said springs act to hold the shaft C vertical when the machine is in operation, while at the same time allowing a lateral movement of the basket and shaft, as is common in centrifugal extractors as heretofore made. In the particular con-

struction illustrated the rods F' are provided at their inner ends with spherical heads f , which engage sockets e' , formed in the sides of the tubular casing E . As a convenient
 5 construction in the casing, the latter is divided horizontally into two parts in a plane passing through the sockets and is held together by bolts passing through lugs $e^2 e^3$, located between the sockets in the manner
 10 clearly shown in Fig. 2.

The springs FF are herein shown as located within horizontally-arranged cylinders $F^2 F^3$, through the inner ends of which the rods F' pass, said springs being located between the
 15 said inner ends of the cylinders and nuts or heads $f' f'$ upon the outer ends of said rods F' . Said cylinders are connected with the machine-casing A by means of horizontal pivots $f^2 f^3$, which allow the cylinders to
 20 swing in vertical planes as the rods $F' F'$ are moved therein.

At its lower end the tubular casing E is connected with a flexible air-pipe G , which communicates with a source or means for
 25 supplying air under pressure, said pipe being made flexible to allow free movement of the basket and tubular casing E during the operation of the machine. Said tubular casing, as more clearly shown in Fig. 3, is also provided with an outwardly-opening spring-
 30 valve H and an inwardly-opening spring-valve I .

J is a centrally-apertured disk located within the central aperture in the bottom of the casing A between the inner margin of said
 35 casing and the tubular casing E , said disk being for the purpose of closing the space between said parts. The disk J is herein shown as made of a flexible material like leather or
 40 rubber; but it may be otherwise constructed, as may be found preferable or desirable.

The operation of the machine described in extracting the free water from clothing or other articles placed in the basket B is the same as
 45 that of other similar machines, water contained within the clothing, being thrown outwardly by centrifugal action through the perforations of the basket into the outer casing A , from which it escapes through a discharge-
 50 pipe A^3 . After the free water has been separated from the clothing, or while such separation is taking place, air under pressure is allowed to flow from the pipe G into the interior of the basket, which it enters through
 55 the perforations in the cone B^3 . The upper opening of the basket being closed by the disk D , the air thus introduced under pressure will be forced outwardly through the perforations in the sides of the basket and
 60 through the clothing, which is held against the said sides by centrifugal action. By passing of air through the clothing in this manner the clothes may be dried to any extent desired by subjecting them to the action of the
 65 air-blast for a necessary length of time. Hot air will preferably be used to facilitate the rapid drying of the clothes. The air issuing

from the interior of the basket may make its escape through the exit-pipe A^3 , or through
 70 the annular space between the upper edge of the basket and the margin of the stationary casing A . In the use of a very hot blast, however, the moisture in the clothing is likely to be converted into steam, which would thus
 75 be caused to escape in large quantities from the apparatus. In cases in which the air and steam are allowed to pass outwardly through the annular space between the basket and casing at the top of the latter in this man-
 80 ner I preferably place over the machine a hood communicating with an exit-flue, in order to carry away the steam and avoid its presence in the apartments in which the machine is placed. As illustrated in the accom-
 85 panying drawings, however, the standards A' A' are made tubular and open through the bottom of the casing and the frame-base A , and are connected with exit-pipes in the man-
 90 ner shown, so that all of the hot air and steam may be carried away or discharged through said pipes. When the air is discharged in this manner, however, I provide
 95 means for closing the space between the top of the basket and the top margin of the casing A , one form of which is herein illustrated in Fig. 1, and is constructed as follows: K is
 100 a ring of wood or metal secured to the inner surface of the outer casing A over the top of the basket, and K' is a second ring located below the ring K and connected with the lat-
 105 ter by means of metal springs k of U shape or other equivalent form, adapted to allow the said ring K' to yield freely in a vertical direction. k' is a piece or strip of flexible material, which is secured to rings K and K' ,
 110 and is made of such width as to allow the lower ring K' to bear against the upper wall b^3 of the basket B . Said upper wall of the basket is made in the form of a spherical segment, the radius of which is equal to
 115 the distance from the said wall to the center of movement of the basket and shaft, so that as the basket moves laterally the lower bearing-ring K' will rest against the basket with uniform pressure in all its parts. It fol-
 120 lows from this construction that the bearing-ring K' will always run smoothly and in close contact with the upper wall of the basket whatever be the angular position of the central shaft. The springs $k k$, which support
 125 the ring K' , are so adjusted as to press the latter with a slight or gentle pressure against the top wall of the basket and with sufficient pressure to prevent any considerable escape of air between the basket and the ring.

The purpose of the inwardly-opening valve I in the tubular casing E is to prevent forma-
 130 tion of a vacuum within the basket or communicating parts such as might be produced by the centrifugal action of the rapidly-revolving basket in case the influx of air through the tube G were cut off by the valve controlling the tube. The purpose of the outwardly-opening valve H in said casing E

is to prevent undue pressure upon the wall of the basket such as might burst the basket, and which might be produced by too great air-pressure within the basket combined with the outward pressure produced by the centrifugal action of the load carried thereby.

It is entirely obvious that the air-blast for drying the clothing may be introduced into the basket at the center of devices equivalent to those described, but differing materially therefrom in mechanical construction. I have shown, for instance, in Figs. 4 and 5 a construction wherein the shaft which supports the basket is made tubular. In this instance B is the basket, and L a shaft for supporting the same, which is made somewhat larger than usual and hollow in its part above the belt-pulley. Said shaft is provided with a plurality of air-inlet ports *l l* and passes through a stationary tubular casing M, with one side of which is connected a flexible air-duct G. The casing M is fitted closely to the shaft above the ports *l l* in the manner illustrated, so that air forced into the casing M is caused to pass through said ports into the hollow shaft. At its upper end the said shaft communicates with the interior of the basket by means of a perforated cone B³, arranged in the same manner as hereinbefore described.

In Figs. 6 and 7 I have shown a somewhat different form of the apparatus embodying the main features of my invention, wherein air under pressure is introduced through the opening in the top of the revolving basket instead of through the bottom thereof. In said Fig. 6, A is the external casing of the machine, and B the basket, which latter is supported and constructed in a manner heretofore common and well known. O is an air-pipe supplying hot air under pressure and arranged vertically over the center of the machine and opening downward, and O' is a movable tubular extension or sleeve fitted to slide vertically on the pipe O and adapted to be joined at its lower edge with the upper margin of the basket B. Said tubular extension or sleeve O' is shown in the drawings as made of conical form and about the same diameter at its lower margin as the margin of the opening in the top of the basket. O² is a vertically-movable ring adapted to rest upon the top surface of the basket beneath the lower edge of the extension O', said ring O² having a smooth surface accurately fitted to the top surface of the basket, which latter is made of spherical form, in the same manner as before described in connection with the basket shown in Fig. 1. The ring O² is connected with lower edge of the tubular extension O' by means of vertically-arranged coiled springs *o o*, adapted to thrust the ring O² against the top of the basket with a gentle pressure. O³ is a strip of flexible material secured at its upper margin to the lower edge of the extension O' and at its lower margin to the ring O². Said flexible strip makes an air-tight connection between the ring and the

tubular extension, but at the same time allowing the ring to move or yield freely in a vertical direction. The tension of the springs *o o* is such as to press the ring O² against the basket with sufficient force to form an air-tight joint, while avoiding undue friction, and, the upper surface of the basket being spherical and concentric with the axis about which the basket turns in its lateral movement, said ring O² will have true bearing upon the basket, notwithstanding the shifting of the same, so that a tight joint will always be maintained between the basket and the ring. It is entirely obvious that hot air introduced through the pipe O will be forced outwardly through the perforations of the basket and will act upon the clothing or other article therein in the same manner as hereinbefore described. In said Fig. 6 I have shown a means of preventing the escape of air and steam from between the basket and the adjacent upper margin of the casing A, constructed generally in the same manner as the device for a similar purpose illustrated in Fig. 1, and consisting of an upper ring K, a lower ring K', a connecting flexible strip *k'*, and springs *k*. In this instance, however, I have provided, in addition to the parts above named, a series of vertical bolts K², engaged at their lower ends with the lower ring K', passing at their upper ends through the casing A, and provided above the casing with thumb-nuts *k²*. Said lower ring K' is conveniently provided with radial arms *k³*, Fig. 8, with which the said bolts are connected. By tightening the thumb-nuts *k²* against the casing A the lower ring may be lifted clear from the basket, and by loosening said nuts allowed to press with a desired force thereon. The main purpose of thus lifting the lower ring is to enable the same to be freed from the basket during the time the latter is being started and until it has gained its equilibrium and is turning steadily about its axis of rotation, after which the lower ring may be allowed to fall against the basket to make a tight joint therewith. By thus lifting the lower ring the basket will be entirely free to seek its normal position in rotation without hindrance from its frictional contact with the ring.

In Fig. 7 I have shown still another device for supplying air under pressure at the top of the machine. In this instance an air-supply duct P is provided with a sliding conical extension P', which, when lowered, rests in contact with the upper margin of the stationary casing A, a suitable packing *p* being usually employed to make an air-tight joint between the said parts. When this construction is employed, I use a device for closing the space between the top of the basket and the upper margin of the casing A, that shown in the drawings consisting of rings K K', connecting a flexible strip *k'* and springs *k*, operating in the same manner as the corresponding parts shown in Figs. 1 and 6.

It is not essential that the air-forcing devices should be employed to produce an air-pressure within the basket of the extractor; but they may be so applied as to exhaust the air from the space outside of the basket. Such a construction is shown in Fig. 9, in which A is the external casing of a centrifugal machine, and B the basket thereof, which latter is supported on a shaft C in the usual manner. Between the top of the basket B and the upper casing A is arranged a device for preventing the passage of air through said space, consisting of rings K and K', a flexible strip *k'*, and springs *k*, arranged and operating in the same manner as before described. The opening in the bottom of the casing A, through which the shaft C passes, is closed by means of a flexible filling-piece Q, attached to the margins of the casing and to the shaft.

R is a pipe or duct connected with the inlet-opening of an exhaust-fan and communicating, by means of branch pipes *r r r*, with the space within the outer casing A exterior to the basket B. Access of air to the said casing A being prevented excepting through the perforations of the basket, it is entirely obvious that when the air is exhausted from the said casing through the ducts R *r r* a continuous current of air will be drawn through or over the articles within the said basket, thereby drying the same in the manner as heretofore described.

The particular mechanism shown embodies certain novel features of construction in the details of the machine, which are also herein claimed as part of my invention.

I claim as my invention—

1. The combination, with a revolving perforated basket and its supporting-shaft, said basket being provided with an opening in its bottom, of a non-rotating casing surrounding the shaft and fitted to the latter and to the margins of the opening in the bottom of the basket, and a flexible air-duct connected with said casing, substantially as described.

2. The combination, with a revolving perforated basket and its supporting-shaft, of an air-duct communicating with the interior of the basket and provided with inwardly and outwardly opening relief-valves, substantially as described.

3. The combination, with a revolving perforated basket having a central opening in its top and provided with a central shaft ex-

tending upwardly from its bottom, of a disk fitting said opening and provided with a central hole to engage the central shaft and a nut upon the shaft for holding the disk in place, substantially as described.

4. An apparatus for the purpose stated, consisting of a revolving perforated basket, a shaft carrying the same, mounted in a universal bearing at its lower end, a stationary casing surrounding the basket, the top of the basket having the form of a spherical segment, the center of which coincides with the center of universal movement of the shaft, and means for closing the space between the top of the basket and the casing.

5. The combination, with a revolving perforated basket, a shaft carrying the same, mounted in a universal bearing at its lower end, and a stationary casing surrounding the basket, the top of the basket having the form of a spherical segment, the center thereof coinciding with the center of universal movement of the shaft, of a ring bearing against the top of the basket and supported from the outer casing and a strip of flexible material connecting the ring with the casing.

6. The combination, with a revolving perforated basket, a shaft carrying the same, mounted in a universal bearing at its lower end, and a stationary casing surrounding the basket, the top of the basket having the form of a spherical segment, the center thereof coinciding with the center of universal movement of the shaft, of a ring in contact with the top of the basket and spring-supported from the outer casing and a strip of flexible material connecting the ring and the casing, substantially as described.

7. The combination, with the basket and a stationary casing, of a ring in contact with the top of the basket, a strip of flexible material connecting the ring with the casing, springs applied to press the ring against the basket, bolts engaged with the ring and passing outwardly through the casing, and thumb-nuts or equivalent means acting on the bolts to lift the ring from contact with the basket, substantially as described.

In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses.

ABRAM F. DOREMUS.

Witnesses:

C. CLARENCE POOLE,
GEORGE W. HIGGINS, Jr.