W. M. CUMMER.

MECHANICAL DRIER.

APPLICATION FILED APR. 6, 1908.

934,712.

Patented Sept. 21, 1909.

3 SHEETS—SHEET 1.

Fig. 1.

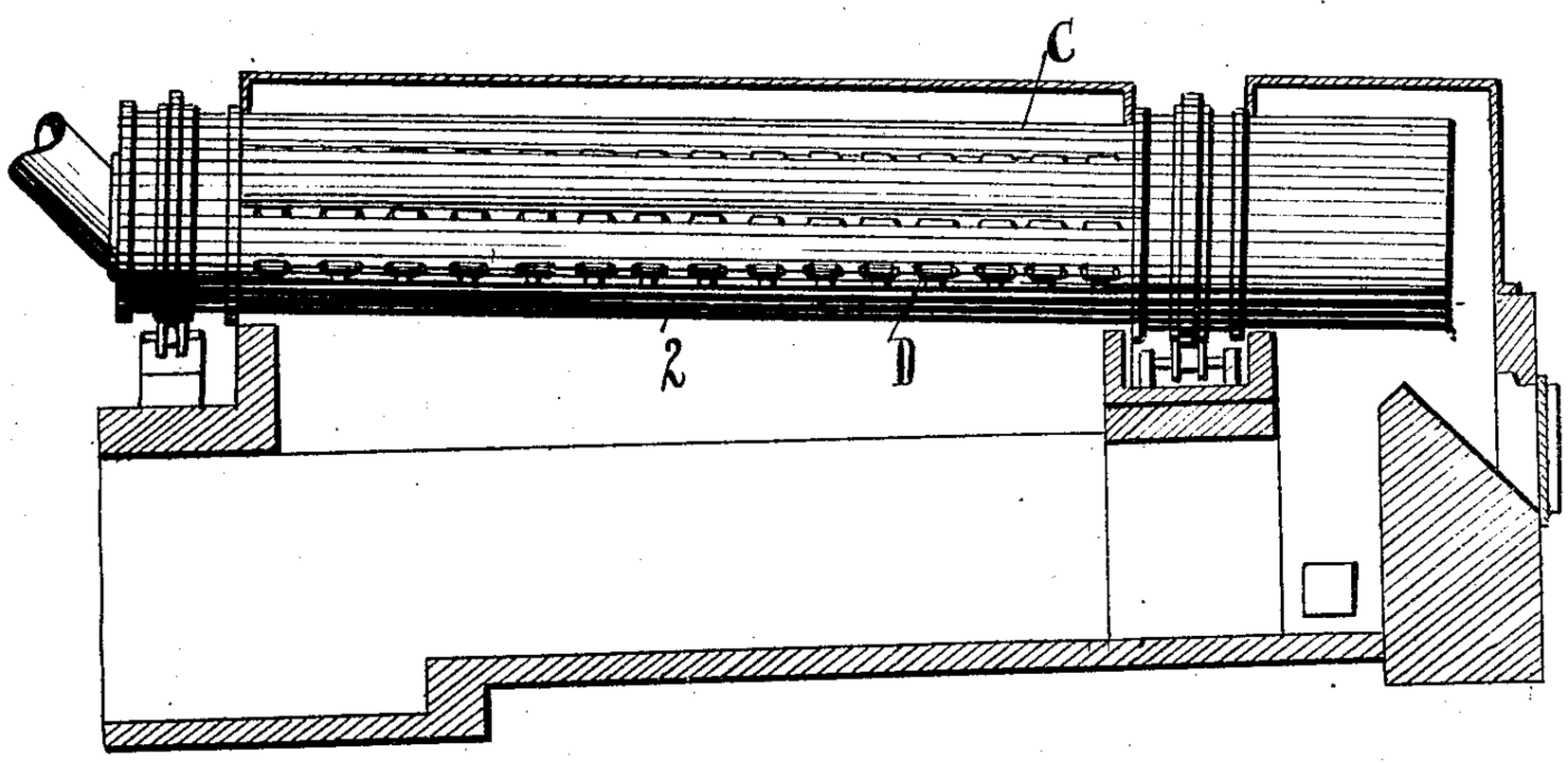
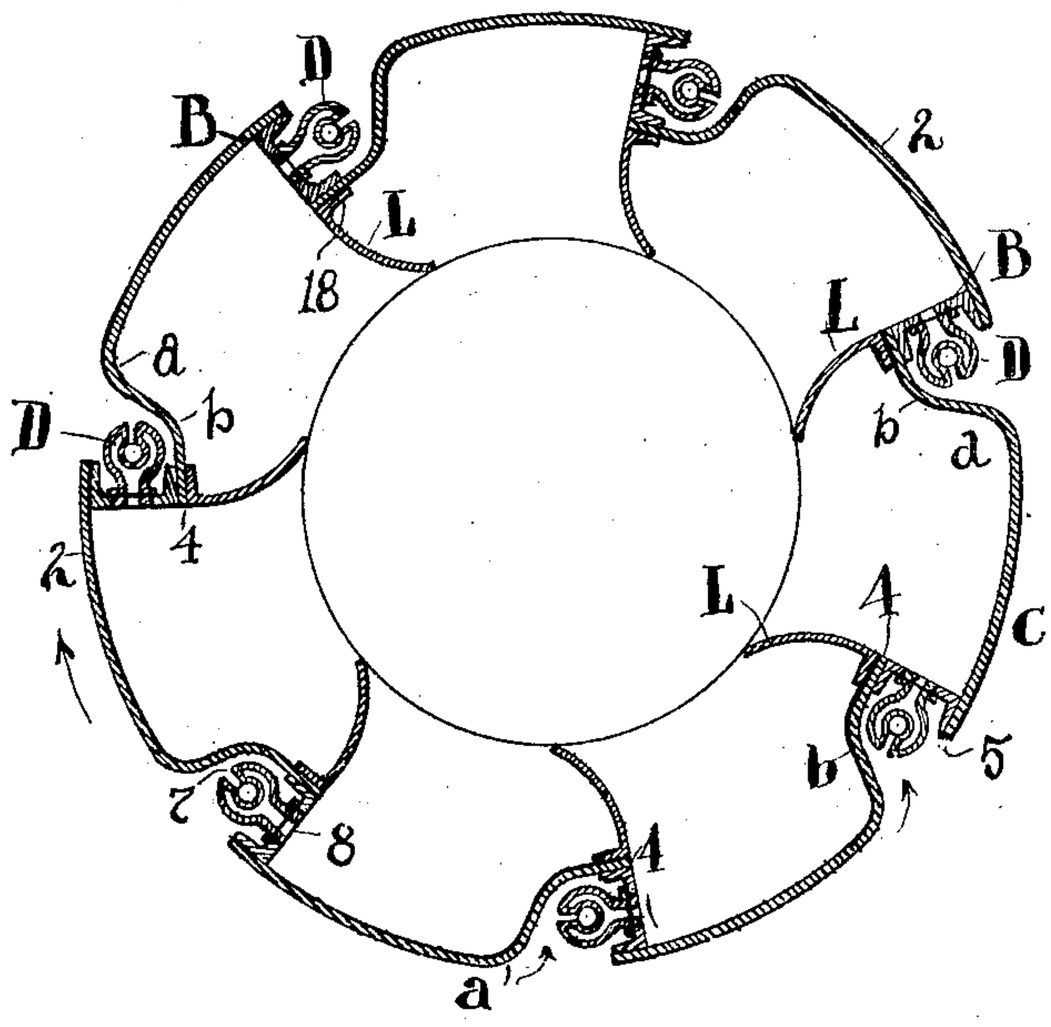


Fig. 2.



ATTEST

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3 SHEETS—SHEET 2.

Fig. 3.

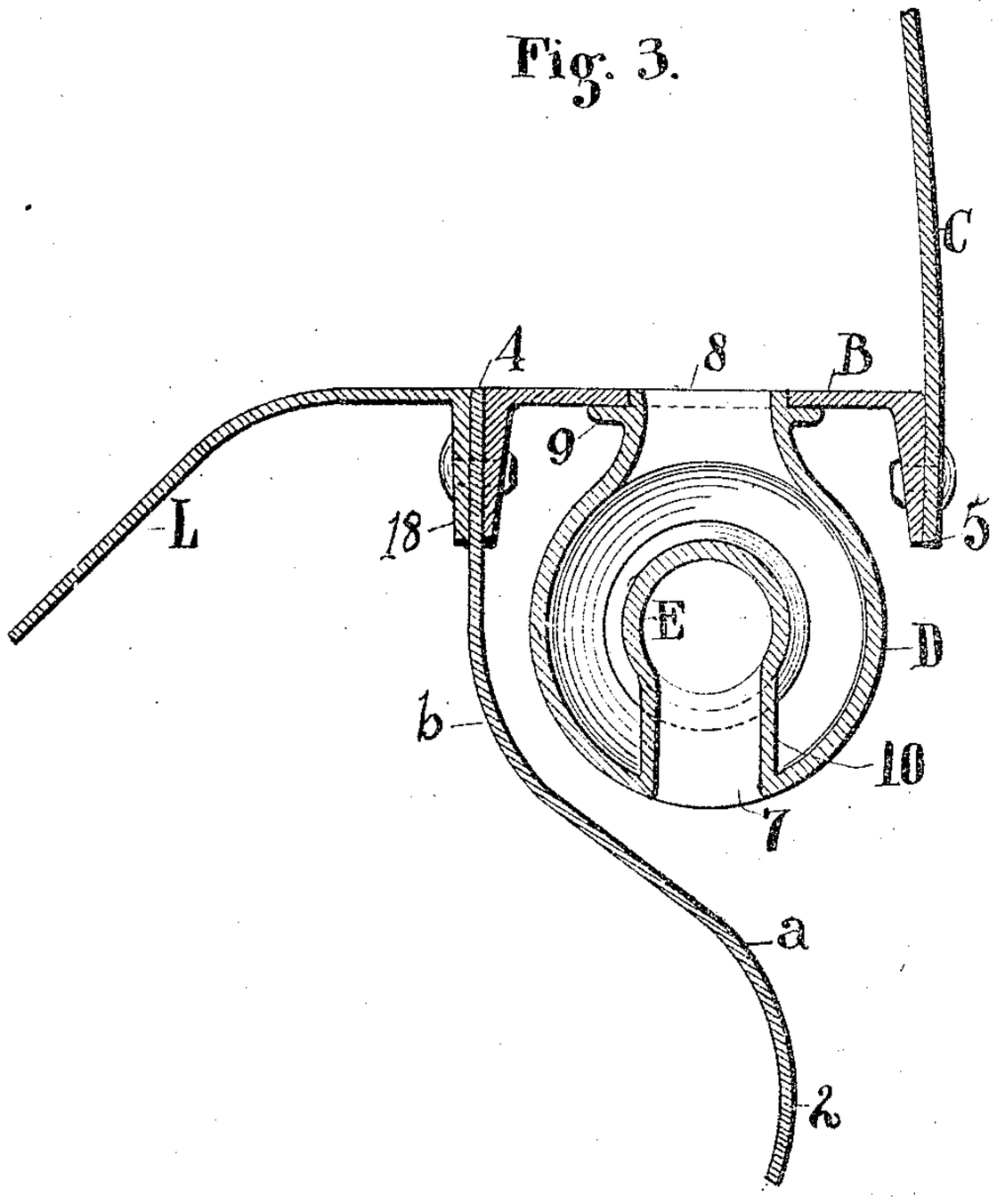


Fig. 4.

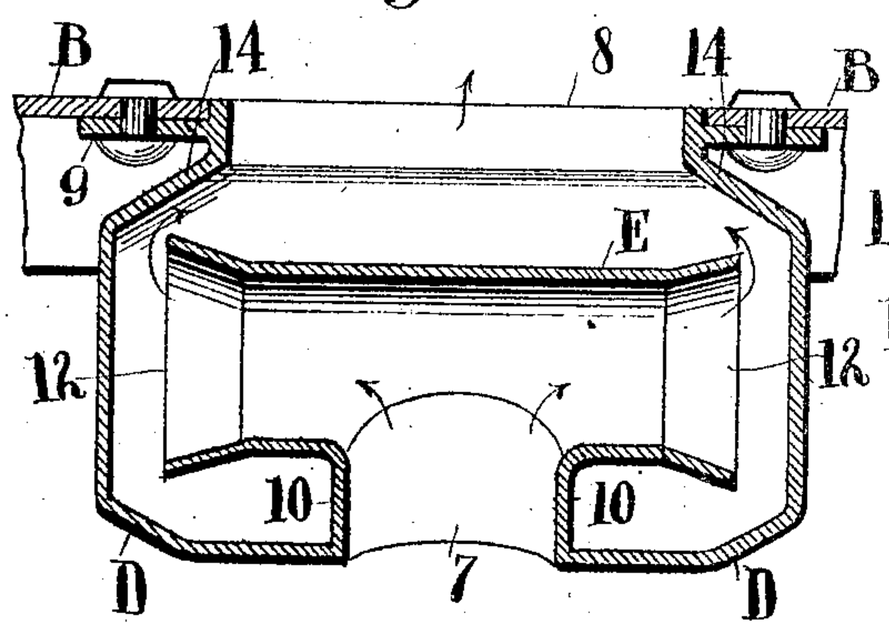
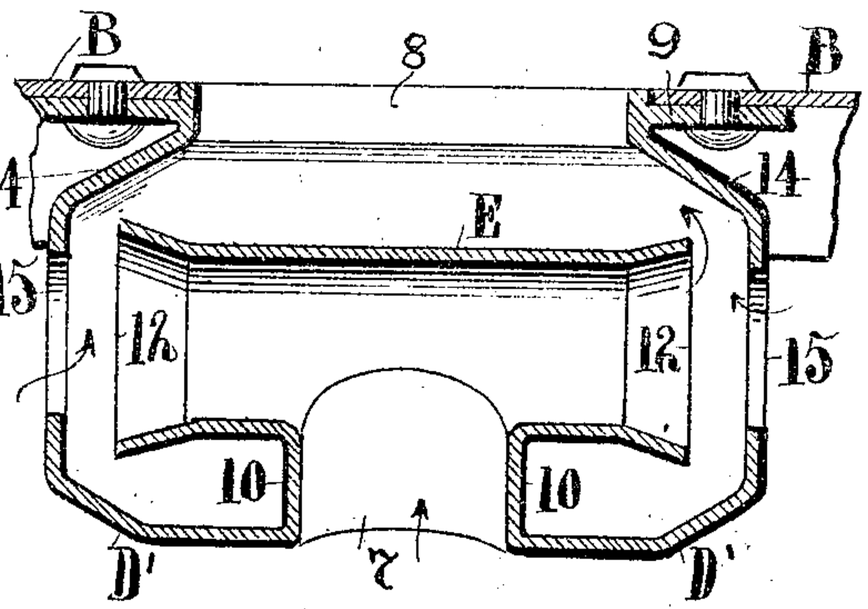


Fig. 5.



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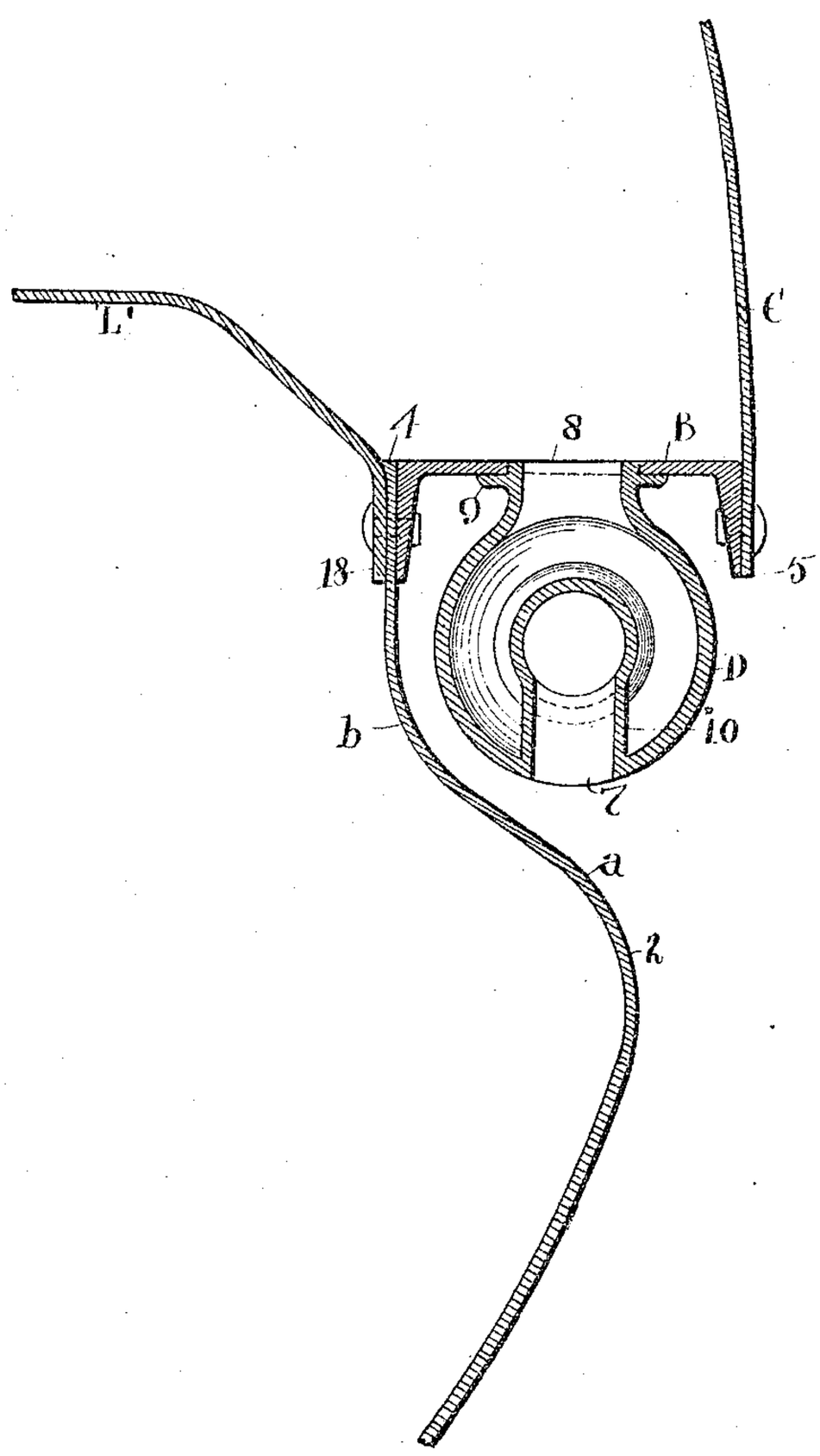
3 SHEETS—SHEET 3.

Fig. 6.



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UNITED STATES PATENT OFFICE.

WILLIAM M. CUMMER, OF CLEVELAND, OHIO.

MECHANICAL DRIER.

934,712. Specification of Letters Patent. Patented Sept. 21, 1909.

Application filed April 6, 1903. Serial No. 425,475.

To all whom it may concern:

Be it known that I, WILLIAM M. CUMMER, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Mechanical Driers, and do declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in mechanical driers, and the invention consists in the construction and combination of parts substantially as shown and described and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a sectional elevation of a furnace and plan elevation of my improved construction of drying cylinder therein. Fig. 2 is an enlarged cross section of the cylinder. Fig. 3 is a still further enlarged cross section of a portion of the cylinder and of one of my improved air valves shown in that connection. Figs. 4 and 5 show two longitudinal sectional views of the air or draft inlet valve mechanism in which Fig. 5 is so far a modification of Fig. 4 as to take in air through the shell at the ends of the internal deflecting member, whereas, in Fig. 4 air or draft is only through the middle of the said shell and then oppositely through the member within. Fig. 6 is a cross section of a portion of a cylinder corresponding in the main to Fig. 3 but showing a modification of the lift blade particularly as to its location in respect to the draft opening.

The invention is comprised in or in connection with cylinder C, and the said cylinder is constructed in part after my application Ser. No. 391,151, and is built with or of a suitable number of plates 2 running longitudinally the full length at least of that portion of the cylinder having draft openings in its periphery, and said plates have a uniform shape in cross section, as shown. That is the body of each plate is shaped to a segment of a circle in cross section and has a compound curve along its inner portion as indicated by *a* and *b* respectively, and which offsets the inner edge 4 of each plate from the periphery of the cylinder relatively as shown and produces a longitudinal depression or recess on the outside of the cylinder within its periphery at the corresponding edge of each plate successively. The space between the immediate inner edge 4 of each of said plates 2 and the outer edge 5 of the next succeeding plate is filled with a channel bar or rail B, or its equivalent, to the flanges or edges of which the respective edge portions 4 and 5 of said plates are firmly riveted. This construction contributes very much to the general strength of the cylinder as an entirety, and the longitudinal depression or recesses in the periphery of the cylinders especially afford spaces in which to arrange the draft and shield mechanism, whereby a free ingress of the heat products from the furnace is obtained and the material is prevented from sifting or working out of the cylinder.

Now, as to this mechanism, referred to herein as the guard, I believe I have developed the most perfect and satisfactory means that can be devised in and for the place in which it is used, and two constructions thereof are shown. Thus, in Figs. 3 and 4, I show the preferred form thereof and which consists of a metallic shell or drum D, which has a central opening 7 in its periphery and a central larger outlet 8 at its base, at which point it is provided with a flange 9 by which it is secured to the channel or like bar B over a corresponding opening therein. Within the said shell or drum D I place a barrel E, which has a neck 10 at its middle connecting it with inlet opening 7 and which practically constitutes the mouth to said barrel for the heated air and products from the furnace, and the ends 12 of said barrel flare outwardly in something like trumpet shape all around and are removed from the ends of drum D far enough to afford a free discharge thereinto, whence the products of combustion and heated air flow into the cylinder through discharge opening 8. All the openings or holes in the said channel bars B are equipped with draft guards of the same kind, whichever kind may be adopted. In the construction thus shown, the outer shell, shield or drum serves as a means of preventing the cascading material in the cylinder from interfering with the draft passages or of escaping from the cylinder if it should appear at this point, and which material, by reason of the peculiar construction and said shield and barrel, would in such case flow back into the cylinder again as it rotates the said parts to the top successively. The inclined or converging walls 14 in said shell about opening 8 and the flaring ends of

barrel E contribute to the keeping of the draft passages clear of possible obstructions from within the cylinder. The same general effects are obtained in Fig. 5, it being understood, however, that under no conditions does material cascade or work out through the openings 8 into the outer spaces of the guard in any such amount as to become an impediment to the free inflow of draft or which would work waste of the material through the same. In fact both forms of the valve or guard mechanism shown are proof against any such waste or leakage, and one of the valuable features of this mechanism is its free draft and perfect security against leakage under all circumstances. Now, as to Fig. 5, it will be seen that the construction therein is identical with Fig. 4 except that the ends of the outer shell or shield D′ have limited openings 15, through which draft enters as well as through opening 7. In conjunction with these parts outside the cylinder, the lifting blades L are important factors in keeping the material from working over onto the descending side of the cylinder and into the draft inlet area through said guards. To these ends the said blades are preferably formed in separate parts, and said blades have flanges 18 through which they are riveted over the inner ends of said plates 2 through the side flanges of channel irons B. From these flanges said blades may be curved from their base inward toward the rising side of the cylinder more or less, say from full lines, Fig. 3 to full lines Fig. 6. This construction of lift blades taken along with the peculiar construction of plates 2 of the cylinder forms a series of longitudinal troughs in the cylinder for the material, and in which the material is carried up on the ascending side of the cylinder toward the top thereof and is gradually cascaded through the heated air within until the top is reached, and the material is all discharged. This is plainly shown in Fig. 2, and in experience it is found that very little if any of the material really overflows or is carried around so as to drop in advance of the draft inlet openings at the bottom of the cylinder especially when blade L′ is used and which forms a practically complete guard for the draft openings 8. But even if this should occur, the construction of the parts is such as to practically prevent the material from creeping out into the draft guards, and the inrushing draft and suction assist in safeguarding the draft ports or channels. Perfect protection against leakage of material through said parts is demanded by users of these machines, and nothing short of this will meet the requirements of the trade. Hence the importance of the walled guard substantially as herein shown and described.

It will be observed that with the foregoing construction there are shown single lift blades L for each series of inlets, and these blades are seated on the inner angle of the longitudinal recesses in which said openings occur and curve more or less therefrom over the back of the recess rather than extending in the opposite direction. The two part guard for each opening coöperates with said lift blade in keeping the openings clear of the material and safeguards escape thereof from the cylinder. Said lift blade is, therefore, an important factor in protecting the material from escape through said openings as well as serving the purpose of lift blades for the material.

By the foregoing construction I am enabled to deliver the full volume of the heated air and gases into the cylinders directly at the periphery thereof and in such relation that the gases or heat sweeps the inner surface of the cylinder and diffuses therefrom into all portions thereof from circumference to center, which is absolutely necessary to utilize all the heat units to the best advantage and facilitate the drying operation. I have also discovered that in some cases this machine can be very advantageously used for cooling certain material, as clinkers from a cement kiln, by simply drawing outside air through by means of the usual fan or blower at or near the head end of the cylinder. In such case the inclosure of the cylinder is omitted and rotation thereof with sustained suction therefrom will do the work and save the long delay hitherto sustained of piling the hot clinkers in a pile and waiting for them to cool before crushing and refining the same.

What I claim is:

1. A cylinder having draft openings through its sides, and guards over the said openings consisting each of two portions inclosed one within the other and having a draft space between them.

2. A cylinder having recesses longitudinally in its side and draft openings through said recesses, and a guard for each of said openings constructed with an outer shell and an inner barrel adapted to provide a draft space between them entering the cylinder.

3. A cylinder provided with longitudinal recesses lengthwise in the wall thereof and having each a series of draft openings entering into the cylinder, and a two-part draft guard over each opening providing a draft passage between them, one of said parts consisting of a shell extending across the discharge portion of the other part and spaced therefrom.

4. A cylinder constructed between its ends with a series of longitudinal recesses within the periphery of the cylinder and each recess having a series of draft openings entering the cylinder, and two guard members for each opening, said members constructed to

discharge one into the other and hence into the body of the cylinder.

5. A cylinder having a series of draft openings entering the same, combined with two part guards over said openings, one of said parts constituting a shield for the other, and the shielded part constructed with a double discharge.

6. A cylinder constructed with draft openings through the wall thereof and guards for said openings consisting each of two portions inclosed one within the other and the inner portion adapted to discharge in the ends of the outer portion.

7. A cylinder having draft openings through the wall thereof and double walled guards for said openings through which the draft passes into the cylinder, one of said guards being within the other and adapted to discharge therein.

8. A cylinder having lengthwise recesses with draft openings through the same and double walled guards over said openings comprising inner and outer walls, and the inner of said walls substantially barrel shaped.

9. A cylinder having recesses lengthwise within the periphery thereof and openings therein, in combination with substantially barrel shaped guards over said openings provided with draft passages through the same, and a shield in each guard covering said openings.

10. A cylinder having longitudinal recesses in its side and a series of draft openings through each recess, in combination with guards over said openings consisting of two portions, one of said portions seated over each opening and the other portion across said opening and having a mouth for the passage of the heated air.

11. A cylinder provided with a series of recesses longitudinally within the periphery thereof, a lift blade extending inward from the inner corner of each recess, a series of draft openings in each recess for the passage of heated air into the cylinder, and guard members comprising two separate parts for each of said openings within said recesses.

12. A cylinder provided with a series of recesses longitudinally within its periphery and inlet openings in each recess, in combination with a guard for each opening located within said recess, and a lift blade along each recess supported at the inner angle thereof.

13. A drying cylinder having a series of recesses lengthwise at intervals about the same and within the periphery thereof and inlet openings in said recesses, in combination with a transversely curved plate supported lengthwise from the inner angle of each recess and extending inward therefrom in guarding relation to the openings in said recess.

In testimony whereof I sign this specification in the presence of two witnesses.

WILLIAM M. CUMMER.

Witnesses:

E. M. FISHER,

R. B. MOSER.