(No Model.) 2 Sheets—Sheet 1.

J. FARRELL.

LEAD SHOT DRYING MACHINE.

No. 265,046. Patented Sept. 26, 1882.

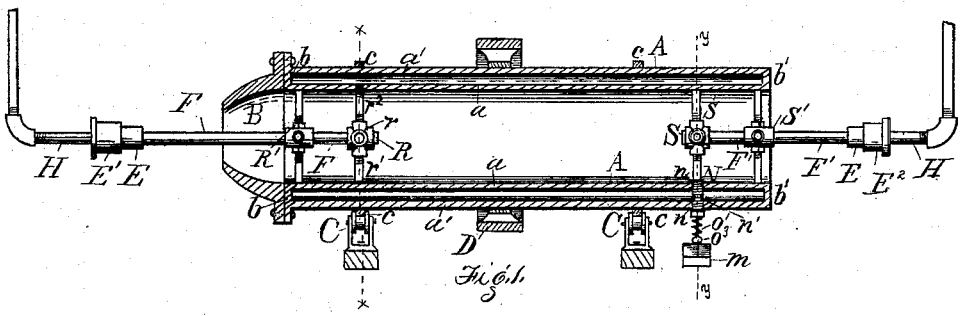

Fig. 1.

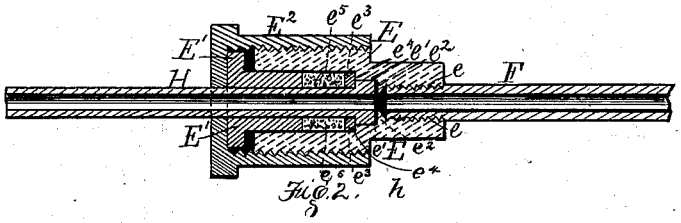

Fig. 2.

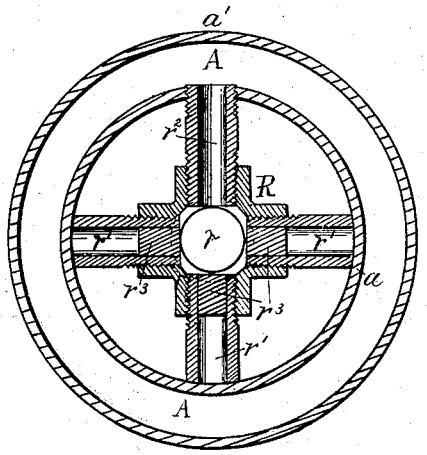

Fig. 3.

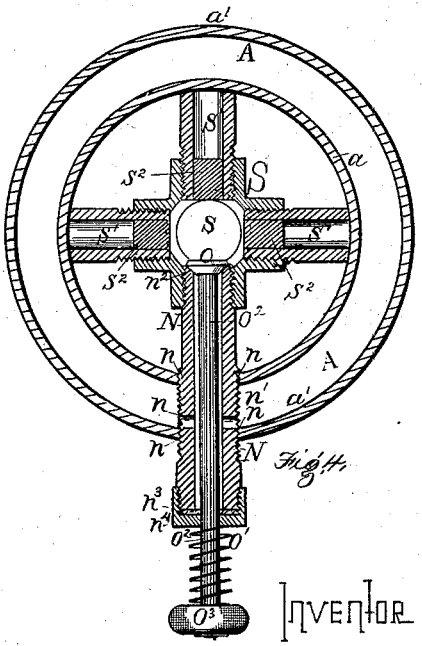

Fig. 4.

Witnesses.
C. L. Parker
R. H. Whittlesey

Inventor
John Farrell,
by George H. Christy
his Atty.

(No Model.) 2 Sheets—Sheet 2.

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LEAD SHOT DRYING MACHINE.

No. 265,046. Patented Sept. 26, 1882.

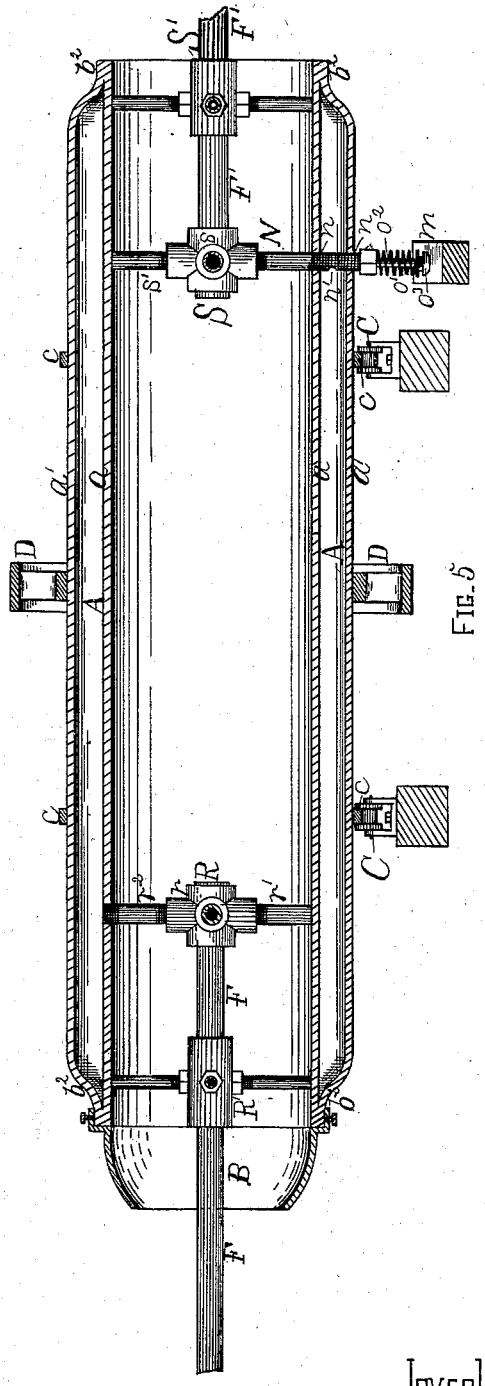

FIG. 5

Witnesses.
C. L. Parlure
W. A. Potter

Inventor
John Farrell
By George H. Christy
his Atty.

UNITED STATES PATENT OFFICE.

JOHN FARRELL, OF PITTSBURG, PENNSYLVANIA.

LEAD-SHOT-DRYING MACHINE.

SPECIFICATION forming part of Letters Patent No. 265,046, dated September 26, 1882.

Application filed April 13, 1882. (No model.)

To all whom it may concern:

Be it known that I, JOHN FARRELL, a citizen of the United States, residing at Pittsburg, county of Allegheny, State of Pennsylvania, have invented or discovered a new and useful Improvement in Lead-Shot-Drying Machines; and I 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 shows a longitudinal vertical section of my improved apparatus. Fig. 2 is a sectional view, to an enlarged scale, of the coupling-joint employed in the steam-pipes to permit rotary motion of the apparatus and Figs. 3 and 4 are transverse sectional views, to an enlarged scale, of the drum and central spider-supports, taken in the planes of the lines *x x* and *y y*, respectively, Fig. 1; and Fig. 5, Sheet 2, is a view similar to Fig. 1, but drawn to a larger scale.

My invention relates to certain improvements in apparatus for drying shot by means of steam introduced into a jacket surrounding a drum or cylinder, through which the shot is passed, such drum being supported in an inclined position, and steam being introduced thereto through axial inlet and outlet pipes, which communicate with the surrounding jacket through tubular radial arms of spider-supports within the drum, provision being made for automatic discharge of water from the jacket and for coupling the steam supply and discharge pipes, so as to permit rotary motion of the apparatus, as hereinafter more fully described and claimed.

In the drawings, *a* represents a cylindrical metal drum or shell, surrounded by a similar metallic shell, *a'*, with an annular jacket or steam-space, A, between. These shells may be connected at their ends by rings *b b*, Fig. 1, by preference welded to the shells, so as to made a solid steam-tight connection, which will not open under the unequal expansion or contraction of shells, owing to difference in temperatures to which they may be exposed. Instead, however, of the rings *b b'*, the ends of the outer shell may be bent upon the surface of the inner shell, and thus welded together, as illustrated at b^2, Fig. 5; or other means of securing a steam-tight connection may be employed, though I prefer to weld the parts, as described, in order to prevent danger of opening joints. Additional advantage is also secured by the form shown in Fig. 5, since the curves in the ends of the outer shell at b^2 will permit of expansion and contraction of that shell without excessive or injurious strain upon the welded union between the ends of the two shells.

To the receiving end of the drum is secured, by bolts or equivalent binding-screws, a segmental feed-chute, B, adapted to receive shot continuously as the drum is rotated and pass the same to the interior of the drum. The drum is supported on its exterior surface by means of grooved rollers C C, which receive collars *c c*, surrounding and secured to the outer shell. Four of these rollers are employed, two for each collar *c*. The drum is mounted in an inclined position, giving a descending slope to its inner bottom surface from the receiving end B to the discharge. One purpose of the groove and collar-support C *c* is to sustain the vertical and endwise bearing of the drum, due to this inclined mounting, without excess of friction. Also, by the use of exterior bearings an open and comparatively unobstructed interior chamber is secured within the drum. Rotary motion is communicated by means of pulley D, secured to the exterior of the drum, as illustrated in Fig 1. The drum is held upon its bearings by gravity, though additional means may be employed, if desired. By these means the desired rotary motion is secured without communicating the driving-power through the supporting-rollers C. Consequently friction is reduced to a minimum, and a steady uniform movement is secured with comparatively small outlay of power and with small expense in construction. Steam is introduced into the jacket A, at or near the feed end, through pipe F, which enters the open end of the drum in its axial line and screws into the hollow hub *r* of a spider-support, R. This support consists of the hub *r*, having thereon threaded radial sockets, into which are screwed radial brace-arms *r'*, whereby the hub may be centered within the drum and the arms be pressed against its inner shell so as to hold the hub securely. One of the arms—

as, for example, the arm r^2—is tubular, and at its outer end is screwed into a tapped hole in the shell *a*, thus affording steam-passage from the hollow hub to the jacket A. The remaining arms, r', are plugged, as at r^3, to prevent escape of steam through them.

In order to assist in holding the pipe F in the axial line of rotation of the drum, it is passed through an additional spider-support, R′, which is secured in or near the mouth of the drum. This support R′ is made and secured substantially like the support R, except that the radial arms simply press against the inner shell, *a*. They are screwed into similar threaded sockets on the hub, and the latter has a central opening for passage through it of the pipe. The steam-escape pipe F′ also passes through a supporting-spider, S′, constructed substantially like the support R′, and the inner end of this pipe screws into a hollow hub, *s*, of an inner spider-support, S. This latter support S is constructed substantially like the support R, consisting of central hollow hub, *s*, having threaded sockets thereon, into which are screwed the radial brace-arms *s′*, plugged, as at s^2, to prevent escape of steam to the interior of the drum. Also, a pipe-arm, N, is screwed into this hub, passing from the exterior of the drum through threaded holes *n* in both shells. Ports *n′* in this pipe afford passage to its interior from jacket A, and thence through hub *s* to escape-pipe F′. In order to regulate discharge through this escape-passage, a valve, *o*, is employed, which seats against the pipe end n^2, the hollow hub *s* serving as a valve-chamber. This valve is seated by a spring, *o′*, acting through the stem o^2, which latter extends from the valve through the pipe N and packing n^3. A head, o^3, and cap n^4 afford rests for the spring *o′*. An inclined bearing, *m*, secured to any convenient support on the under side of the drum, is placed in such position that as the head o^3 is turned to the under side of the drum it presses upon the face of the bearing, and the valve is thereby raised from its seat, thus opening the escape-passage. Water from condensation of steam will settle in the bottom of the jacket, and by opening the escape-passage when the ports *n′* are also on the under side the water will be blown out by pressure of steam which is accumulated in the jacket while the escape-passage is closed—that is, during the greater part of the time of rotation of the drum. It is for the purpose of blowing off water in this manner that I have arranged, as above described, for intermittent opening of the escape-passage from the under side of the drum, and I consider this an important feature of improvement, as it affords a practicable means of disposing of water of condensation without waste of steam and insures the presence of comparatively dry steam within the jacket.

Shot to be dried are passed into the drum at its upper end in continuous supply, being guided into the drum by the ring-shaped chute B. The interior of the drum being comparatively unobstructed, the shot will be passed through it as it is rotated, and in such passage will be dried by the surrounding heated surface, the vapor escaping at the open ends of the drum. The shot thus dried are delivered at the lower end of the drum ready for polishing.

I have described the steam-pipes F and F′ as placed in the axial line of the drum and screwed into the hubs *r s*; consequently they rotate with the drum. Another feature of my invention is the means employed for connecting these pipes F F′ with stationary pipes, so as to permit of such rotation. This I do as follows: The pipes F and F′ at their outer extremities are screwed into threaded sockets *e*, formed in the end of a coupling-piece, E. On the end of the fixed pipe H is an enlarged collar, *h*, which is seated in socket or chamber *e′* in the base of the coupling-piece E. A shoulder, e^2, forms an end bearing for this pipe. The collared end *h* is held loosely within its chamber by a ring or washer, e^3, which rests upon a shoulder, e^4, which latter forms the base of a packing-chamber, e^5, somewhat larger in diameter than the socket-chamber *e′*. Any suitable packing, e^6, is employed, which is forced upon the collar e^3 by a close-fitting gland, E′, and screw-cap E^2. The collared end of pipe H is thus relieved from pressure of packing, and consequently it will not be worn away rapidly by use. Also, danger of blowing it out by steam-pressure is avoided, and the difficulties heretofore experienced in this class of machines in introducing steam into the jacket are to a great degree obviated.

I am aware that steam has been supplied to and discharged from a jacket surrounding a horizontal rotary drying-drum by means of pipes connecting such jacket with a tubular axial shaft, also that open-ended rotary drums have been supported upon a horizontal shaft by means of spider-frames, and I make no claim herein to such features of construction alone considered; but in my improved apparatus I make use of adjustable brace-arms *r′ s′* to accurately center the hollow hubs *r s* of the spiders, and also to allow of and compensate for the expansion or contraction of the shell under varying degrees of heat. Also, by utilizing one radial arm of the spider as a pipe-connection between the hollow hub and jacket I secure a much more simple, cheap, and efficient device than heretofore.

The valve mechanism herein described for intermittent discharge of steam I consider of especial importance and advantage, as by it the heat of the steam is utilized to a greater degree, and accumulation of water in the jacket is prevented; and this feature of my invention may be applied to advantage where the steam passage from the jacket to the tubular axis is by a pipe-connection outside of the spider, though for the reasons above given I prefer the specific construction of spiders shown and described.

I claim herein as my invention—

1. A rotary shot-drying drum having a steam-jacket surrounding the same, in combination with spider-supports R and S, having tubular passages from their hollow central hubs to the steam-jacket for supply and discharge, and suitable valve mechanism for opening intermittently the discharge-passage from the jacket, substantially as and for the purposes set forth.

2. A rotary shot-drying drum having a surrounding steam-jacket, in combination with spider-supports R and S, having hollow central hubs *r s*, adjustable brace-arms *r' s'*, and tubular radial arms affording steam-passages from the hollow hubs to the surrounding jacket, substantially as set forth.

3. A rotary shot-drying drum having a surrounding steam-jacket, in combination with hollow hub *s*, radial brace-arms *s'*, pipe N, having ports *n'*, opening into the jacket, valve *o*, stem o^2, spring *o'*, and suitable means for raising the valve to open escape-passage while the ports *n'* are on the under side of the drum, substantially as and for the purposes set forth.

4. The combination of rotary drum *a a'*, spider-supports R R' and S S', pipes F F', leading to the centers of supports R and S in the axial line of the drum, and rotary joint-couplings for connecting the pipes F and F' to stationary pipes, substantially as set forth.

5. The coupling-piece E, having therein chambers *e' e*^{5} and shoulder e^4, in combination with collared pipe H, collar e^3, packing e^6, gland E', and cap E^2, substantially as set forth.

6. A rotary shot-drying drum having a steam-jacket surrounding the same, in combination with a tubular axial shaft, spider-frames for support of the drum on such shaft, steam-pipe connections from the tubular shaft to the jacket for supply and discharge of steam, and automatic valve mechanism in the discharge-passage, substantially as described, for intermittent discharge of water of condensation by the steam.

7. A drying-drum having a steam-chamber formed by inner and outer metallic shells welded together at their ends, substantially as and for the purposes set forth.

In testimony whereof I have hereunto set my hand.

JOHN FARRELL.

Witnesses:
R. A. WHITTLESEY,
C. L. PARKER.