No. 877,291. PATENTED JAN. 21, 1908.

D. A. BREMNER.

MORTAR BOX FOR STAMP MILLS.

APPLICATION FILED JULY 31, 1905.

4 SHEETS—SHEET 1.

Fig. 1.

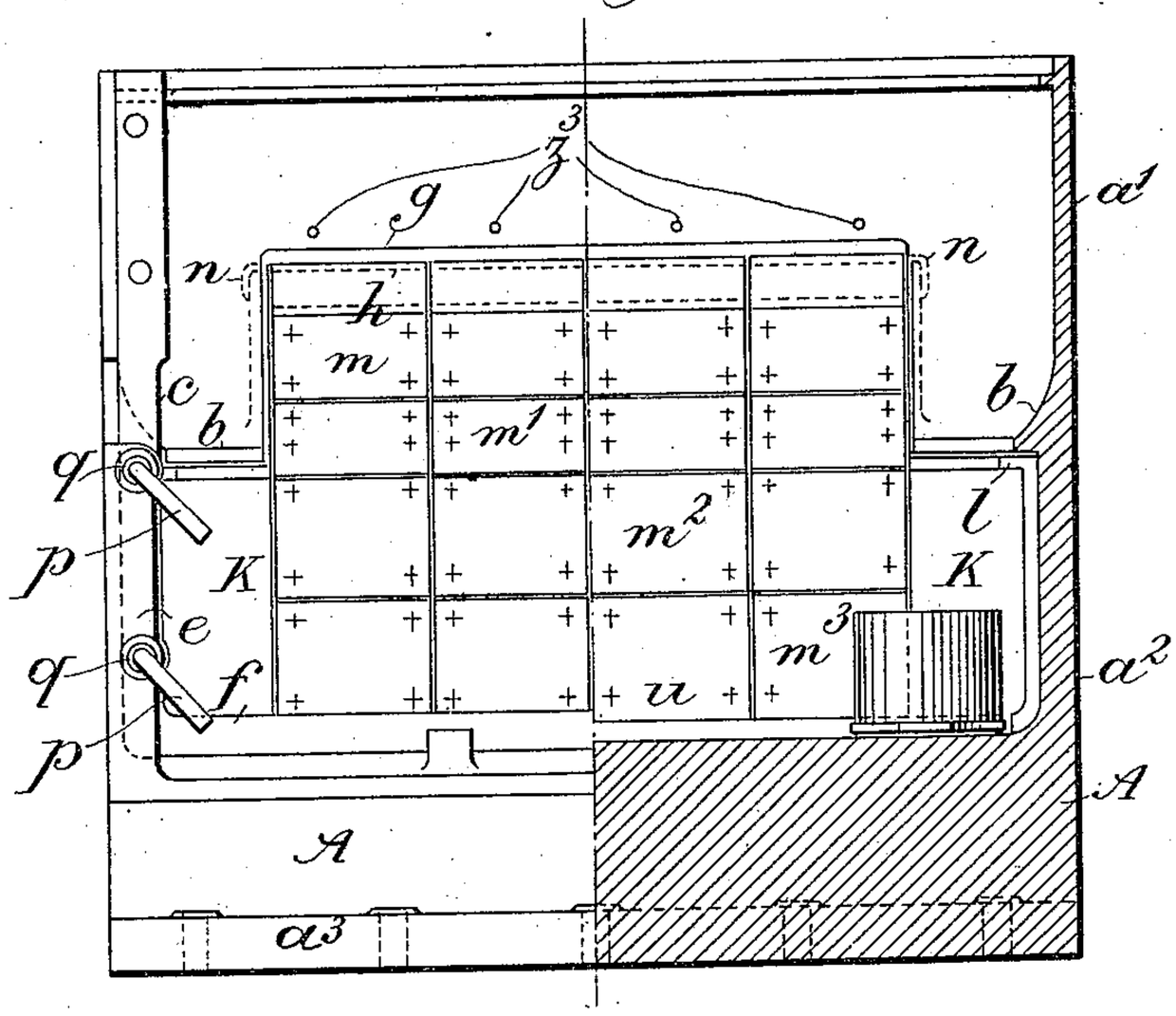
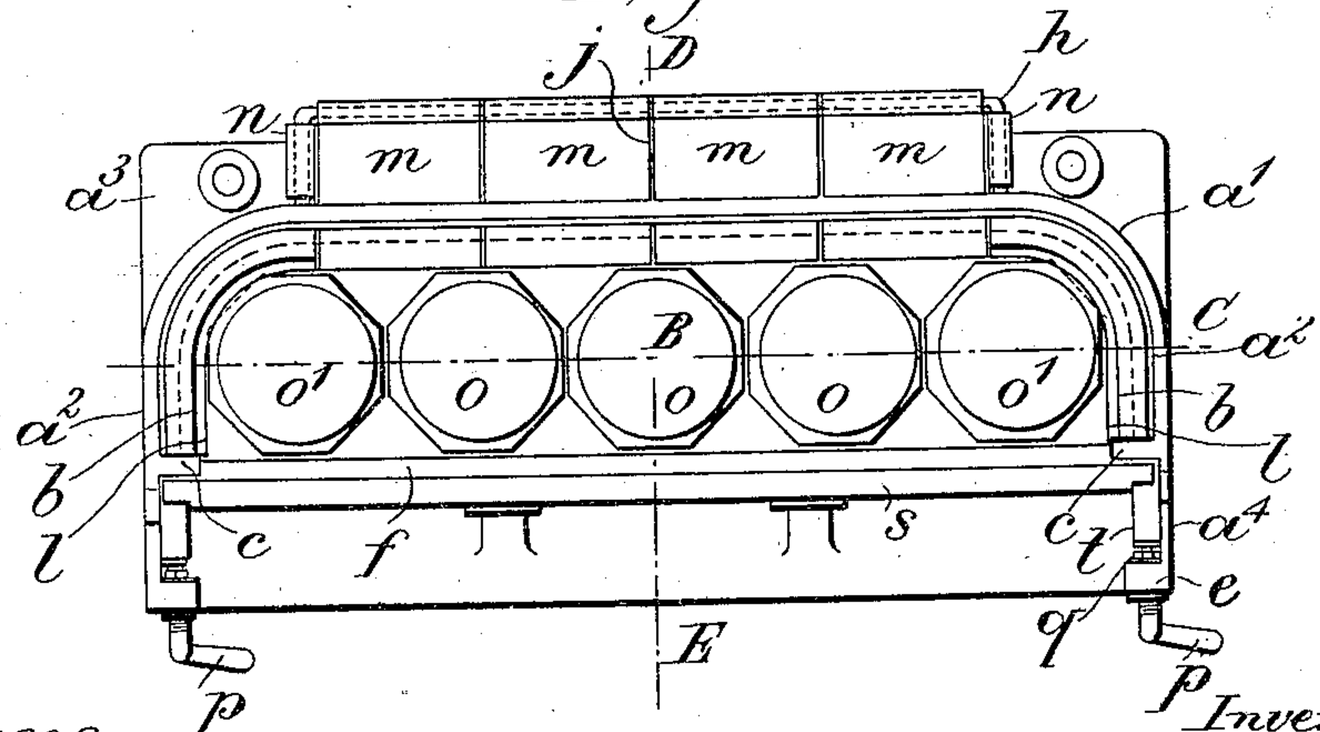


Fig. 2.



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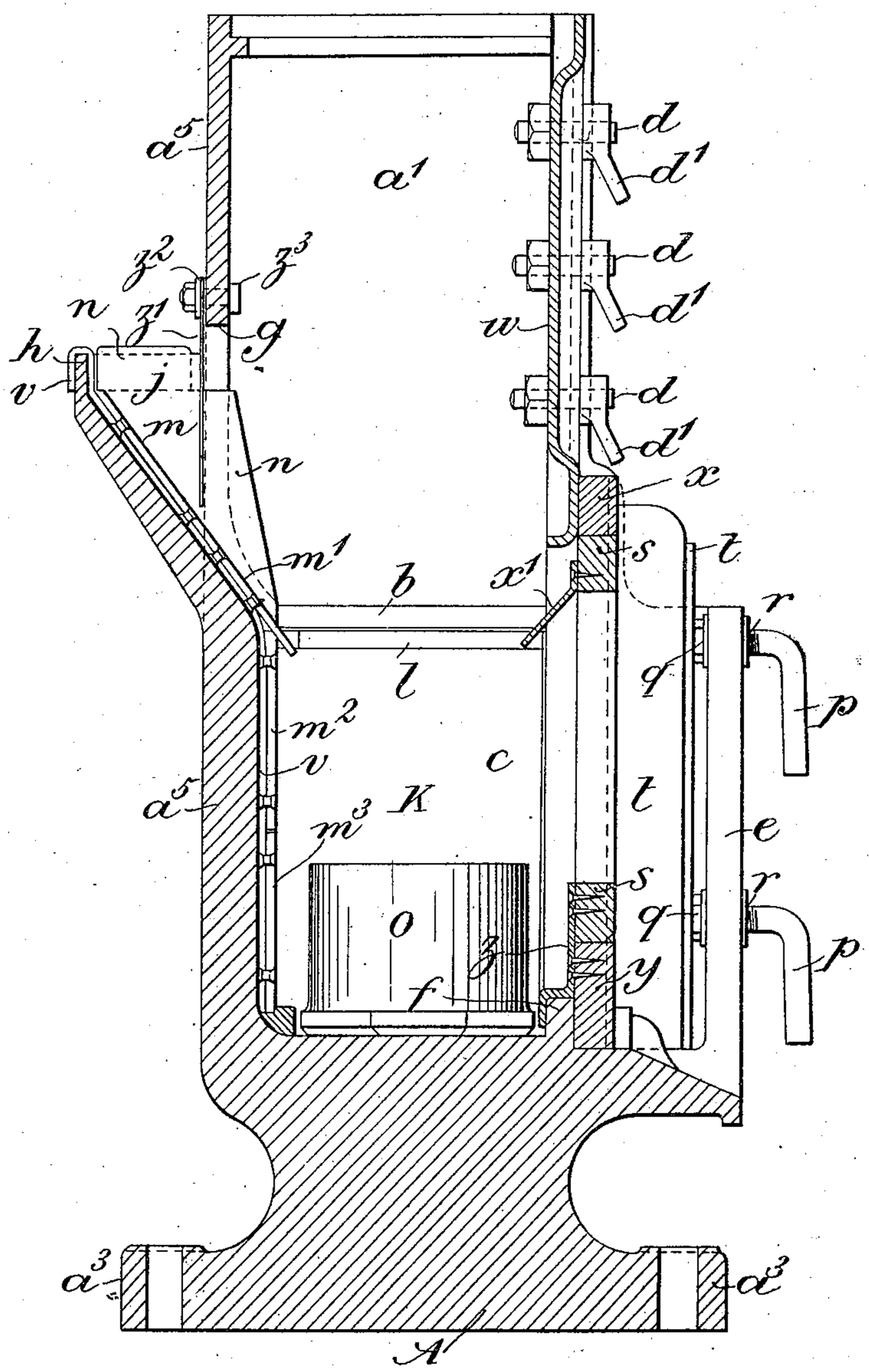
4 SHEETS—SHEET 2.

Fig. 3.



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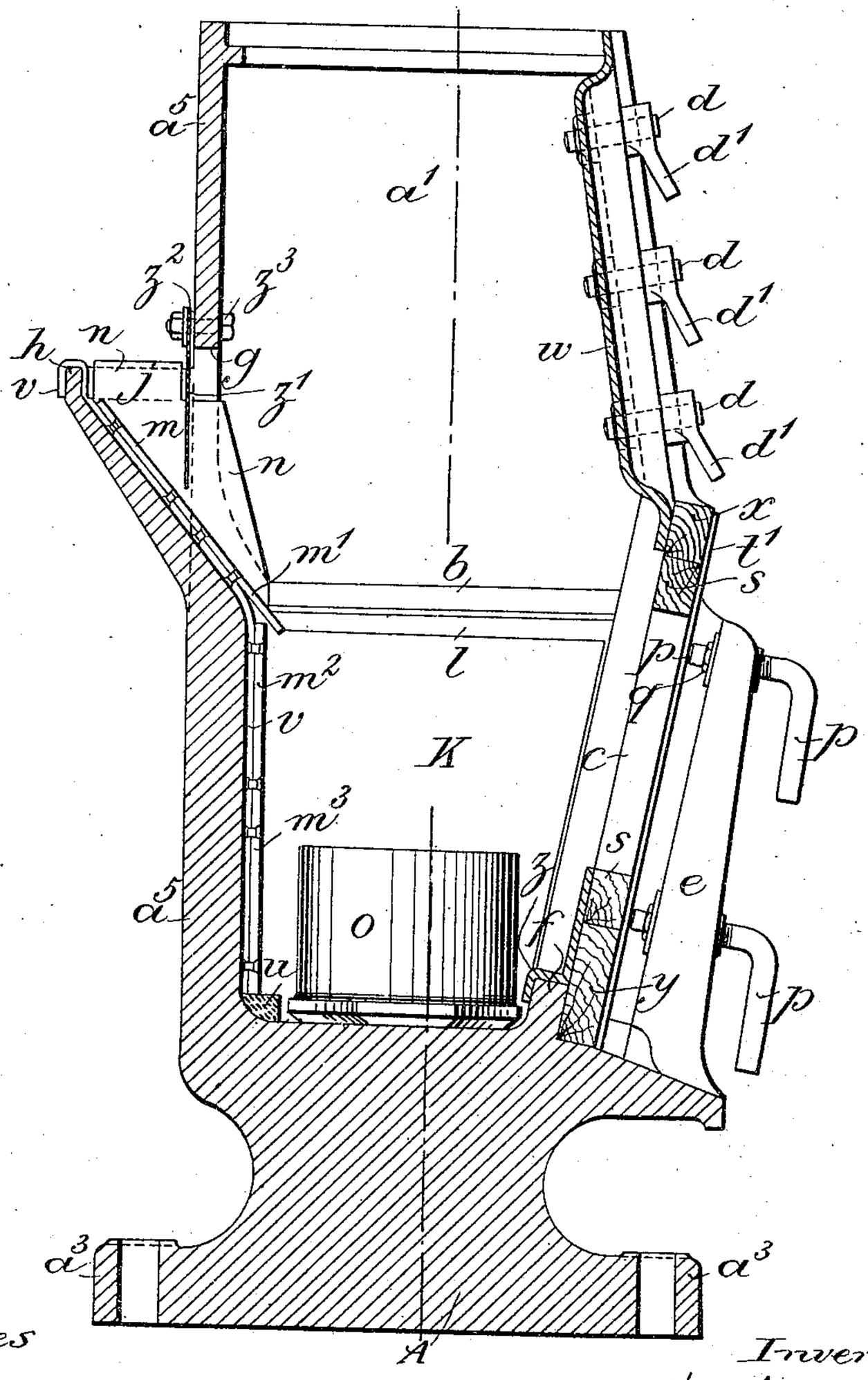
4 SHEETS—SHEET 3.

Fig. 4.



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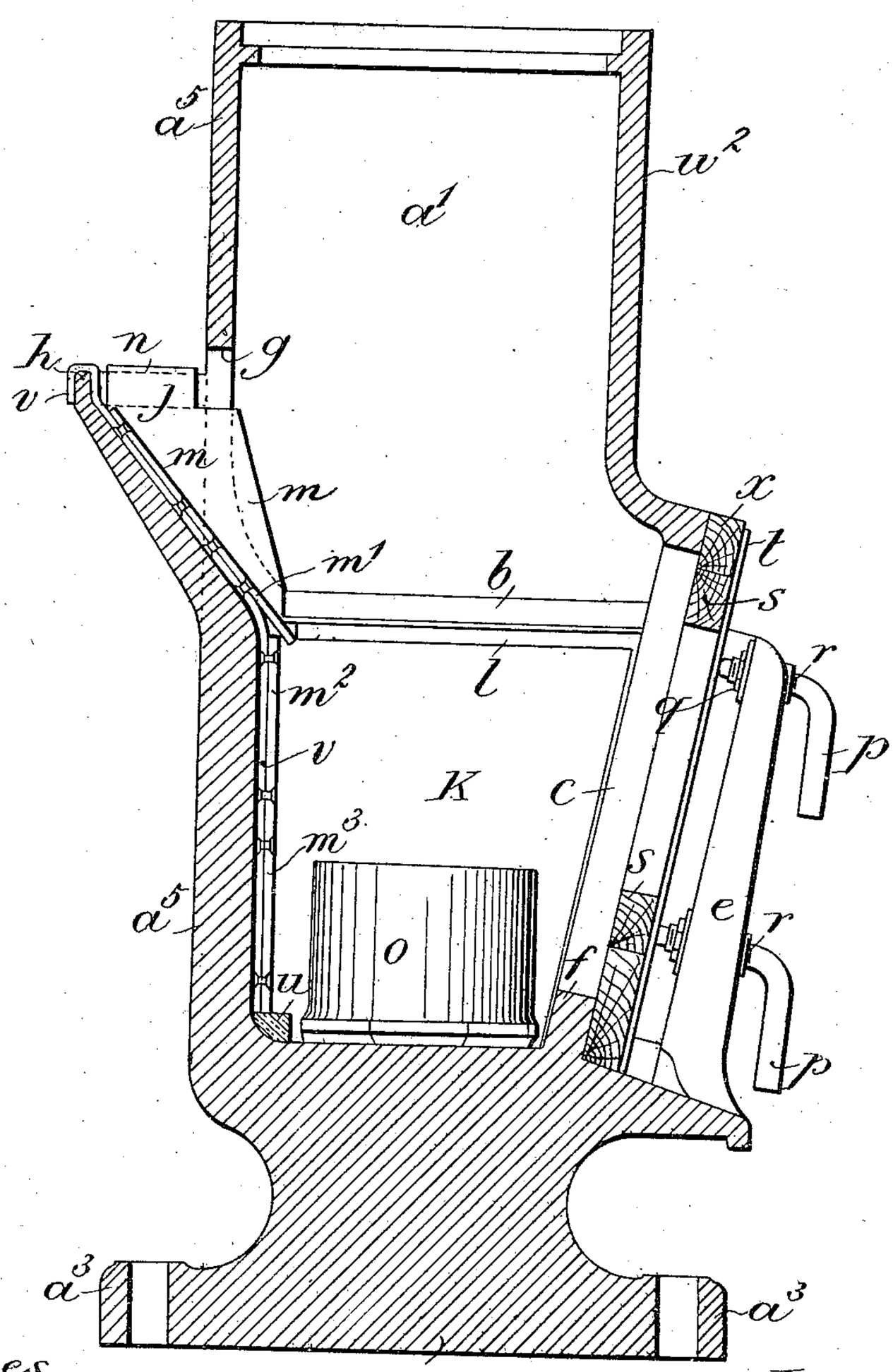
4 SHEETS—SHEET 4.

Fig. 5.



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UNITED STATES PATENT OFFICE.

DAVID ALEXANDER BREMNER, OF LONDON, ENGLAND.

MORTAR-BOX FOR STAMP-MILLS.

No. 877,291. Specification of Letters Patent. Patented Jan. 21, 1908.

Application filed July 31, 1905. Serial No. 272,083.

To all whom it may concern:

Be it known that I, DAVID ALEXANDER BREMNER, a subject of the King of Great Britain and Ireland, residing at London, England, have invented Improvements in Mortar-Boxes for Stamp-Mills, of which the following is a specification.

This invention relates to mortar boxes for stamp mills, such as are used for crushing mineral ores and other substances, and its objects are to expedite the discharge of the crushed material, to prevent the accumulation of crushed or partially crushed material in the vicinity of the end stamps and the choking of the feed mouth by the lodgment of material therein, to facilitate the removal and replacement of the screen and of the interior linings of the box, and to reduce the wastage of lining material.

In the accompanying drawings Figures 1 to 3 illustrate the application of this invention to a mortar box constructed with a removable front in accordance with Morison's British Patent No. 10890 A. D. 1901 and United States Patent No. 755,913 of March 29, 1904 and fitted with a vertical screen. In Fig. 1 the left hand half is a front elevation of the box with the front, screen, and chuck block removed, and the right hand half is a section on the line B—C of Fig. 2, one end die being, however, shown in elevation. Fig. 2 is a plan view, showing the screen and the five dies in position. Fig. 3 is a transverse section on the line D—E of Fig. 2 the dies being, however, shown in elevation. Figs. 4 and 5 are similar views to Fig. 3 showing this invention applied to other types of mortar boxes.

Referring to Figs. 1, 2 and 3, in this example the feed mouth j extends practically from center to center of the end stamps coinciding with the centers of the two dies o^1 at either end of the box as shown in Fig. 2. The upper edges g of the opening in the back wall a^5 of the body of the box A, communicating with the feed mouth, j, is at a higher level than the outer lip h of the latter so that the entering material being unconfined on the side nearer the stamps, will not lodge in the feed mouth and to check the ejection of crushed material and water through the feed mouth j, a swinging or flexible screen or partition z^1 of canvas, leather, or other suitable material is suspended from the overhanging wall a^5 of the box, to which it is attached by means of the flat iron clamping bars z^2 and bolts z^3; the screen z^1 may advantageously be vertically sub-divided into a number of independent sections so that the passage of material under it at one point may not displace the entire screen and possibly create open spaces through which splashes of pulp might be ejected.

In Figs. 1–3 the lower and thicker portions of the back wall a^5 and the end walls a^2 of the body of the box A are vertical up to a height corresponding approximately to the top of the opening in the screen frame s. In the direction of the length of the box, the back wall a^5, below the feed opening j, is straight throughout a distance corresponding approximately to the inside length of the latter between its end walls n. Each end wall a^2 of the box is straight in the direction transverse to the length of the box, from the screen seating flange c to a point corresponding with the longitudinal center line of the stamps. At either end of the box the inner face of the wall extending between the contiguous ends of the aforesaid straight back and end walls, is a concave cylindrical surface embracing an angle of 90° struck from the center of the adjacent end stamp, at a radius equal to the perpendicular distance therefrom to the inner face of the back wall a^5 of the box, and to which cylindrical surface the inner surfaces of the straight back and end walls are tangential. The aforesaid curved walls may, however, be curved to a larger radius than that specified above and shown in the accompanying drawings, in which case the curve would be struck from a center located on the screen side of the center of the adjacent end stamp, and the wall of the box may be entirely curvilinear from the end of the straight back wall round to the screen seating flange, or the curvature may be of increasing radius towards the latter.

The desired object of gradually deflecting the wave of pulp from the back of the box around the end stamps and out through the screen can be accomplished by either of the above mentioned alternative constructions.

A further advantage resulting from the above described formation and proportions of the interior of the box is that the screen opening extends well beyond the end stamps, and that the edges at each end thereof can be made flush with the wearing faces of the end liners contiguous thereto throughout the full height of the latter, thus obviating the formation of shoulders or opposing

surfaces tending to check the discharge of pulp from the extreme ends of the box.

At each end of the box an inwardly projecting rib *b* is cast on or attached to the inner face of the walls, at such a height that its underside is approximately level with the top of the opening in the screen frame *s*. Below each rib *b* is inserted a cast steel segmental liner K curved to conform to the curvature of the contiguous wall a^2 of the box casting, and extending around from the inner face of the screen seating flange *c* to the inner face of the corresponding end wall *n* of the feed mouth *j*. The liners K are flanged inwardly at top and bottom, the upper flange *l* projecting beyond the edge of the rib *b* to protect the latter from wear, and the lower flange being shaped to fit around the base of the adjacent die o^1 and prevent displacement of the latter. A bar *u* of cast steel or other suitable material is placed in the back bottom corner of the box, and extends lengthwise between the edges of the end liners K which it assists to retain in position. This bar *u* also acts as a stop to check lateral displacement of the dies *o*, o^1. The bar *u* is laid on the bottom of the box against the back wall of the latter, and inserted between the lower ends of the end liners after the end liners have been placed in position.

The sloping bottom of the feed mouth *j* and the corresponding straight portion of the back wall a^5 of the box A are protected from wear by the cast steel liner plates *m*, m^1, m^2, m^3, riveted on to mild steel apron plates *v* which are bent to conform to the shape of the underlying surfaces and preferably hook on to the outer lip *h* of the feed mouth *j* from which they are suspended. For convenience of handling, the apron plates and liners are subdivided into four separate and interchangeable parallel sections, each of which extends from the lip *h* of the feed mouth *j* down to the top of the bar *u*. The end walls of the feed mouth *j* are protected by liners *n* which hook on to the edges thereof.

The shape and dimensions of the feed mouth *j* and the feed opening in the back wall a^5 of the box, are such that the lining described above can be readily withdrawn from or inserted into position through the feed mouth, and its suspension from the lip of the latter obviates the use of bolts or other fastenings to retain it in position. The linings may be made of cast steel, steel plate, or other suitable material, and are secured by rivets or other means so as to enable any individual wearing plate, which may have become so badly worn as to require renewal, to be readily removed and replaced by a new plate, without involving the wastage of considerable unworn portions of the liners. For the purpose of forming a continuation along the back of the box of the inwardly projecting flange *l* the wearing plates m^1 may be made to overhang the wearing plates m^2 as shown.

As will be obvious, the use and advantages of such a construction and disposition of linings are not restricted to mortar boxes of the particular form and proportions hereinbefore described. They may, for example, be applied to mortar boxes in which the corners are either square or curved to a comparatively small radius.

The screen opening is of such a length that the edges of the screen seating flanges *c*, *c* are flush with the inner faces of the contiguous portions of the end liners K, so that there are no shoulders or other opposing surfaces to retard the discharge of the pulp through the screen at each end of the box.

The screen frame *s* is held up to the face of the seating flanges *c* by wooden filling blocks *t* and screws *r* working in threaded gunmetal bushes *q* supported in holes in the flanges *e* formed on the extensions a^4 of the end walls a^2 of the box casting A. The filling blocks *t* are each fitted with a metal backing t^1 to take the pressure of the screws *r*. The threaded bushes *q* are made with a hexagonal flange at the end nearest the screen *s*, and are so located that when in position a cant or facet of the flange closely approaches the face of the adjacent wall a^4 of the box casting, the bush being thereby prevented from turning. The screws *r* are made with long single ended handles *p* and the bushes *q* are so adjusted that, when the screws are tightened up to the filling blocks *t*, their handles lie on the right hand side of the vertical position. Under the influence of vibration the movement of the handle about the axis of the screw tends to turn the latter, and keep it tightened up against the filling block *t*. When, owing to wear or other cause, the screw becomes tight when the handle is on the left hand side of the vertical position, it can be readily restored to its self tightening position by removing the screw and filling block from their places, drawing the bush *q* out of its seat, turning it round and re-inserting it in the required position. It will be obvious that there are a variety of means whereby the bush may be adjusted and held in any required position.

The screen is preferably held in a vertical position and as close to the stamps as may be conformable with the other constructional requirements; such a disposition of the screen having been found in practice to conduce to a rapid discharge of the crushed material.

The discharge lip *f* of the box A is protected from wear by the liner plate *z* attached to the chuck block *y*. When the position of the screen *s* is such that the top bar of the screen frame does not overlap the joint face at the bottom of the removable front *w*, the filling board *x* is inserted to make the joint.

To check the useless splashing of the pulp up past the screen *s*, a metal baffle plate or deflector x^1 is attached to the top bar of the screen frame. Where the proportions of the box and stamps require it, as in Figs. 1 to 3, the baffle plate x^1 is scalloped out to fit round the stamp heads.

Fig. 4 illustrates the application of my invention to a mortar box with an inclined screen *s* and an oppositely inclined removable front *w*. In this case the filling blocks *t* shown in Figs. 1 to 3 are dispensed with because, when the screws *r* are slackened, the screen *s* can be freely removed upward, if the tail nuts d^1 on the lowermost of the door fastening bolts *d* be turned into the required position.

Fig. 5 illustrates the application of my invention to an ordinary mortar box, in which the front wall w^2, above the screen opening is integral with the box casting A. In this case also the filling blocks *t* are dispensed with because there is no obstruction to the upward removal of the screen *s* as soon as the screws *p* are slackened.

What I claim is:—

1. In a stamp mill having a series of stamps, a mortar box with a screen opening at the front, and solid end portions each formed inside with curved concave surface of considerable radius adapted to guide the pulp round the end stamps towards the front of the box, as set forth.

2. In a stamp mill having a series of stamps, a mortar box with a screen opening at the front and solid ends comprising front portions the internal surfaces of which are perpendicular to the back wall and intermediate portions having concave internal surfaces curved to a radius approximately equal to the distance between the center of the adjacent end stamp and the back wall of the box, said curved and perpendicular surfaces being adapted to guide the pulp round the end stamps and towards the front of the box, as set forth.

3. In a mortar box having a screen opening in its front wall, a back wall which is practically vertical to a height corresponding to the top of the screen opening, a feed opening in said back wall and a feed mouth with a sloping bottom, linings extending over said bottom, through the feed opening and over the corresponding length of the said back wall of the box below the tops of the dies, said linings being adapted to be withdrawn from and inserted into position through the feed mouth opening, as set forth.

4. In a mortar box having a screen opening in its front wall, a back wall which is practically vertical to a height corresponding to the top of the screen opening, a feed opening in said back wall and a feed mouth with a sloping bottom, linings extending over said bottom, through the feed opening and over the corresponding length of the said back wall of the box below the tops of the dies, said linings being adapted to be withdrawn from and inserted into position through the feed mouth opening, end liners for the end walls of the box and a bar extending along the back of the box and engaging with the lower parts of the back and end liners, as set forth.

5. A mortar box having a feed opening in the back wall thereof and a feed mouth with sloping bottom wherein said bottom and the corresponding length of the back wall are lined with an apron plate and renewable faces detachably secured thereto, said apron with attached faces being adapted to be withdrawn from and inserted into position through the feed mouth, as set forth.

6. A mortar box having a feed opening in the back wall thereof and a feed mouth with sloping bottom wherein said bottom and the corresponding length of the back wall are lined with an apron plate and renewable faces detachably secured thereto, said apron with attached faces being adapted to be withdrawn from and inserted into position through the feed mouth and the said apron plate being adapted to hook over the lip thereof, as set forth.

7. In a mortar box, the combination of internal ribs upon the end walls of the box, end liners inserted beneath said ribs and a bar extending along the back of the box and engaging with the end liners and retaining them in position, as set forth.

8. In a mortar box, the combination of internal ribs upon the end walls of the box, end liners inserted beneath said ribs and a bar extending along the back and at the bottom of the box and engaging with the lower parts of the end liners and retaining them in position, as set forth.

9. In a mortar box, the combination of internal ribs upon the end walls of the box, end liners inserted beneath said ribs, a bar extending along the back and at the bottom of the box and engaging with the end liners and retaining them in position and, at the back of the box, liners the lower edges of which engage with said bar, as set forth.

10. A mortar box wherein the screen frame is held up to the joint faces by means of screws supported in extensions or lugs, which screws are constructed with unbalanced handles and mounted in threaded bushes adapted to be set in suchwise that, when the screws are tightened up, the handles occupy such positions that under the influence of vibration they will tend to cause tightening of the screws, as set forth.

11. In a mortar box, a screen opening, joint faces around same, angularly adjustable threaded bushes mounted in abutments, means for fixing said bushes in given adjusted angular positions, screws mounted

in said bushes and adapted on rotation to move towards or from the joint faces, and unbalanced projections on said screws, as set forth.

12. In a mortar box, a screen opening, joint faces around same, angularly adjustable threaded bushes mounted in abutments, means for fixing said bushes in given adjusted angular positions, screws mounted in said bushes and adapted on rotation to move towards or from the joint faces, and unbalanced handles on said screws, as set forth.

13. In a stamp mill having a series of stamps, a mortar box with solid end portions formed inside with curved concave surfaces and a screen opening in the front of such length that the edges of the screen seating flanges are flush with the inner concave surfaces of the ends of the box, the curvature of said concave end surfaces being of considerable radius and adapted to guide the pulp round the end stamps and outwards through the screen opening, as set forth.

Signed at West Hartlepool, England this twentieth day of July 1905.

DAVID ALEXANDER BREMNER.

Witnesses:
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JOHN WILLIAM WALTON.