

(No Model.)

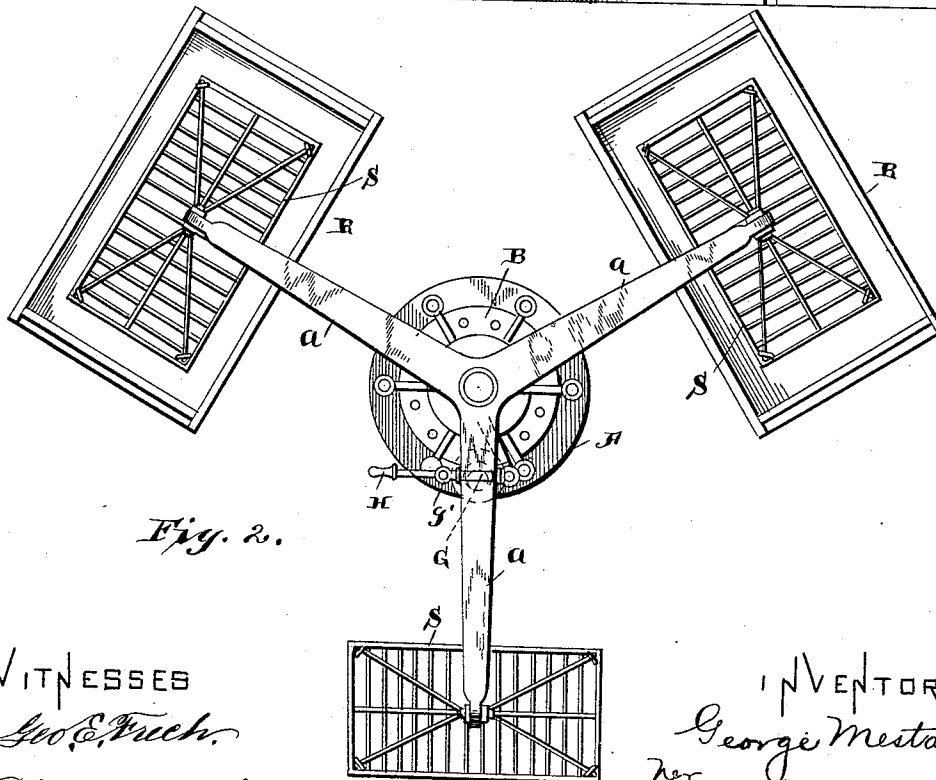
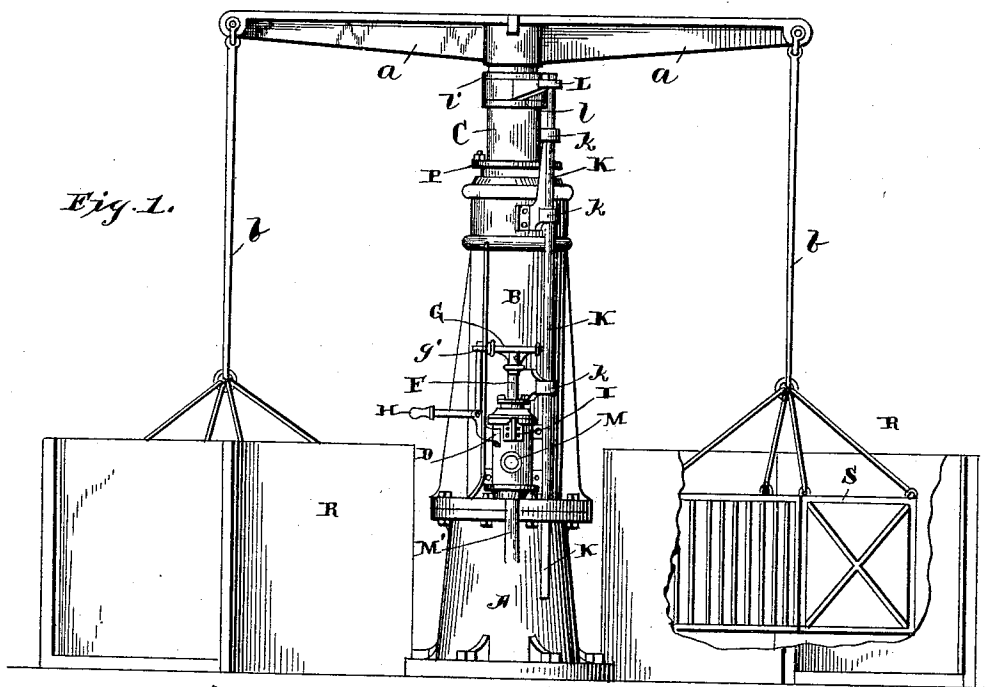
3 Sheets—Sheet 1.

G. MESTA.

APPARATUS FOR PICKLING AND WASHING METAL PLATES, &c.

No. 484,664.

Patented Oct. 18, 1892.



WITNESSES

Geo. E. French.

Col. A. Fitzgerald.

INVENTOR

George Mesta

per
Lehman Patterson Nesbit
Attys

(No Model.)

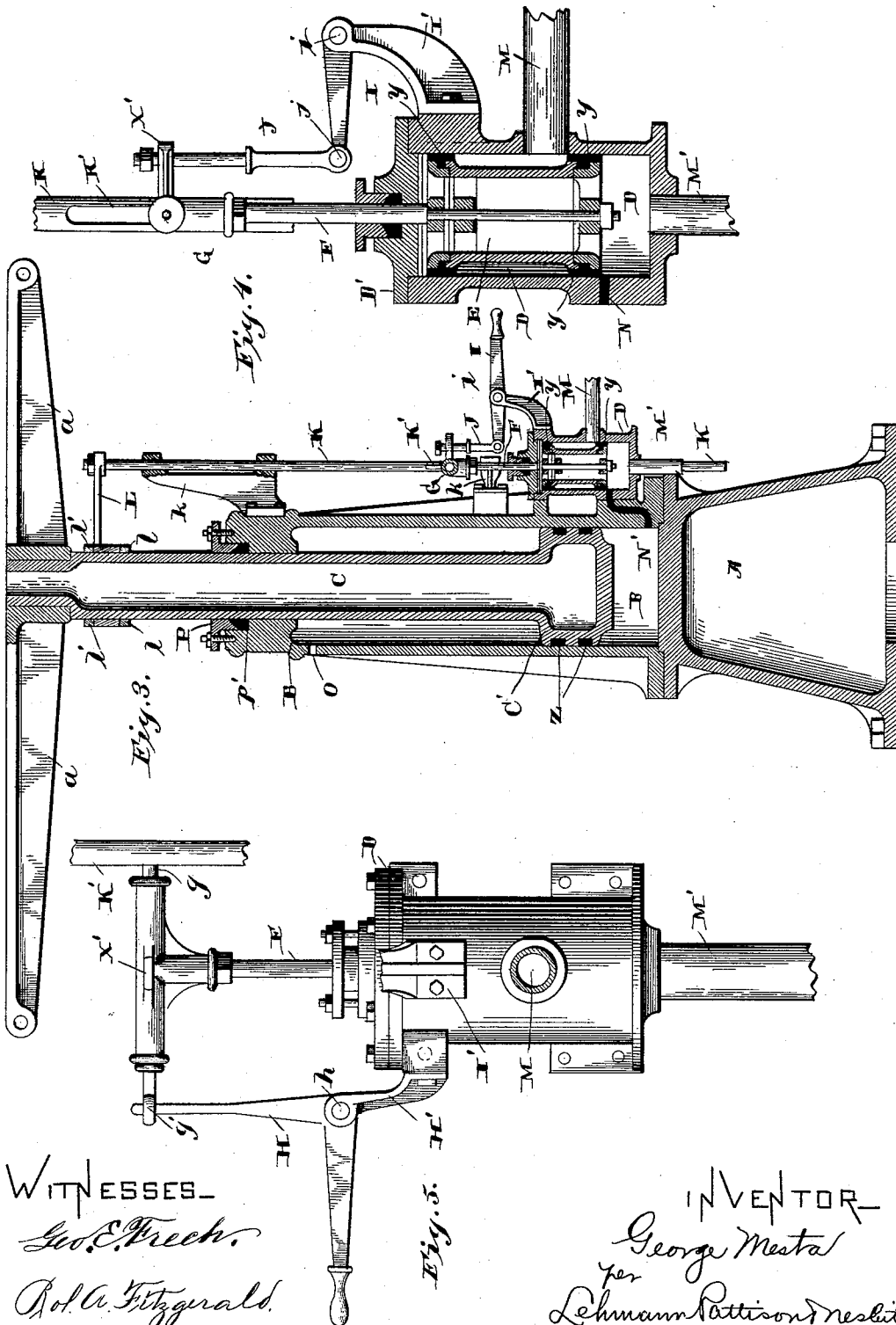
3 Sheets—Sheet 2.

G. MESTA.

APPARATUS FOR PICKLING AND WASHING METAL PLATES, &c.

No. 484,664.

Patented Oct. 18, 1892.



(No Model.)

3 Sheets—Sheet 3.

G. MESTA.

APPARATUS FOR PICKLING AND WASHING METAL PLATES, &c.

No. 484,664.

Patented Oct. 18, 1892.

Fig. 6.

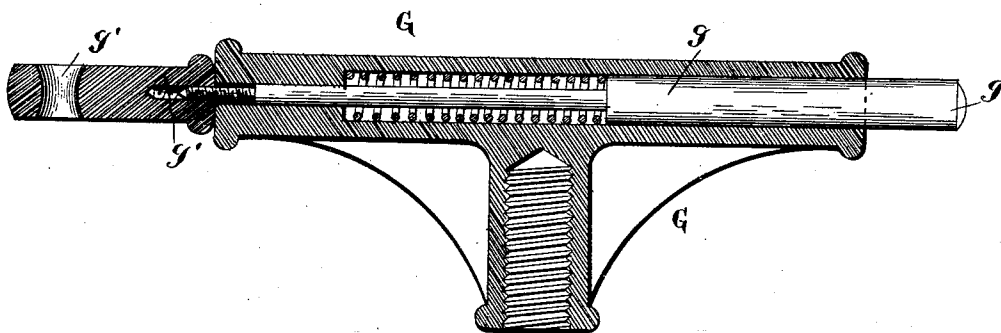
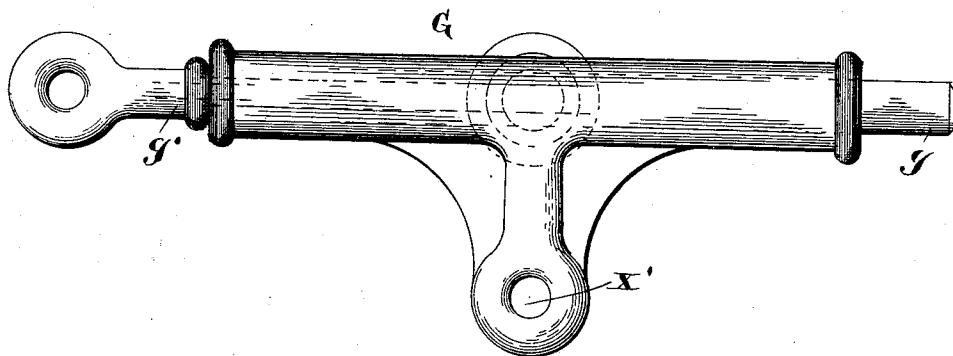


Fig. 7.



WITNESSES

Geo. E. Truch.

Robt. A. Fitzgerald.

INVENTOR

George Mesta

per

Lehmann Patterson & Nesbitt

attys.

UNITED STATES PATENT OFFICE.

GEORGE MESTA, OF PITTSBURG, PENNSYLVANIA.

APPARATUS FOR PICKLING AND WASHING METAL PLATES, &c.

SPECIFICATION forming part of Letters Patent No. 484,664, dated October 18, 1892.

Application filed January 2, 1892. Serial No. 416,907. (No model.)

To all whom it may concern:

Be it known that I, GEORGE MESTA, a citizen of the United States, residing at Pittsburgh, county of Allegheny, and State of Pennsylvania, have invented a new and useful Improvement in Machinery or Apparatus for Pickling and Washing Metal Plates and other Wares, of which the following is a specification.

My invention relates to improvements in pickling and washing machines in which crates containing the plates or wares to be pickled and washed are operated automatically and vertically within vats containing the pickling and washing liquids by means of a vertical plunger operating in a vertical cylinder. This plunger has a vertical and revolving motion within the cylinder, and has attached to its top a spider or three or more cross-arms, to which the crates operating within the vats are fastened. The plunger is operated automatically by steam, gas, or hydraulic pressure transmitted to the cylinder through a balance piston-valve which is attached to the cylinder. This valve is so constructed that the motion of the plunger can be changed while in operation from an automatic movement to a hand movement and from a short stroke to a long stroke comprehending the full length of the cylinder, thereby subjecting the motion of the plunger to a full and entire control of the operator, and at the same time applying the same motions or movements to the crates operating within the vats containing the pickling and washing liquids. I thus accomplish the following objects: First, a vertical motion is applied automatically or otherwise to the crates operating within the vats; second, a vertical motion is applied automatically or otherwise to the plunger; third, a revolving motion, when deemed necessary or convenient, can be applied to the crates and plunger or either of them; and fourth, the amount of labor formerly required in said operation of pickling and washing is thereby reduced, and I employ a minimum number of workmen. I attain these objects by the mechanism or machinery illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of the machine with crates attached and suspended in vats

containing the liquid, the side of one vat being open to show the position of the crate when in the vat; Fig. 2, a plan of the machine, showing the spider or three cross-arms attached to the top of the plunger. More than three cross-arms can be used, if deemed necessary or convenient, with the crates suspended from the cross-arms and two vats containing pickling and washing liquids. Fig. 3 is a vertical section of the spider or cross-arms, plunger, cylinder, base supporting the cylinder, and automatic balance piston-valve attached to the cylinder; Fig. 4, a vertical section of the automatic valve detached from the cylinder and also part of the rod which connects the plunger with the valve; Fig. 5, an outside elevation of the automatic valve detached from the cylinder and a part of the rod which connects the plunger with the valve; Fig. 6, a vertical section of the part which is attached to the top of the valve-stem; Fig. 7, a plan of the part which is attached to the top of the valve-stem.

Similar letters refer to similar parts throughout the several views.

A represents the cylindrical base, made of cast iron or any other suitable material, and rests upon a foundation which can be made of stone, brick, iron, or other material of sufficient strength or durability. This base forms the bottom head and supports the cylinder B. This cylinder is securely fastened to base A by means of bolts, as shown in Fig. 1, or any other mechanical device whereby a tight joint can be obtained, so as not to permit the escape of the steam, gas, or any element which may be employed in operating the plunger.

C is the piston or plunger which operates within the cylinder B, as shown in Fig. 3. The lower end of the plunger is so formed as to fit the cylinder, and on the top is fastened the spider or cross-arms *aaa*, as in Fig. 2. Three cross-arms are here represented as a matter of preference, though more than three could be used if deemed desirable.

S S S represent the crates, in which are placed the plates which are to be pickled and washed, and R represents the vats, one of which contains the pickling fluid and the other the washing fluid. After the plates are passed through the pickling liquid it may be deemed advisable, in order to be thoroughly washed

or cleaned, to pass them through more than one washing liquid. This object can easily be accomplished by adding more vats, so that two or more vats are used containing the washing liquid. In this case the spider will be made of a corresponding number of cross-arms, each arm to operate in conjunction with a vat, so that when the power is applied to the plunger the plates immersed in a vertical position in the vats containing the acid or pickling fluid receive a vertical motion and are being pickled, and simultaneously the pickled plates receive a vertical motion and are being washed in the vats, which may be one or more, containing the washing fluid, and simultaneously the washed plates are being removed from the crates and new or black plates are placed therein, ready for the pickling and washing process. These crates *SS* are attached to the cross-arms *aa* by means of the rods *bb*, as appears in Fig. 1. These rods are made of convenient lengths, and so constructed and fastened by any known mechanical device that the operator may either detach them from the cross-arms *aa* or the crates *S*. This is a matter of preference and depends upon circumstances; but the rods are so constructed as to be detachable. By this means the crate *S*, which contains the washed plates, is disconnected from the machine and is emptied and refilled with new plates. The plates in the remaining crates are being pickled and washed, and these three operations are conducted simultaneously, necessitating no stoppage of the machine. When it is desired to move the crates from one vat to the other, or from the washing-vat to the place where they are disconnected, they are raised above the top of the vats, by a process which is to be hereinafter described and explained, and swung into any desired position by means of the plunger *C*, which supports the cross-arms, and is caused to revolve in the cylinder.

The crates, as appear in Fig. 2, are made on a number of cross-bars or any other convenient manner; but so designed as to hold the plates in a vertical position when immersed in the liquids.

Fig. 1 shows the position of the crates within the vats. They can be made of wood or any other suitable material. They are connected with the cross-arms by means of a rod.

My object is to lower the plates vertically in the liquids and entirely immerse them, then by suddenly lifting the crate to force the liquids through and between the plates, and by a constant repetition of this process this constant dip of the plates vertically in and out of and up and down in the liquids to obtain a more perfect wash than has been obtained by any other process or machine. This is accomplished by the connection of the crates with the spider or cross-arms and the connection of the spider with the plunger. Let the power be applied automatically to the plunger. Immediately and necessarily the vertical

up-and-down motion is transferred to the crates and can be regulated at any degree of speed and any degree of length; but the length or the distance of the motion is dependent upon the stroke of the plunger. If the stroke of the plunger *C* be a short one, the motion to the crates will be short and quick. By preference the plunger is given a ten-inch stroke, because it is not deemed necessary to transfer a greater motion than that to the crates in order to accomplish a thorough washing, and the vats containing the liquids are made of proportionate sizes and dimensions. All other machines accomplish this pickling process by either moving the plates horizontally or angularly in the liquids, or by leaving the plates stationary agitate the liquids, or by applying to the cradles a rectilinear motion; and in the latter case crates are used in combination with cradles, and the cradles are operated within the vats by some outside power or appliance, and in no case is the direct vertical motion applied or can be to the crates holding the plates by the mechanism which is described and employed.

I will now describe and explain how the plunger *C* is operated in the cylinder *B* by means of the balance piston-valve, as shown in Figs. 3 and 4. The plunger has two movements, first, an automatic movement, second, a hand movement; also, a short stroke and a long stroke. In order to reciprocate the crates vertically within the vats and accomplish a thorough pickling and washing of the plates the automatic movement and short stroke of the plunger is used. When it is desired to transfer the crates from one vat to the other or to any convenient place for a renewal of the supply of plates, the hand movement and long stroke are employed. In that case the crates are raised bodily out of and above the vats. The plunger can then be revolved in the cylinder and the crates placed into any convenient position, or the plunger can remain stationary, thus enabling a change of crates. In either case it is under the full and absolute control of the operator.

The balance piston-valve, as represented in Figs. 4 and 5, consists of a hollow cylinder *D*, closed at the upper end by a movable head *D'*, and through which passes the valve-rod *F*. *M* represents the inlet-pipe to the cylinder; *M'*, the exhaust or outlet pipe. Through these pipes gas or other element or fluid employed in operation passes. In describing the operation of this valve I shall confine myself to the element steam, for convenience. Within the cylinder *D* operates a hollow cylinder *E*, of the usual construction, containing five parts, as appears in Fig. 4. *x* and *y* are outer rings of the cylinder *E*, preferably of brass, and closely fit into the large cylinder *D*, so as not to permit the escape of the steam from one part of the cylinder to the other. *F* is the valve-rod, and passes through the head *D'* and connects the cylinder *E* with the part *g*, as appears in Fig. 5. *K* is a rod

having a slot K', as appears in Fig. 4, supported in the brackets *k* and *k'*, and fastened to the plunger C by means of the arm L, and there held in position by two rings *l* and *l'*, as appears in Fig. 3. Fig. 7 represents part G, which connects the valve-rod F with the rod K, as appears in Fig. 5. Fig. 6 represents a vertical section of part G, and shows its construction. *g* is a rod with a shoulder, and is made to fit and move in part G. It is pressed out by means of a spring placed behind the shoulder, is attached to the eye *g'*, and the end of the rod *g* is made to fit and work in slot K', as appears in Fig. 5. I' is a bracket fastened to the valve D and supports the lever I by means of the pin *i*. J is a rod connected with the lever I by means of the pin *j* and passes through and is attached to the eye X' of part G, as in Fig. 4. H' is a bracket fastened to the valve D and supports the lever H by means of pin *h*. Lever H is attached to eye *g'* of part G, as in Fig. 5. The valve is attached to the cylinder B, and connected by means of the conduit or port *n* and *n'*, as appears in Fig. 3, and through which steam is transmitted from cylinder D to cylinder B.

In order to operate the machine and put the plunger C into motion, steam is admitted through the inlet-pipe M. The cylinder E is lowered to the bottom of the cylinder D by means of the lever I, which is fastened to the valve-rod F, as described above. The ring *y* thus passes below the port N, and the steam which has filled the cylinder D passes through the port N and N' into the cylinder B and immediately operates on the plunger by giving it an upward motion and forcing it to the top of cylinder B. The plunger carries with it the rod K, containing the slot K', and in which fits and works the rod *g*, as described above. The plunger moves upward until the rod *g* has reached the bottom of the slot K', as appears in Fig. 4. The upward motion of the plunger still continues; but by means of the valve-rod F, fastened to the part G, which works and fits in slot K' by means of the bar *g*, the valve E is moved upward from the bottom of the cylinder D until the ring *y* is raised above the port N and N'. The steam which has filled the lower chamber of cylinder B passes in the lower chamber of cylinder D and then into the atmosphere by means of the exhaust-pipe M'. The upward motion of the plunger ceases and immediately a downward motion results by force of gravity. The action of the pin *g* in the slot K' is now repeated. The rod K is now moved downward by the action of the plunger until the pin *g* strikes the top of slot K'. This lowers the cylinder E, and the downward motion continues until the ring *y* is lodged below the port N, when the steam in the upper chamber of the cylinder D, admitted through the inlet-pipe M, passes into the cylinder B, thus stopping the downward motion of the plunger and again forcing it upward and repeating the process above de-

scribed. By this connection of the valve with the cylinder B and plunger C, whereby the port N is automatically opened and closed, an automatic and continuous motion is given to the plunger and by means of the cross-arms transferred to the crates operating within the vats. This also gives to the plunger its short stroke; but it readily appears that this stroke can be regulated to any length by changing the dimensions of the slot K'. By this automatic opening and closing of the port N the plunger is given a continual action and will continue its vertical motion in the cylinder until the automatic connection is broken. When the plates are thoroughly pickled and washed and it is desirable to change the crates from one vat to the other, I break the automatic connection between the valve and the plunger C and accomplish it by means of the lever H, as described above. When the plunger C is on its upward course, the handles of the lever H are pressed downward. This forces the rod *g* out of the slot K' and disconnects the rod K from the valve-rod F. The plunger continues its ascent and carries with it the rod K, but transfers no motion to the cylinder E until C', the shoulder of plunger C, moves against the top of cylinder B. In this position it is held. The lower chamber of cylinder B is filled with steam and forms a cushion on which the plunger rests and on which it revolves. The crates can then be moved in any convenient position, emptied, and refilled or changed from one vat to the other, as necessity demands. This gives the plunger its long stroke and calls into play the hand movement. When it is desired to return again to the automatic motion, the cylinder E is operated by the lever I until the ring *y* is raised above the port N. The steam escapes from the cylinder B through the exhaust M', and the plunger descends until the rod *g* meets the slot K' and the connection is formed with the valve-rod F, and the plunger falls into its automatic motion.

In order to reduce friction to the minimum between the shoulder C' and the top of the cylinder B', the stuffing-ring P is attached, and which holds in position packing *p'* around the plunger. It also prevents the escape of the steam that passes into the upper chamber of the cylinder B through the rings Z in the plunger. By this means the steam is compressed in the upper chamber and the shoulder C' is prevented from striking the shoulder B', which would otherwise happen when the plunger was given its long stroke or revolved in the cylinder. Should there be too much steam held in the upper chamber, so as not to allow the plunger to make a sufficient stroke, a part of the steam can be released by means of a valve connected to the upper part of the cylinder at the opening O. The rod J and the end of the lever H are so constructed as to permit the part G to slide over them at the point of connection *g'* and X' when moved up and down by the action

of the plunger C; otherwise the levers H and I would be in constant motion when the plunger was operated automatically.

I am aware that prior to my invention pickling-machines have been in use by which the plates were pickled and washed by moving the crates which contained the plates in the liquids in an angular or horizontal motion, which is applied to the crates by means of steam operating in cylinders or from eccentrics which were driven from belts and pulleys; also, that balance piston-valves somewhat similar to the one I here use are in use on steam-engines; but

What I do claim as my invention, and desire to secure by Letters Patent, is—

1. In a pickling apparatus, a vertical cylinder, a plunger therein, spiders or arms secured to the upper protruding end of the plunger, crates suspended from the arms, vats for the crates, and a mechanism operated by the plunger for regulating the flow to the cylinder to impart a vertical movement to the plunger, the parts combined substantially as described.

2. A pickling apparatus comprising a vertical cylinder, a plunger therein carrying arms, crates suspended therefrom, a rod carried by the plunger, a valve for regulating the flow to the cylinder, and a connection between the said valve and the plunger-rod, substantially as specified.

3. A pickling apparatus comprising a vertical cylinder carrying a plunger, supporting arms carried by the upper end of the plunger, crates suspended therefrom, a rod carried by the plunger, a valve for regulating the flow to the cylinder, a device carried by the valve-rod engaging the said plunger-rod, and a lever for operating the said device to disengage it from the plunger-rod, substantially as set forth.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

GEO. MESTA.

Witnesses:

J. O. HORNING,
E. E. CRAUMER.