

(No Model.)

5 Sheets—Sheet 1.

J. A. SHOEMAKER.
SAND BLAST MACHINE.

No. 523,907.

Patented July 31, 1894.

Fig. 2

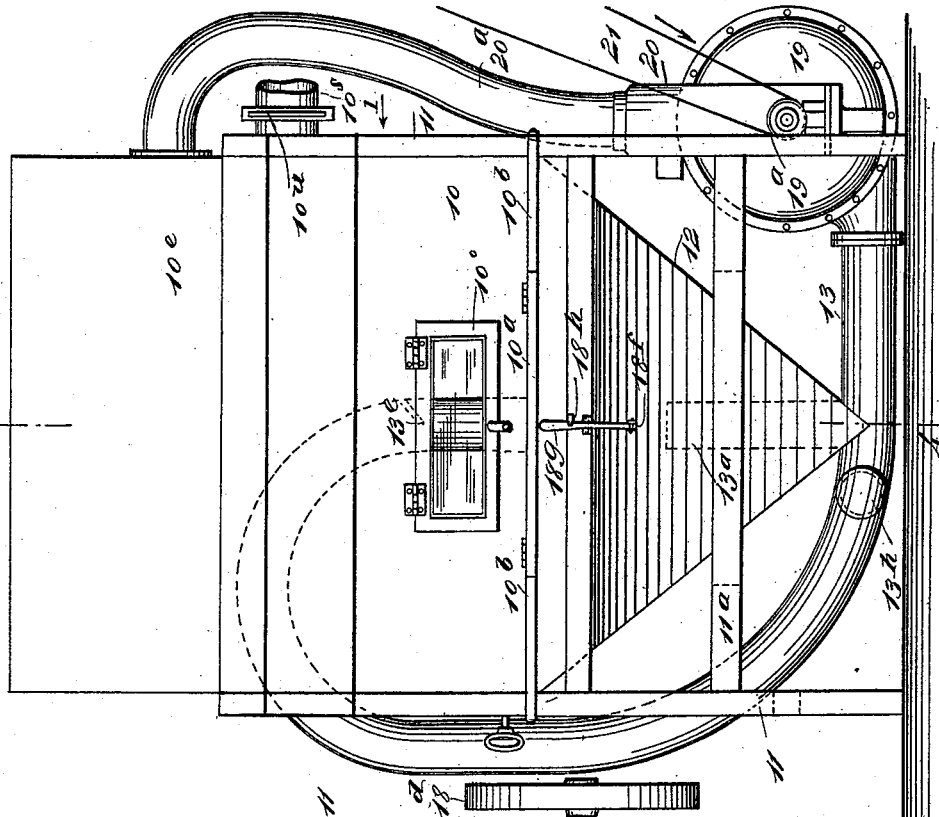
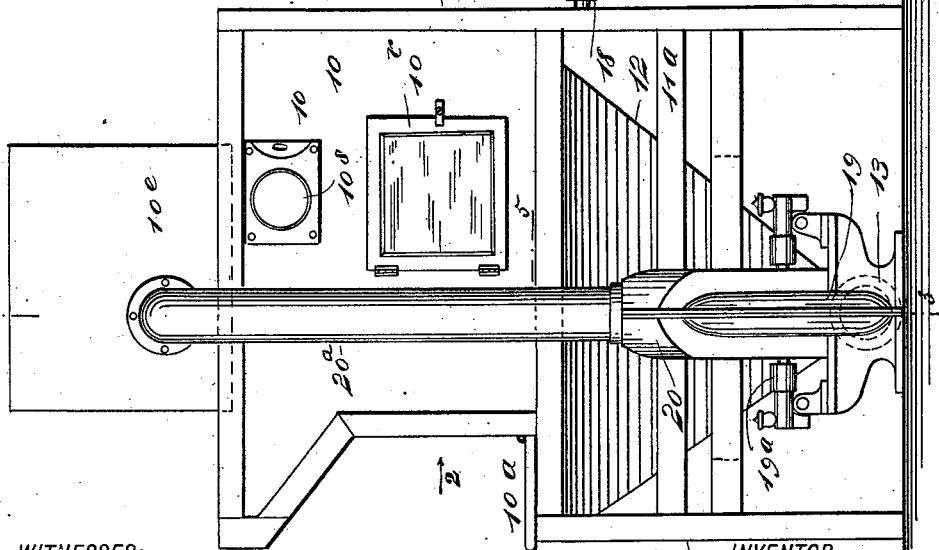


Fig. 1



WITNESSES:
C. Neveu
C. Bedgwick

INVENTOR
J. A. Shoemaker
BY *Munn & Co*
ATTORNEYS.

(No Model.)

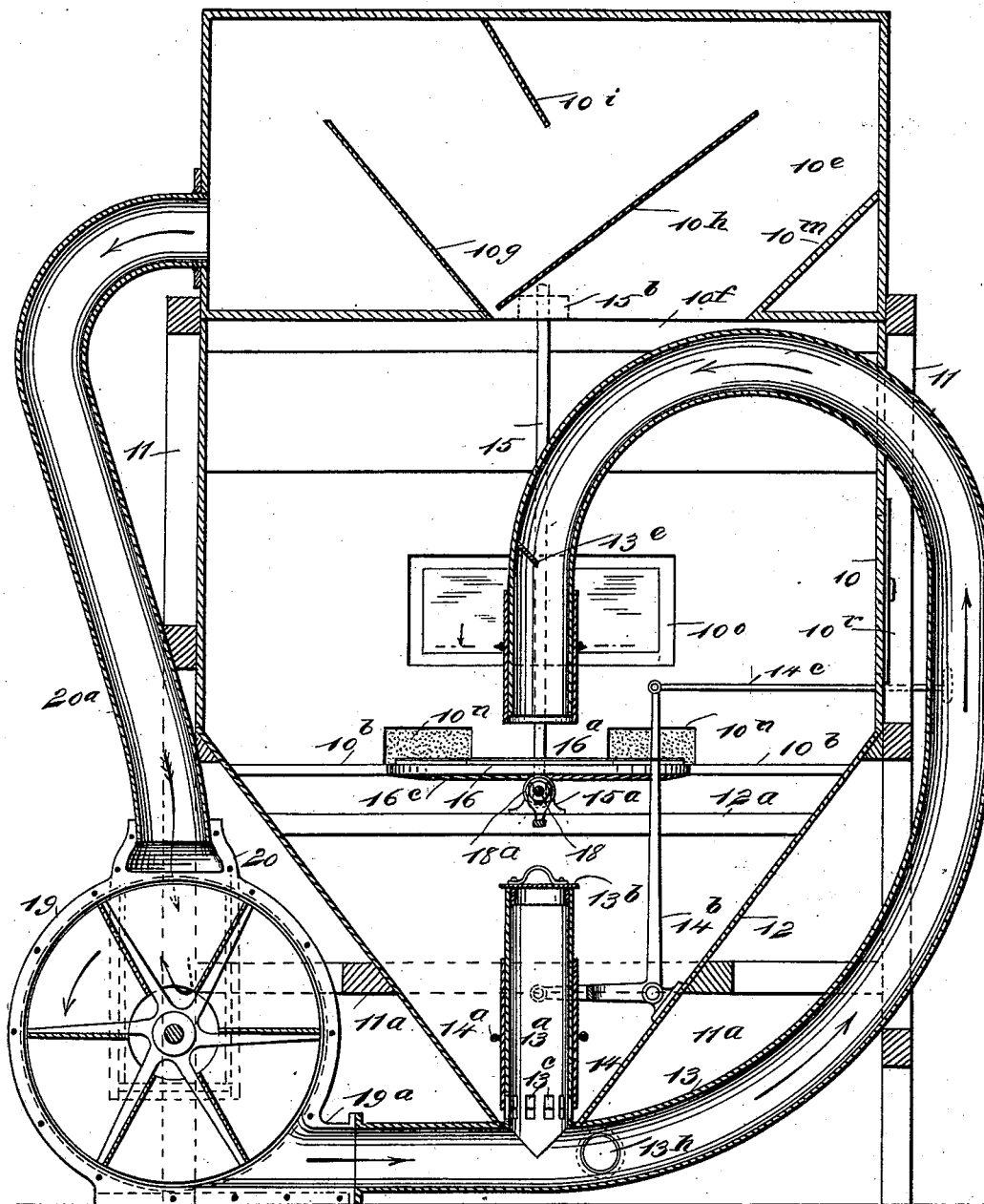
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Fig. 3



WITNESSES:

C. Neveu
C. Sedgwick

INVENTOR

J. A. Shoemaker
BY
Munn & Co
ATTORNEYS.

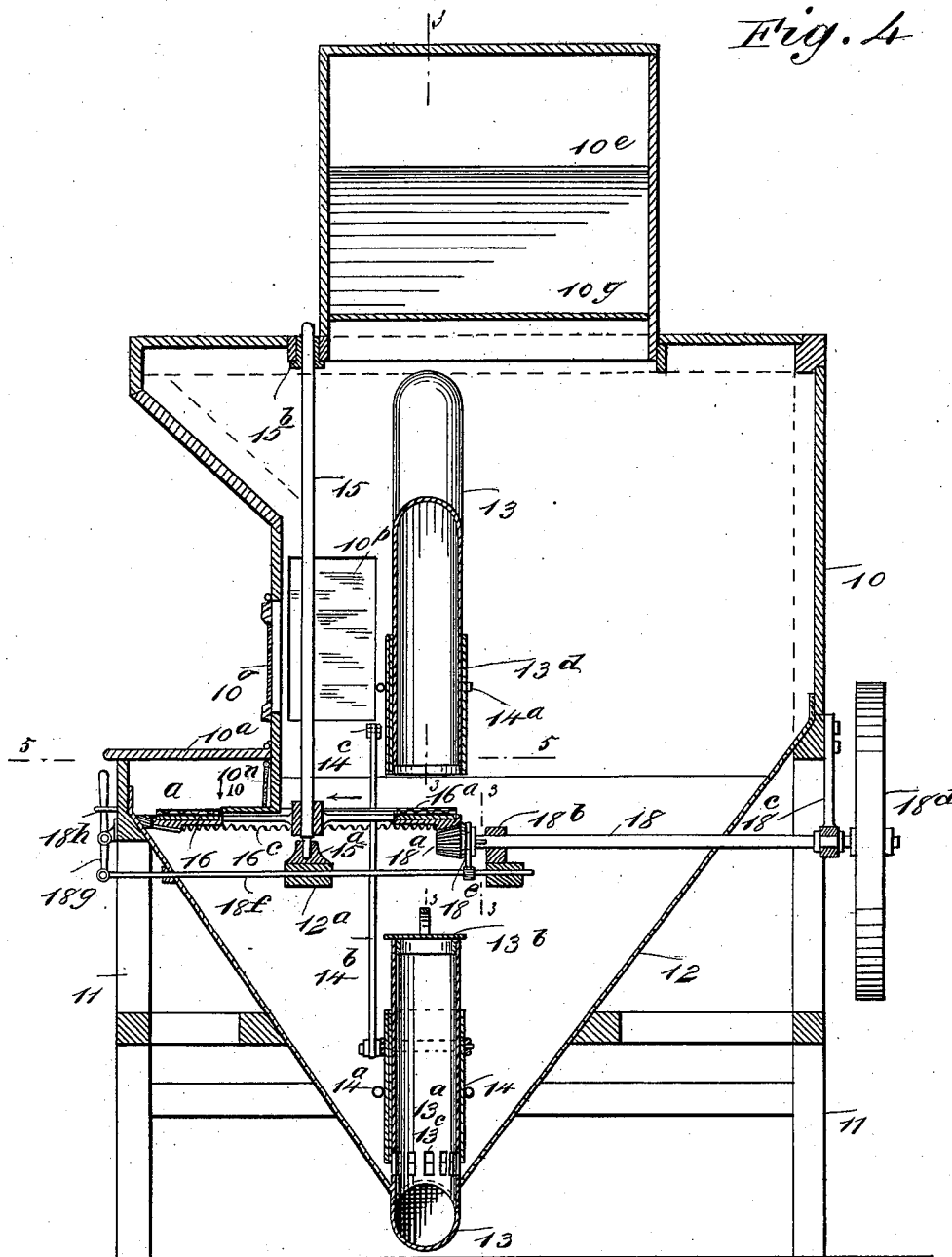
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WITNESSES:

C. N. Nix
C. Sedgwick

INVENTOR

J. A. Shoemaker
BY
Munn & Co.
ATTORNEYS.

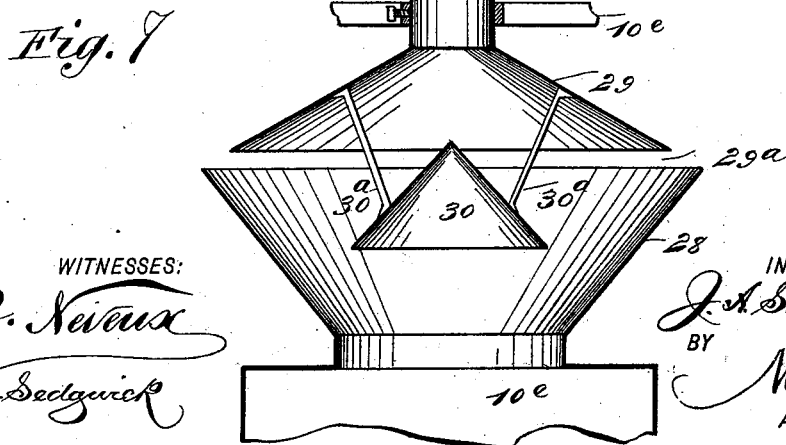
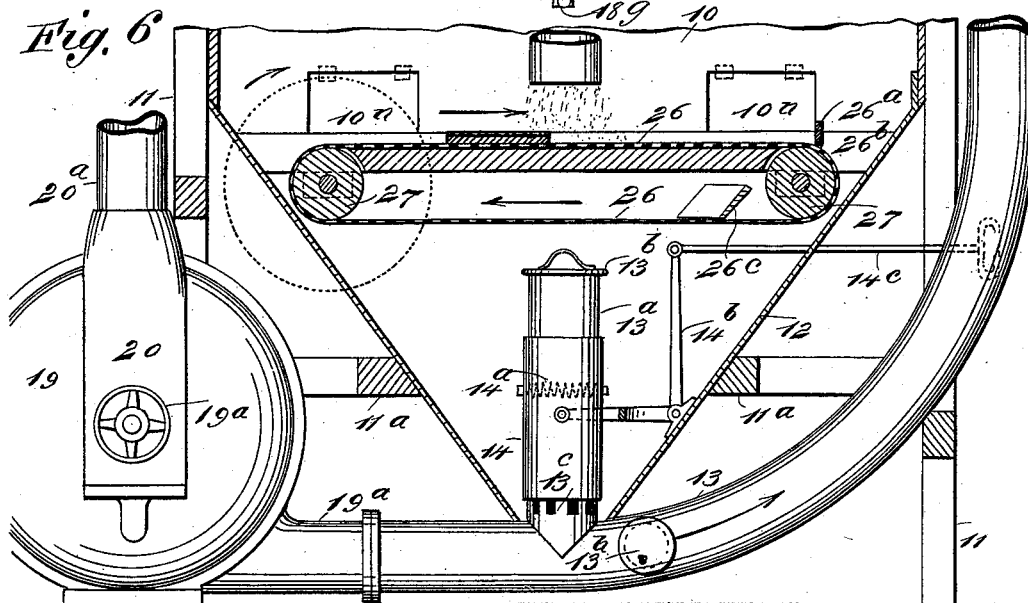
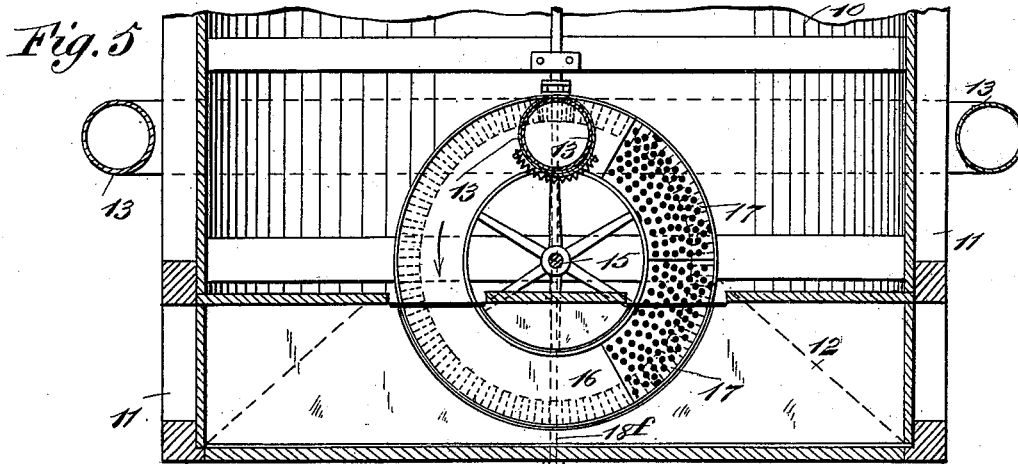
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J. A. SHOEMAKER.
SAND BLAST MACHINE.

No. 523,907.

Patented July 31, 1894.



WITNESSES:

C. Neveu
C. Sedgwick

INVENTOR

J. A. Shoemaker
BY *Munn & Co.*
ATTORNEYS.

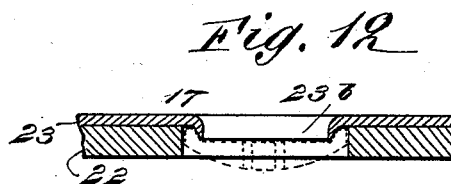
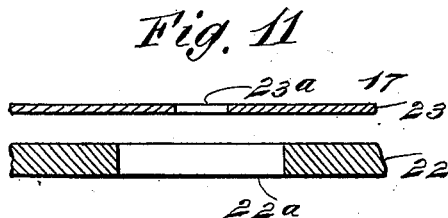
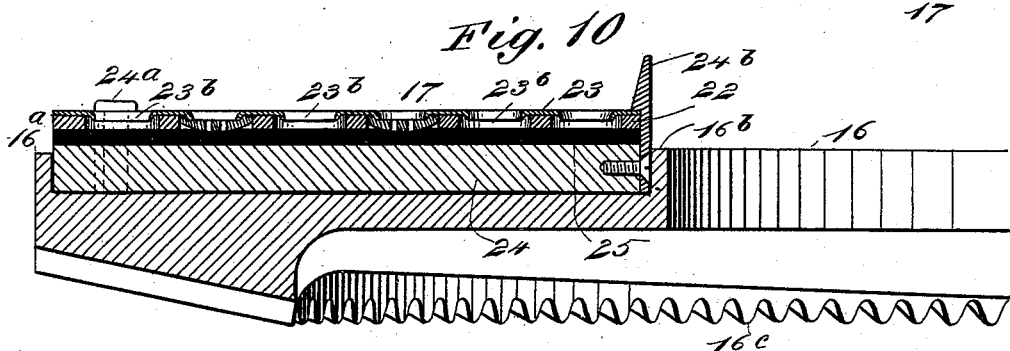
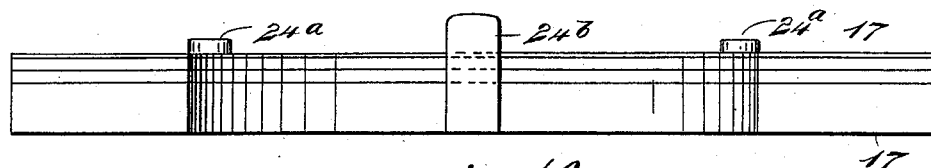
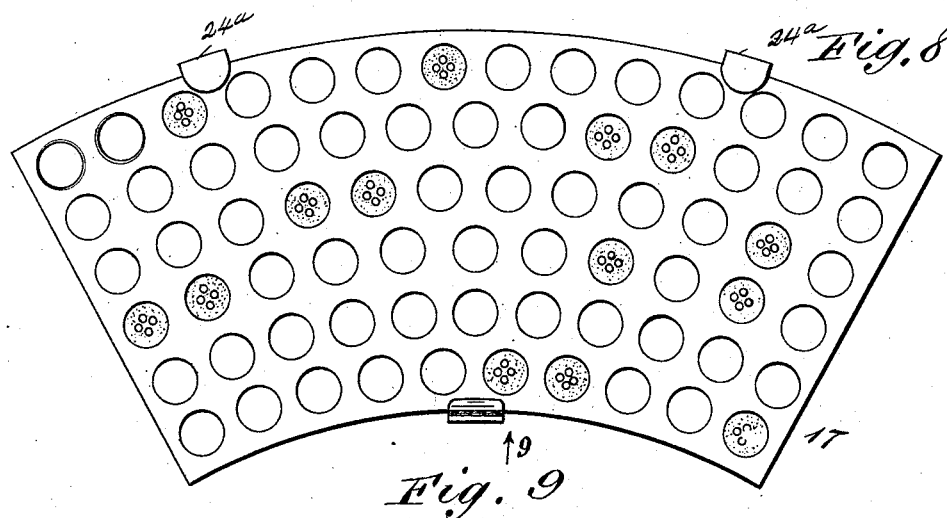
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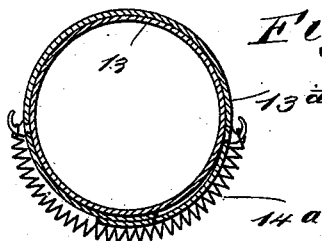
J. A. SHOEMAKER.
SAND BLAST MACHINE.

No. 523,907.

Patented July 31, 1894.



WITNESSES:
C. Newell
C. Sedgwick



INVENTOR
J. A. Shoemaker
BY
Munn & Co
ATTORNEYS.

UNITED STATES PATENT OFFICE.

JOHN A. SHOEMAKER, OF ROCHESTER, NEW YORK.

SAND-BLAST MACHINE.

SPECIFICATION forming part of Letters Patent No. 523,907, dated July 31, 1894.

Application filed February 21, 1894. Serial No. 501,041. (No model.)

To all whom it may concern:

Be it known that I, JOHN A. SHOEMAKER, of Rochester, in the county of Monroe and State of New York, have invented a new and useful
5 Improved Sand-Blast Machine, of which the following is a full, clear, and exact description.

My invention relates to improvements in sand blast machines employed to produce ornamental effects on articles of manufacture;
10 and more particularly to improvements in a machine of the type mentioned, which is adapted to produce non-lustrous surfaces on previously polished buttons, and other small articles of personal wear, or general use that
15 may require sand blast treatment to afford a desired finish.

The objects of my invention are to produce a novel, convenient, and reliable device of the character indicated, which will afford means
20 to rapidly, and perfectly sand blast a considerable number of buttons at one time, be adapted for continuous operation, and the ready placing and removal of the articles which are to be operated upon, and also to enable
25 an operator to gage the force of impact of the sand blast and graduate the amount of sand pervading the air current used to effect the blast.

To these ends my invention consists in the construction and combination of parts, as is hereinafter described and claimed.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar figures and letters of reference indicate corresponding parts in all the
35 views shown.

Figure 1 is a side view of the device opposite the arrow 1, in Fig. 2. Fig. 2 is a front view taken opposite the arrow 2, in Fig. 1.
40 Fig. 3 is an enlarged transverse sectional view on the line 3—3 in Fig. 1, looking toward the front. Fig. 4 is a longitudinal sectional view on the line 4—4 in Fig. 2. Fig. 5 is a sectional plan view in part of the preferred form of the device on the line 5—5 in Fig. 1. Fig. 6 is a
45 transverse sectional view of parts on a median line of the machine showing modified details of interior construction. Fig. 7 is a detached side view of a modification of parts that are located in the upper portion of the machine and serve to separate sand and blasted powdered material from the air current. Fig. 8

is an enlarged plan view of a novel chuck plate that is an essential feature of the invention. Fig. 9 is an edge view of the device
55 shown in Fig. 8, taken opposite the arrow 9 in said figure. Fig. 10 is an enlarged transverse sectional view in part of the button chuck in preferred form, and its supporting platen, said part being located below the ar-
60 row 10, in Fig. 4. Fig. 11 is an enlarged sectional side view of portions of the improved button chuck plate in the initial stage of its construction. Fig. 12 represents the parts
65 shown incomplete and detached in Fig. 11, completed and united to form a section of the improved button chuck; and Fig. 13 is an enlarged sectional plan view of parts on the line
13—13 in Fig. 3.

The casing 10, which is provided to contain
70 essential working parts of the machine, is mainly rectangular in form, and is sustained upon a rectangular frame 11, the latter being made of a sufficient height to maintain the casing at a proper distance from the floor or
75 other level support for the frame. On the front side of the casing 10, a niche is formed across said wall, by which an opening is produced, as at *a* in Fig. 4, which is partly closed by the horizontal lid 10^a, that is hinged to the
80 vertical wall of the casing. Said lid being of a suitable length is centrally located, and at each side has a loose contact with horizontal fixed portions of the casing, as shown at 10^b in Fig. 2.

There is a converging four-walled bottom
85 portion 12, secured by its upper edges upon the bottom of the casing 10, which hopper-like structure extends to near the bottom of the frame 11, and is formed of any suitable
90 material, either wood, metal, or portions of both materials as may be preferred. The inverted pyramidal chamber 12 is sustained in place by portions 11^a of the frame 11, and at its lower extremity is affixed upon the upper
95 side of the blast pipe 13, covering an orifice in the pipe that is preferably made equal in dimensions with the diameter of the latter.

As represented in Figs. 2 and 3, the blast pipe 13 comprises a strong and preferably cast
100 metal tube, which is straight for a portion of its length at the lower end, which end is secured to the air discharge nozzle of a fan blower which will be further mentioned.

From the point where the converged end of the chamber 12 is attached to the blast pipe, the latter is outwardly and upwardly curved, a straight portion above said curved part having a sufficient upward projection to permit the upper extension of the blast pipe to be given a semi-circular bend, so as to return the upper terminal in a vertical plane coincident with a vertical center line of the chamber 12, said end being suitably removed from the top of the chamber, as indicated in Figs. 2, 3 and 5.

Near the upper edge of the chamber 12, a level cross brace 12^a is affixed by its ends to the inner surface of said chamber, the location of this brace being near the front upright wall of the casing 10, as shown in Fig. 4, and on said piece 12^a, the vertical shaft 15 is stepped at its lower end in a proper box 15^a, its upper end being rotatably supported in another box 15^b that is attached to the upper wall of the casing. The shaft 15 affords support to the horizontal platen 16, that is secured on it near the box 15^a, said platen being preferably formed of metal in circular form having such a relative diameter as will project its periphery near the front part of the case 10, that is below the lid 10^a.

The device under consideration being particularly adapted for sand-blasting the central portions of polished buttons, which when undergoing the operation are held in position on the platen 16, in specially constructed chuck plates that will be described, the platen shown is formed with reference to its function. It comprises the round edged plate mentioned, having the flanges 16^a, 16^b, raised around its edges to prevent the accidental displacement of parts that may be located on it, and on its lower surface a continuous series of gear teeth 16^c are formed around and near to the circumference of its rim, which part is flat on the upper surface, and of such proportionate breadth as will adapt it to afford a proper support to the button chuck plates 17.

It will be seen that from the position given to the platen 16, and as clearly represented in Fig. 4, one portion of its flat surface will be always located at the front of the casing 10 below the lid 10^a, which when raised will expose the platen section that happens to lie below it, the rotation of said platen, as will be explained, serving to successively dispose all parts of its face below the opening at the front of the case which is normally closed by the lid.

The bevel toothed rim 16^c provided on the lower side of the platen 16, is in meshed engagement with a small bevel pinion 18^a that is loosely secured on the inner end of the horizontal drive shaft 18, which shaft is rotatably supported at the inner end by its loose engagement with a perforated transverse bar 18^b that is affixed horizontally and by its ends to the side walls of the chamber 12. The outer end of the drive shaft having a similar

engagement with the perforated hanger 18^c, projects far enough beyond the frame 11 to receive the band wheel 18^d, as shown in Fig. 4.

The pinion 18^a has a feather key connection provided between it and the shaft 18, and also is adapted to loosely receive a shifting arm 18^e that is fast on the slide bar 18^f, which is loosely supported in a level position below the platen, as shown in Fig. 4. The outer end of this bar 18^f projects at the front of the frame 11, and is pivoted to the lower end of a tripping lever 18^g that is loosely sustained free to vibrate on the frame, and has its upper portion engaged with a spring latch 18^h, whereby the pinion may be retained in meshed engagement with the teeth of the platen, or be thrown out of gear, as may be desired.

The flat annular rim portion of the platen 16, sufficiently projects above the spider arms of the same that support it, to permit the edges of the circular rim to have a loose engagement with the mating curved edges of a channel formed for the reception of the platen rim in the level top part of the frame projection and casing that lies below the lid 10^a, as shown in Fig. 4, whereby the portion of the platen that occupies the channel mentioned, will be incased at the edges, so that air or sand cannot escape from above or below the platen.

There is a stand pipe 13^a erected within the converged chamber 12, over the orifice in the blast pipe 13, and secured by its lower end on the latter so that it will project upright, a suitable length being given to the stand pipe for effective service, and on its upper end a bonnet 13^b is closely fitted. A series of spaced small slots 13^c is formed in the wall of the stand pipe above and near to the point where the lower end of the chamber 12 is joined with it, as shown in Figs. 3, 4 and 6, this row of equal sized and upwardly elongated holes being continued around the pipe.

A sleeve like gate 14 is loosely secured as an envelope on the stand pipe 13^a, and is preferably constructed of a sheet metal piece which is wrapped around the pipe, and is caused to have a close sliding contact with it by the spring 14^a, clearly shown in Fig. 13, which spring is attached to the lapped portions of the sleeve gate by its ends so that the construction of the spring will draw the gate closely on the stand pipe and permit it to be freely reciprocated endwise. The preferred means for sliding the gate 14, is best shown in Figs. 3 and 4, consisting of a bell crank lever 14^b, which is pivotally secured at the junction of its limbs upon the inner sloping side wall of the chamber 12, the lower and horizontal limb of the lever being furcated and made to loosely embrace the sleeve gate with its limbs that are pivoted at their ends thereto. The vertical limb of the bell crank lever is jointed at its upper end to the inner end of the horizontal pusher bar 14^c, that ex-

tends through a hole in the side of the casing 10, or below it if the parts are arranged as shown in Fig. 6, having a handle piece on the outer end for its convenient manipulation, the longitudinal movement of the pusher bar serving to elevate or depress the gate 14, and graduate the size of or entirely close the slots 13^c in the stand pipe 13^a.

On the depending upper end portion of the blast pipe 13, a sleeve 13^d is located, which is constructed similar to the gate 14, having a contractile spring for its clasp adjustment on the blast pipe, this sliding piece being designed to afford means for the convenient extension or shortening of the discharge end of the sand blast pipe, as occasion may require, and at a proper distance above the end of the blast pipe, a deflector plate 13^e is outwardly and downwardly projected from the inner surface of the pipe 13.

On the upper wall of the casing 10, a separator box 10^e is transversely mounted and secured near the longitudinal center of the casing, the height and width of the box being proportioned to the capacity of the machine so as to afford ample interior space for its purpose. Over the curved upper portion of the sand blast pipe 13, an aperture 10^f is formed in the top of the casing 10, of considerable dimensions, and equal in width with that of the separator box which is above it. In the box 10^e, a baffle board 10^g is secured by its ends to the side walls of said box and inclined upwardly and laterally from the transverse edge of the aperture 10^f, of a suitable height, and from a point near the lower terminal of the board 10^g, another longer board 10^h is secured by its ends to incline upwardly and away from the other baffle board, as shown in Fig. 3.

At a point about the center of width of the casing 10, a depending baffle board 10ⁱ is secured to the sides and top wall of the separator box 10^e, which board is located in an inclined plane about parallel with the inclined board 10^g, and projected toward the board 10^h. At the transverse edge of the aperture 10^f, which is parallel with the edge that is engaged by the lower end of the baffle board 10^g, an inclined cross wall 10^m is secured, as shown in Fig. 3.

On the side of the frame 11, toward which the lower terminal of the blast pipe 13 is projected, the fan blower 19 is placed on a suitable foundation, its discharge nozzle 19^a being attached to the end of the blast pipe that approaches it, as before mentioned. The rotary fan 19 may be of any approved style which is capable of exhausting air as well as forcing it, and as such a device generally receives air from an opening at the center of its shell on one or both sides, to carry into effect an important feature of this invention, one side of the fan shell is closed, and the central aperture formed in the opposite side wall of the shell is inclosed in a receiver box 20, that is only perforated to permit the fan shaft to

project, whereon the driving pulley 19^a is secured, that in service is driven by a belt 21. From the upper end of the box 20, an air conduit pipe 20^a is extended, and so bent that its upper terminal may be attached to the end wall of the separator box 10^e over an orifice made in said wall.

From the construction of parts that have been described it will be evident that the air in the casing 10 and chamber 12, will be circulated by the action of the fan 19, as a rapid movement of the driving belt 21 in the direction of an adjacent arrow in Fig. 2, will cause the fan blades to rotate in the direction of the curved arrow in Fig. 3, and force a current of air through the said blast pipe 13 in the direction indicated in said figure, the supply of air being taken from the separator box 10^e, as the air is expelled from the upper end of the blast pipe.

As before mentioned, the preferred use of the present improvement is for the dead finishing of polished buttons, and particularly, to remove the polish from the circular center portions of hard rubber, celluloid or other buttons having thread-receiving perforations at their centers, and which will be improved in appearance by such an operation. In order to properly support a considerable number of these buttons in position to receive sand blast treatment, a special form of chuck plate 17 has been provided, which is an independent feature of the invention, and as clearly shown in Figs. 8 to 12 inclusive, comprises the following described parts:

The peculiar chuck plate 17 being intended for use in sufficient numbers to fill the annular space afforded for their reception on the top surface of the platen 16, each plate is preferably formed on the edges to produce the segment of a plate-like ring, any suitable number being employed, those shown representing the sixth part of the platen surface, but this is not imperative. Each chuck plate consists of two parts, the base piece 22 being of greater thickness than the cap plate 23. The parts mentioned are oppositely perforated in series at suitable intervals throughout their area, the similar circular holes in the base piece being of greater diameter than those in the cap plate, these being clearly represented in the order mentioned at 22^a and 23^a in Fig. 11, that indicates the initial stage of manufacture for the chuck plate. The thin cap plate 23 is firmly attached by soldering or other means upon the top surface of the base piece 22, so as to render the holes in the cap plate concentric with those in the base piece. After the two plates 22, 23, are securely joined throughout their area, there is a depending flange 23^b formed on the rim or edge of each perforation in the cap plate by the use of a proper die and punch, which will increase the diameter of the holes in the cap plate, and the joined plates at each hole will present the appearance shown in Fig. 12.

In the figure just mentioned, it will be seen that the turned down flange 23^b will closely bear on the cupped rim of the recess produced on the face of the button that is represented by dotted lines, so that if a number of the buttons are placed in the holes 22^a, and do not closely fit therein, the flanges 23^b will serve to hold the buttons centrally in the receiving holes of the chuck plate, and expose a central circular part of each button face to receive the action of the sand blast.

It is preferred to construct the upper face of the platen 16 as shown in Fig. 10, recessing its top face, so as to provide a retaining flange on the inner edge of the platen face concentric with its flanged outer edge, the level space between said flanges 16^a, 16^b, being adapted to receive a hollow plate 24, whereon a felt or other slightly yielding cushion ring or pneumatic pad 25 is laid, which ring affords a slightly elastic support to the buttons that are located in the chuck plate.

These several similar chuck plates which have been singly described are each retained in place so as to be readily removed, by two or more clip-hooks 24^a that project upwardly from the outer flange 16^a of the platen, and hook over the top outer edge of the cap plate 23, a spring latch hook 24^b being secured on the inner flange 16^b at a point intermediate of each pair of clip plates, so that each chuck plate may be readily placed on or removed from the platen.

Referring to Figs. 3 and 4, there will be seen two apertures in the front wall of the casing 10, below the lid 10^a, that cut through said walls above the top surface of the chuck plates that pass below and must have room afforded for their free rotation. The holes mentioned are preferably made rectangular in outline, and are closed by flap doors 10ⁿ which are formed of leather, gum or other suitable slightly yielding material, which will lightly press upon the button-holding chucks and seal the crevices where these parts pass around in the space *a* below the lid 10^a, which serves to prevent sand or air currents from issuing therefrom while the machine is in operation.

As it is essential that convenient means be provided for the ready adjustment of the sleeve gate 13^a from without the casing 10, and also that light be introduced from the front to enable a close inspection of the work as it progresses, a pendent, hinged, and glazed door 10^o is placed over a laterally elongated rectangular aperture in the front wall of the casing 10, above the lid 10^a. Two other windows are provided for the casing 10, one 10^p being near the front at the left side of the casing, as shown in Fig. 4, and the other window at the right side of the same, it being placed in the door 10^o, which also permits access to the interior of the casing to allow an operator to inspect or adjust the working parts within. Above the door 10^o, an outlet branch pipe 10^q is secured over an orifice

formed in the side wall of the casing 10, having a slide gate 10^u located in it near the casing, for an adjustment of size for the orifice or its complete closure, said pipe being extended to any desired point for discharge.

The operation of the machine in its preferred form, which has been described, is as follows: The series of button chucks being filled with buttons that are to be sand blasted, the platen of the machine may be revolved, it taking the direction of rotation indicated by the curved arrow in Fig. 5, and simultaneously the fan 19 is started. At the time the button chucks are placed and revolved as stated, a sufficient amount of sand having a proper degree of fineness and grit is fed from the chamber 12 into the sand blast pipe 13, by an adjustment of the sleeve gate 14, there having been a quantity of said material previously deposited in the chamber or sand holder 12. The blast of air forced from the fan in the direction of the arrows shown in Fig. 3, will carry with it a commingled modicum of the fine sand, which when it reaches the deflector plate 13^c, will be spread so that an even shower of the sand grains will be forcibly driven upon the exposed portions of the buttons that are being slowly moved around beneath the upper terminal of the sand blast pipe 13.

As the distance intervening the discharge end of the pipe 13 has a controlling effect on the power and concentration of impact imparted to the sand blast, it will be apparent that the provision of the longitudinally adjustable sleeve 13^d is essential, as it facilitates the critical adjustment for length, of the upper end portion of the blast pipe, it being conveniently reached through the front door 10^o, as previously mentioned. As the series of button-holding chuck plates are gradually moved below the said blast, their exposed surfaces are deadened thereby, and when one of these chucks is located in the space below the lid 10^a, it can be lifted from the platen after it has been released from the holder plate 24, the manipulation of the tripping lever 18^e affording means to instantly stop and start the platen, as may be desired. The glazed door 10^o affords a convenient opening to closely examine the work, the machine being then stopped; and chuck plates with a filling of unblasted buttons may be placed in position through this door.

The baffle boards that are located in the separator box 10^e, are designed to separate sand that has been carried up with the rising current of air that is produced by the exhausting action of the fan, this being effected by the impinge of the sand and air on the board 10^h, which by its inclination over the aperture in the top board of the casing will arrest the momentum of most of the sand which will fall by gravity into the chamber 12, for re-use. Any sand that is carried over the top edge of the baffle board 10^h will strike the depending board 10ⁱ, and slide down on the

board 10^b, or if deflected below the board 10^b, will impinge the board 10^c, and thus be prevented from passing into the air conduit pipe 20^a, so that the sand will be eliminated from the air, and only light dust that may be the powder removed from the buttons will pass along with the current of air drawn from the box 10^c.

At any time it is desired to purify the air in the casing 10, the gate 10^a may be opened in the ventilating branch pipe 10^a, which if effected while the fan is in motion will cause an expulsion of the dusty air, a fresh supply entering at one or more of the doors in the casing.

When it becomes necessary to remove the sand from the chamber 12, to change its grade, or dry it in case it absorbs moisture from the aperture, this can be done by opening an orifice in the blast pipe 13 that is located near the stand pipe 13^a, and that is sealed by a bonnet 13^b. In such a case, the gate 14 on the stand pipe is slid upwardly so as to open the slots in the stand pipe, and allow all of the sand in the chamber 12 to run down into the blast pipe as it is being removed with a small scoop or like utensil.

A modified means for progressively moving the button chuck plates below the discharging end of the sand blast pipe, is represented in Fig. 6, comprising an endless apron 26, made of any suitable material, which is mounted on two rollers 27, that are rotatably supported by their journal shafts in boxes at the sides of the chamber 12. The rollers 27 occupying the same horizontal plane near the upper edge of the chamber 12, are respectively located near the opposite side walls of said chamber, so that the upper ply of the endless apron 26 will be sustained in a taut condition, with one end nearly opposite one of the flap doors 10^a, and the other end of the apron about opposite the other flap door in the front of the casing 10.

One of the roller shafts is projected through the side wall of the casing 10, and is provided with a pulley (shown by dotted lines in Fig. 6) for the application of power through a belt, and the rotation of the rollers and apron in the direction of arrows in said figure, or any other preferred means for the progressive movement of the apron may be provided.

The relative location of the apron 26, disposes its upper surface below and comparatively near to the discharge end of the blast pipe 13, so that button chucks, that in this case may be rectangular in outline, will if filled with buttons as before explained, and placed on the apron, be adapted to move the buttons with the slowly moving apron below the sand blast issuing from the nozzle end of the pipe 13.

When the apron device is used, one of the flap doors 10^a is utilized to place the chucks on the apron, and the other door to remove a chuck and the buttons held in it that have passed below the sand blast, a block 26^a fixed

near the last mentioned door across the end of the apron serving to stop the chuck that is to be removed.

In order to prevent a lateral displacement of the chucks that are used in connection with the apron 26, two guard strips 26^b are used, which are arranged and secured along the side edges of the upper ply of the apron, these forming guides for the chucks as they travel with the apron.

On the lower ply of the apron 26, a scraper 26^c is diagonally arranged, this piece being supported by its ends that are attached to the opposite sides of the chamber 12, and if necessary may be made adjustable, so that its lower edge may be caused to impinge the lower ply with graduated force, and remove sand that falls on it and would have a tendency to clog the free movement of the apron.

A modified form for the sand separator device is shown in Fig. 7, which may be used in place of the baffle boards shown in Fig. 3, and that have been described. The sand arrester indicated in Fig. 7, comprises an upwardly and outwardly flared continuous wall 28, that is located over an aperture in the top wall of the casing 10, and within a separator box that is arranged with regard to the fan 19, as has already been explained. Above the flared wall 28, that may be circular or any other shape in contour, a coniform deflector 29 is suspended at such a distance from the top edge of the lower wall as to permit an escape passage 29^a around and between the adjacent edges of the parts mentioned. Within the deflector 29, a smaller conical arrester 30 is hung from the deflector by braces 30^a, the centers of the three parts 28, 29 and 30, being located in the same vertical line.

In use, the upwardly moving air in the casing 10, that is pervaded with sand, will strike first on the sand arrester piece 30, the sand will fall, and air re-act, escaping partially at 29^a, and any air that is not impinged by the piece 30, will have contact with the deflector 29, and be returned to the escape channel 29^a, while the sand will slide down the inner surface of the flared wall 28, into the casing 10, finally reaching the chamber 12, for re-use.

In the sand blast machine that has been described and which is illustrated by the drawings, full control of the operation is afforded, and by inclosing the working parts in a sealed casing the injurious effects to the health of the operator are avoided, the workman being protected from the dust that is thrown off from the articles blasted, which is detrimental to the lungs, and also affects the eyes of the operator.

By obvious slight changes in the arrangement of details of construction, the work may be held inverted over the stand pipe 13^a, and a sand blast thrown upwardly instead of downwardly; in this case the sealing cap on the stand pipe is removed from the top of the stand pipe, and is placed on the upper end of the pipe 13.

By using chucks of different forms, various articles of manufacture, either of metal, glass, or other material may be conveniently subjected to the sand blast process in the improved machine.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In a sand blast machine, the combination with a casing, a sand holder in the lower part of the casing, a sand blast pipe in communication with the sand holder, and a support for articles to be blasted, of an exhausting and air blowing device arranged to receive air from the casing and return it through the blast pipe, substantially as described.

2. In a sand blast machine, the combination with a casing, a sand holder in the lower part of the casing, and a movable support for articles to be blasted, of a curved sand blast pipe arranged to receive sand from the holder, and an exhausting air blowing device that receives air from the casing and returns it through the blast pipe, substantially as described.

3. In a sand blast machine, the combination with a supported casing, a hopper shaped sand holder in the lower part of the casing, and a rotary support for articles to be blasted, of a curved sand blast pipe arranged to receive sand from the holder and project it along with air upon the moving articles to be blasted, and an air exhausting and blowing device that receives air from the casing and returns it through the blast pipe, substantially as described.

4. In a sand blast machine, the combination with a casing and a hopper-shaped sand holder in the lower portion thereof, of a movable support for the articles to be blasted, an air blowing device connected with the upper part of the casing, and a blast pipe into which the said holder discharges connected with the blowing device and having its upper end projecting into the casing above the support for the articles, substantially as described.

5. In a sand blast machine, the combination with a casing, a hopper-shaped sand holder in the bottom of the casing, a rotary support for articles to be blasted, and means to start and stop said support, of a sand blast pipe curved upwardly from the sand holder with which it communicates, and projecting into the casing above the rotary support, a sand feeding device in the holder below, and an air exhausting and blowing device arranged to receive air from the upper part of the casing and forcibly project it through the blast pipe, substantially as described.

6. In a sand blast machine, the combination with a casing, a sand-holder in the bottom of the casing, a rotary platen, means to stop and start said platen, and a chuck plate secured on the platen and adapted to hold goods to be blasted and expose portions thereof, of a curved sand blast pipe communicating with

the sand holder and discharging air driven sand on the goods held in the chuck plate, an adjustable sand feeding device for said pipe, and an air exhausting and blowing device arranged to receive air from the casing and return it through the blast pipe, substantially as described.

7. In a sand blast machine, the gear-driven platen, and the start and stop device therefor, comprising the pinion slidably held on the horizontal drive shaft, the forked shifting arm, the horizontal slide bar, the tripping lever pivoted to the outer end of the slide bar, and the spring latch engaging said lever, substantially as described.

8. In a sand blast machine, the combination with a casing having a hopper-shaped bottom forming a sand holder, and a movable support in the casing for the articles to be blasted, of an air blowing device, a blast pipe connected with the blowing device and secured to the sand holder below the discharge opening thereof, the blast pipe being extended and having its end projecting into the casing above the movable support, a stand pipe in the sand holder over the discharge opening thereof and provided with openings, and a valve for opening and closing the openings of the stand pipe, substantially as described.

9. In a sand blast machine, the combination with a casing having a hopper-shaped bottom forming a sand holder, and provided with a separator chamber in its top having baffle plates therein, of a movable support in the casing, an air blowing device connected with the separator chamber, an air blasting pipe leading from the air blowing device and secured to the sand holder below the discharge opening thereof, the blast pipe being extended and having its end projecting into the casing above the movable support, an apertured stand pipe in the sand holder over the discharge opening thereof and having its upper end closed, and a valve for regulating the amount of sand passing through the apertures of the stand pipe, substantially as described.

10. In a sand blast machine, the casing, the frame therefor, the separator box, the baffle boards inclined within above an aperture in said casing, a sand blast device below the box, and an exhausting and air blowing device arranged to receive air that has impinged the baffle boards, and force it through the sand blast device, substantially as described.

11. In a sand blast machine, the upwardly-curved and return-bent sand blast pipe arranged to receive air from a blower at the lower end and discharge it at the upper end, and an adjustable sleeve extension on the upper end of the blast pipe, substantially as described.

12. In a sand blast machine, the combination with a casing, a downwardly converged sand holder below thereon, and a curved sand blast pipe, of a slotted stand pipe on the blast

pipe and located in the sand holder, and a device to adjust the dimensions of the slots in the stand pipe, substantially as described.

13. In a sand blast machine, the combination, with a casing and a downwardly converged sand holder below thereon, of a curved sand blast pipe, a slotted stand pipe within the sand holder, and a vertically slidable sleeve gate on the stand pipe, substantially as described.

14. In a sand blast machine, the combination with a frame, a casing, and a downwardly converged sand holder below on said casing, of a curved sand blast pipe, a slotted stand pipe thereon within the holder, a slidable and diametrically adjustable sleeve gate thereon, a bell crank arranged to move the sleeve gate when rocked, and a pusher bar to rock the bell crank, substantially as described.

15. In a sand blast machine, the upwardly-curved and return-bent sand blast pipe ar-

ranged to receive sand, and air blast from below and discharge it at its return-bent upper end, and the deflector plate within the blast pipe near its discharge nozzle end, substantially as described.

16. In a sand blast machine, a button holding plate, comprising an apertured base plate, and a cap plate mounted with apertures to correspond with the apertures of the base plate, the apertures of the cap plate being of less diameter than the apertures of the base plate and provided with depending flanges around its apertures, the two plates being secured together with the flanges of the cap plate projecting into the apertures of the base plate, substantially as and for the purpose set forth.

JOHN A. SHOEMAKER.

Witnesses:

WM. P. PATTON,
JNO. M. RITTER.