July 26, 1927. 1,637,196

F. LEU

SAND BLASTING MACHINE.

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Fig. 1.

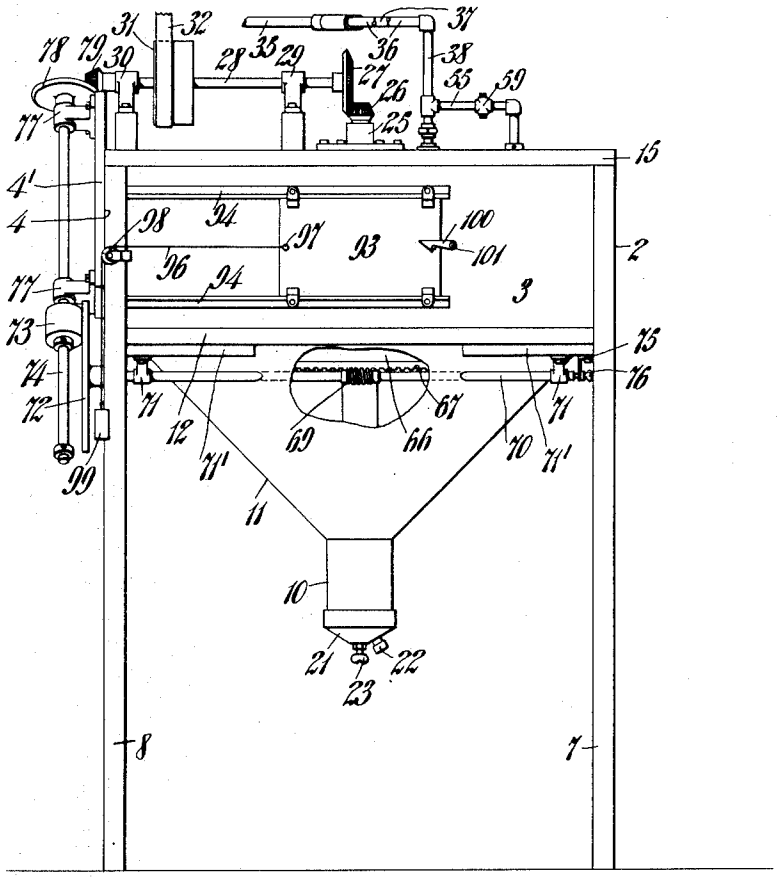
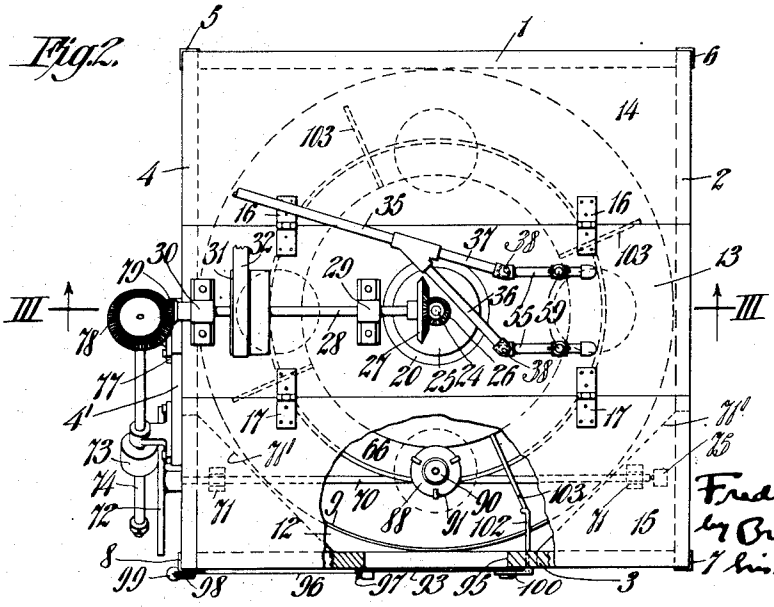


Fig. 2.



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Fig.3.

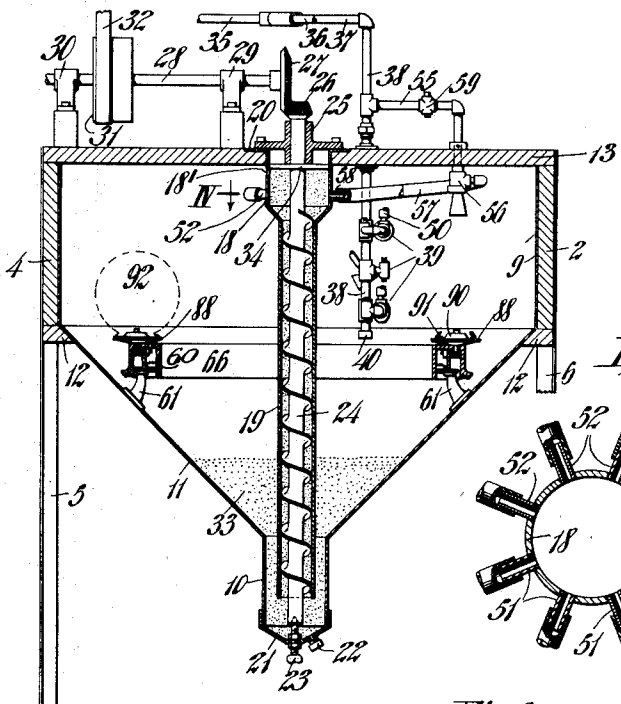


Fig.4.

Fig.5.

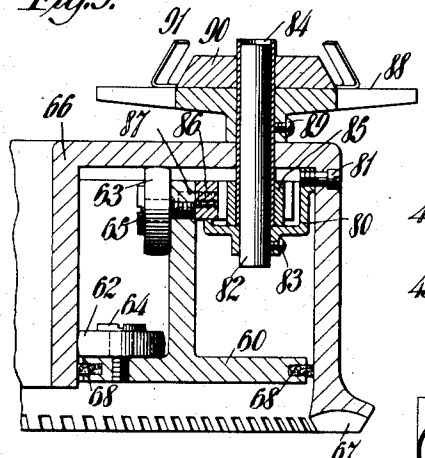


Fig.6.

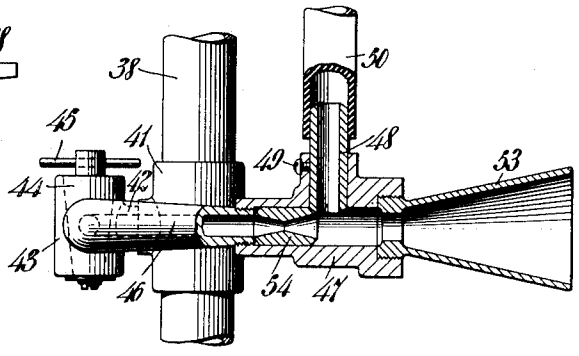


Fig.7.

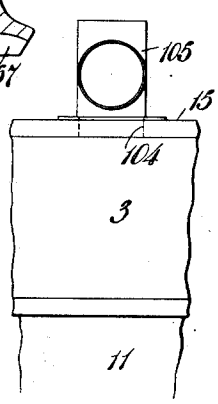
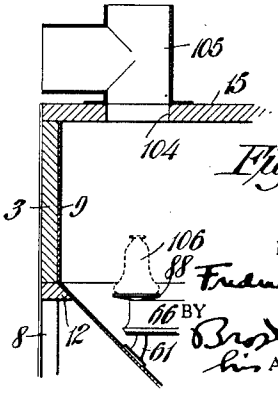


Fig.8.



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Patented July 26, 1927. 1,637,196

UNITED STATES PATENT OFFICE.

FREDERICK LEU, OF CARMEL, NEW YORK.

SAND-BLASTING MACHINE.

Application filed November 21, 1923. Serial No. 676,073.

This invention relates to a sand blasting machine such as is used, for instance, in subjecting glass articles to blasts of sand in finishing the same.

An object of the invention is to provide such an apparatus which is exceedingly efficient and rapid in operation.

Another object consists in providing such an apparatus which may readily be adapted so as to operate with equal success upon articles varying greatly in size and shape.

Another object consists in providing such an apparatus which includes means for revolving and rotating the articles at the same time.

Another object consists in providing such an apparatus which includes means for varying the direction of impingement of the blasts upon the articles.

Another object consists in providing certain improvements in the form, construction and arrangement of the several parts whereby the above named and other objects may be effectively attained.

A practical embodiment of the invention is represented in the accompanying drawings, in which

Fig. 1 represents a side elevation of the apparatus, partly broken away.

Fig. 2 represents a top plan view of the apparatus, partly broken away.

Fig. 3 represents a section, partly broken away, taken in the plane of the line III—III of Fig. 2, looking in the direction of the arrows.

Fig. 4 represents an enlarged detail section, taken in the plane of the line IV of Fig. 3, looking in the direction of the arrow.

Fig. 5 represents an enlarged detail section through the supporting and moving means for the articles to be treated.

Fig. 6 represents an enlarged detail section partly in elevation, showing one of the spray heads for ejecting the sand blasts.

Fig. 7 represents a detail elevation, showing a modified form of arrangement for inserting and removing the treated articles from the apparatus.

Fig. 8 represents a vertical section through the parts shown in Fig. 7.

The apparatus includes a box-like framework which has four sides 1, 2, 3, 4. These sides may be composed of wood and provided with suitable angle iron legs 5, 6, 7, 8, that serve to elevate the apparatus a desirable distance above the floor or other support.

Within the members 1, 2, 3, 4 is carried a container which has an upper cylindrical part 9, a lower cylindrical part 10, and an intermediate conical part 11. This container may be held in position by clamps 12 that are fastened to the lower edges of the members 1, 2, 3, 4 and engage the conical part 11. This container may conveniently be composed of sheet metal.

The members 1, 2, 3, 4 have a top composed of a central portion 13 which is fixed to the said members, and side portions 14, 15 that are secured to the portion 13 by hinges 16, 17. The hinging of these parts permits ready access to the interior of the machine.

The member 13 has a centrally disposed aperture in which is fitted the upper enlarged portion 18 of a tube 19. The said portion 18 of the tube has a laterally projecting flange 20 that rests upon and is fastened to the top of the member 13. The tube 19 may be composed of sheet metal and, as will be seen by reference to Fig. 3, it projects downwardly through the container and terminates a short distance above the bottom of the cylindrical portion 10 thereof.

The last named portion of the container has a cap 21 which is provided with a drain plug 22, and which also has a spindle bearing 23 threaded therein. The said spindle bearing is fitted to receive the lower end of an Archimedean screw 24 which has its upper end journaled in a bearing 25 secured on top of the flange 20. The extremity of the said upper end of the screw 24 is provided with a bevel pinion 26 that meshes with a gear 27 carried on a power shaft 28 mounted in journals 29, 30 carried on the member 13. The said shaft 28 has fast and loose pulleys, represented generally by 31, which receive a belt 32 actuated from a suitable source of power, not shown.

The mechanism just described serves to rotate the screw 24, and thereby to draw sand, which may be placed in the container as indicated at 33, up through the tube 19 into the enlarged portion 18 thereof. A disc 34, formed on the screw 24, serves to prevent the sand from rising more than a certain distance within the portion 18, and also prevents it from entering the bearing

25. A suitable overflow opening 18' may be provided in the wall of the portion 18 to permit the escape of excess sand.

The means for ejecting the sand thus drawn up by the screw 24 includes a source of compressed air supply which is represented by the pipe 35 that is forked into two branches 36, 37, each of which communicates with a like downwardly extending pipe, only one being fully shown and being represented by 38. The description of this pipe 38 and connected parts will serve to describe its companion. The said pipe 38 projects downwardly through the member 13, and carries at its lower extremity a plurality of spray heads, three being shown in the present instance. As all these spray heads are alike, they will be given a common reference numeral 39, and the description of one will serve to describe all. The lower end of pipe 38 is closed with a cap 40.

Referring to Fig. 6, it will be seen that the spray head 39 is connected to the pipe 38 by a T coupling 41 which has a nipple 42 that enters at one side of a valve 43 which has a plug 44 that may be operated by a handle 45. The other side of the valve 43 opens into a nipple 46 that is threaded into another T coupling 47. The lateral opening of coupling 47 receives a bushing 48 which is adjustably held therein by a screw 49, and projects outwardly therefrom so as to receive one end of a flexible tube 50. The other end of tube 50 is fitted to a nipple 51 that opens out from the enlarged portion 18 of the tube 19 below the disc 34. It will be understood that two similar nipples 51 are adapted to receive flexible tubes that communicate with the other of the three spray heads 39; and it may be added that nipples 52 are arranged for similar communication with spray heads on the companion to pipe 38 hereinbefore mentioned. The third opening of coupling 47 carries a spray nozzle 53 which is suitably flared for ejecting the sand. A bushing 54 is located in the bore of the coupling 47 between the end of the nipple 42 and the bushing 48. It should be stated that bushings 48 and 54 are composed of wear resisting material, such as hardened steel, and are formed so as to be reversible in order to prolong their useful life. The fact that the coupling 41 is threaded onto pipe 38 enables the adjustment of the spray heads 39 in a rotary direction about the said pipe so as to permit them to eject the sand in any desired direction.

The air entering the coupling 47 through pipe 38, valve 43 and nipple 42 will cause a suction in bushing 48 and pipe 50 whereby sand will be sucked through the portion 18 and the tube 19 and ejected from nozzle 53. A similar operation will take place in the other spray heads 39 carried by pipe 38 and in the other spray heads carried by the pipe which is a companion to pipe 38. While I have described two pipes as carrying three spray heads each, it will be understood that the number of pipes and the number of spray heads on each pipe may be varied as desired. Operation of the plug 44 in valve 43 will serve to stop the operation of any spray head when desired.

Branch pipes 55 project from the air supply pipe 38 and extend downwardly through the cover member 13. The lower ends of these pipes are provided with spray heads 56, only one being shown in the drawings. Each of these spray heads 56 is the same as the spray heads 39, so that it is not necessary to describe their construction, but it may be said that each is connected by flexible pipe 57 with a nipple 58 that projects from the enlarged portion 18 of tube 19. As a result of this arrangement, the passage of air from the spray heads 56 will suck sand through pipes 57 and eject the same as already described in connection with spray heads 39. If desired, the operation of the spray heads 56 may be terminated by closing valves 59 which are located in the branch pipes 55. It will be understood that the number of spray heads 56 may be increased or decreased as desired.

The mechanism for supporting and moving the articles to be subjected to the sand blasts includes a ring 60 which is T shaped in cross section and is fixedly supported by a plurality of brackets 61 that are fastened to the interior of the conical part 11 of the container. This ring 60 carries two sets of bearing rollers 62, 63, which are fixed thereto by screws 64, 65, and the said rollers serve as vertical and lateral supports for a hollow annulus 66, that has a spiral ring or crown gear 67 formed at the lower edge thereof. Strips 68 of felt, or other suitable material, are set into the lateral edges of the ring 60, and bear against the annulus 66, so as to prevent the ingress of sand between the said parts.

The ring gear 67 is designed to mesh with a worm 69 that is carried on a shaft 70 which is supported in brackets 71 secured to plates 71' fastened to the bottom of the members 2, 3 and 4. One extremity of shaft 70 carries a friction disc 72 which is designed to mate with a friction gear 73 that is slidably but not rotatably mounted on a shaft 74. A bracket 75 depends from one of the plates 71' and carries a thumb screw 76 at its lower end, which thumb screw abuts the extremity of shaft 70 away from disc 72, whereby the screw 76 is adapted to move the shaft 70 in its bearings 71 so as to bring about proper engagement between disc 72 and friction gear 73. Slidable adjustment of the gear 73 on the shaft 74 will serve to vary the relative driving speed of the shafts 70 and 74.

Shaft 74 is mounted in bearings 77 that

are fixed to a plate 4' attached to the member 4, and the upper end of said shaft carries a mitre gear 78 that meshes with a pinion 79 which is fixed to the end of power shaft 78 opposite to the gear 27.

As a result of this arrangement, the same power shaft may be used for driving the Archimedean screw 24 and the annulus 66, and the relative speed of rotation of these parts may be varied as desired by adjustment of the friction gear 73.

The annulus 66 carries a plurality of brackets 80 (four being shown in the present instance) which are fixed thereto by screws 81, and each of these brackets supports a stub shaft 82 which is held in position by a set screw 83. Each of said stub shafts 82 extends upwardly from its bracket 80 and is surrounded by a sleeve 84 that passes through an opening formed in the top of the annulus 66. Each said sleeve has a pinion 85 keyed thereto, and all said pinions mesh with a circular rack 86 that is fixed to the upper part of the ring 60 by screws 87. The portion of each sleeve 84 which extends above the annulus 66 carries a support 88 that is fastened thereto by a set screw 89, upon which support rests a centering block 90 and spring clips 91 which serve to movably hold the articles 92 in position for the operation of the sand blasts.

The arrangement of the parts just described is such that, as the annulus 66 is revolved by the worm 69, each of the sleeves 84, and parts carried thereby, will be rotated owing to the engagement of pinions 85 with gears 86. Thereby the articles 92 will not only be revolved around during the travel of the annulus 66, but will be simultaneously rotated on their own axes, so as positively to expose all parts of their surfaces to the sand blasts emanating from the spray heads previously described.

An arrangement is provided for unloading and loading the articles 92 from and onto the moving annulus 66, and this consists in a sliding door 93 that travels upon tracks 94 fixed on the member 3; which door serves to cover an opening 95 formed in the said member. A flexible connection 96 is fast at one end to a pin 97 on the door 93 and passes over a pulley 98 fixed on leg 8, while its lower end carries a weight 99. This causes the door 93 to be continuously urged to slide in such direction as to uncover the opening 95 in the member 3. A latch 100 is carried on a rod 101 that traverses member 3 and has a finger 102 which is adapted for engagement by trips 103 which are fixed on and project radially from the annulus 66. Each of the trips 103 is located adjacent a support 88 and is so arranged as to immediately follow its adjacent support in the movement of the annulus 66. Thus, as each support 88, with its article 92, comes opposite the opening 95 in the member 3, the corresponding trip 103 will actuate finger 102 and thereby disconnect latch 100 from door 93, thereby permitting the weight 99 to slide the door so as to uncover the opening 95 and permit the operator to remove the article 92 which has been subjected to the sand blasts and replace it with another article to be treated. As the movement of the annulus 66 is quite slow, this operation is readily accomplished, and immediately thereafter, the door 93 is manually closed and engaged by the latch 100. It should be mentioned that the spray heads are preferably so arranged that they will not, at any time, throw a jet of sand toward the opening 95.

In the modified form shown in Figs. 7 and 8, no door is provided, but an aperture 104 is formed in the cover member 15 and is surmounted by a T shaped piece 105 which permits the hand and arm of the operator to be inserted for the purpose of withdrawing and replacing the articles, which are here represented by 106. This arrangement is especially adaptable when comparatively small articles are being treated.

It is believed that the operation of the device will be clear from the foregoing description, but it may be briefly stated that the articles to be treated are placed one at a time upon the centering devices and clips 90, 91 carried on the supports 88. The spray heads are adjusted so as to project at the desired angles in order to most effectively operate upon the particular kinds of articles to be treated, and the apparatus is set in operation. Its work is, thereafter, automatic, and it is only necessary to remove and replace the articles as they intermittently arrive opposite the opening 95 or the opening 104, as the case may be. In some cases, it may be desirable to use more or less of the spray heads, and it will be clear that the arrangement of the latter, as well as the particular manner of moving the articles to be treated, is such as to enable most thorough and effective operation of the sand blasts upon all portions of the articles at the most desirable angles for successful results. Of course, the centering blocks 90 and clips 91 may be changed to suit the shape and size of the articles being treated.

It will be understood that various changes may be resorted to in the form, construction and arrangement of the several parts without departing from the spirit and scope of my invention and hence, I do not intend to be limited to the details herein shown and described, except as they may be included in the claims.

What I claim is:

1. An apparatus of the character described comprising, a container for the sand, a tube within the container, a screw within

the tube for moving the sand upwardly therein to a discharge point, a spray head for the sand connected to said discharge point, another spray head for the sand also connected to said discharge point, and means for supporting and moving the articles to be treated in an annular path beneath said first named spray head and outside of said other spray head.

2. An apparatus of the character described comprising, a container for the sand, a tube within the container, a screw within the tube for moving the sand upwardly therein to a discharge point, a set of spray heads for the sand connected to said discharge point, another set of spray heads for the sand also connected to said discharge point, and means for supporting and moving the articles to be treated in an annular path beneath said first named set of spray heads and outside of said other set of spray heads, the spray heads of said other set being individually adjustable so as to cause them to eject the sand in different directions.

3. An apparatus of the character described comprising, means for supporting and moving the articles to be treated in an annular path and for simultaneously rotating said articles, said means comprising a fixed ring, an annulus mounted to travel on said ring, a rack gear carried by said ring, an article support on said annulus, a pinion on said article support engaging said rack gear, and means for rotating said annulus.

4. An apparatus of the character described comprising, a container for the sand, a tube within the container, a screw within the tube for moving the sand upwardly therein to a discharge point, a spray head for the sand connected to said discharge point, a ring fixed in said container surrounding said tube, an annulus mounted to travel on said ring, a rack gear carried by said ring, an article support on said annulus, a pinion on said article support engaging said rack gear, and means for rotating said annulus.

5. An apparatus of the character described comprising, a container for the sand, a tube within the container, a screw within the tube for moving the sand upwardly therein to a discharge point, a spray head for the sand connected to said discharge point, a ring fixed in said container surrounding said tube, an annulus mounted to travel on said ring, a rack gear carried by said ring, an article support on said annulus, a pinion on said article support engaging said rack gear, a worm gear on said annulus, a worm engaging said worm gear, and common power means for actuating said worm and said screw.

6. An apparatus of the character described comprising, a container for the sand, said container having downwardly tapered walls and a cylindrical portion at the bottom thereof, a tube within the container and projecting into said cylindrical portion, a screw within the tube for moving the sand upwardly therein to a discharge point, a ring fixed in said container surrounding said tube, an annulus mounted to travel on said ring, a rack gear carried by said ring, an article support on said annulus, a pinion on said article support engaging said rack gear, a worm gear on said annulus, a worm engaging said worm gear, and common power means for actuating said worm and said screw.

7. In an apparatus of the character described, a work support comprising, a fixed ring of inverted T-shaped cross section, rollers on said ring, an annulus of inverted U-shaped cross section supported by said rollers, means for turning said annulus, article holding means mounted upon the annulus and arranged to rotate simultaneously with the turning motion thereof, and strips of yielding material arranged to close the spaces between said fixed ring and said annulus so as to prevent the ingress of sand between the two parts.

In testimony, that I claim the foregoing as my invention, I have signed my name this 7th day of November, 1923.

FREDERICK LEU.