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UNITED STATES PATENT OFFICE.

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SPRAYING DEVICE

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My present invention relates to devices for spraying or projecting sand or other material against articles to be treated with such material. Primarily, the invention is intended for use in connection with apparatus in which sand or some other fine hard substance is thrown against a surface to be cleaned. When the article to be treated is of intricate shape (for instance bath tubs, automobile bodies, stove castings, etc.), its successful treatment requires the provision of a plurality of nozzles, and in my present invention improved results are obtained by a novel arrangement of nozzles having movements of different character.

Two satisfactory embodiments of my invention will now be described in detail, and the novel features will then be pointed out in the appended claims.

Reference is to be had to the accompanying drawings, in which Fig. 1 is an end elevation of one example of my invention; Fig. 2 is a corresponding plan view; Fig. 3 is a partial side elevation, in section on line 3—3 of Fig. 1; Fig. 4 is a plan view of a second example; Fig. 5 is a vertical section substantially on line 5—5 of Fig. 4; and Fig. 6 is an end elevation, with parts in section on line 6—6 of Fig. 5.

In the form of my invention illustrated by Figs. 1, 2 and 3, a conveyor 10 of any suitable construction (generally apertured) carries the articles to be treated, through a housing 11 shown as having a central portion 11′ of greater height. Within the chamber 12 formed by his portion 11′ are arranged the movable nozzles. Two of these, 13, are directed downwardly and mounted to rotate about vertical axes located in the longitudinal central plane of the housing, the upper ends of these rotary nozzles being secured to vertical tubes or sleeves 14 mounted to turn in suitable bearings 15 at the top of the housing. Each of these tubes has an air-tight connection with a stationary or at least non-rotary pipe or hose 16 through which a blast of air and sand or other material is supplied in any well-known or approved manner. The rotation of the nozzles 13 may be effected, for instance, by means of spur gears 17 held to turn with the sleeves 14 and in mesh with a driving gear 18 on a central vertical shaft 19. At the upper end of this shaft is a bevel gear 20 in mesh with a similar wheel 21, on a horizontal shaft 22 journaled in stationary bearings 23. The shaft 22 may be driven by means of a belt applied to a pulley 24, or in any other way. It will be understood that the two nozzles 13 will rotate in the same direction, and preferably, as shown best in Fig. 2, they extend in the same direction from their axes of rotation, the nozzles virtually forming parallel crank extensions from the sleeves 14. The tips of the nozzles 13 are at a relatively considerable distance above the conveyor 10.

The side walls of the chamber 12 are provided with vertical slots 25 into which extend the tips of transverse nozzles 26, 27 located on opposite sides of said chamber. As will be noted in Fig. 2, these nozzles do not move in the same vertical transverse plane, but their paths are out of transverse alignment, so as to avoid injury to one nozzle by the jet issuing from the other nozzle. Each of these nozzles is moved up and down in a different transverse vertical plane, and in the example illustrated, this up-and-down motion is substantially a rocking motion about a horizontal axis parallel to the path of the conveyor 10, so that the jets discharged from the nozzles 26, 27 will pass from the upward direction corresponding to the position Fig. 1 to a horizontal direction and to a downward direction, to then swing back to the original position illustrated. This movement may be obtained, for instance, by the following mechanism: Each of the nozzles 26, 27 extends through a carrier 28 movable between the parallel vertical inner faces of two stationary guides 29, and said nozzle further passes loosely through an opening at the upper end of a connecting rod 30. A mixture of sand or the like and compressed air is supplied to the nozzles 26, 27 through stationary pipes 31 by means of flexible hose connections 32. The lower end of the connecting rod 30 is connected with a crank pin 33 on a disk 34 secured rigidly to a horizontal shaft 35 journaled in bearings 36. A convenient arrangement, illustrated by Figs. 1 and 2, consists in mounting the disk 34 on the same shaft that carries the lower pulley 37 of a bucket elevator 38 such as is used in this art for raising the sand which has dropped to the bottom of the housing, to tanks (not shown) from which it is fed to the nozzles in any well-known manner. I have deemed it unnecessary to show the details of the elevators proper. The upper

pulleys of the elevators are indicated at 39, and one of them is shown as secured on the shaft 22, and driven thereby. The other pulley 39 is on another horizontal shaft 40 aligning with the shaft 22 and driven by a belt applied to a pulley 41.

In the operation of the form of my invention illustrated by Figs. 1, 2 and 3, the rotary nozzles 13 will project the sand or other material against a strip of the article under treatment, which strip is of a width somewhat greater than the diameter of the circle described by one of the nozzle tips, since the sand spreads outwardly as it issues from the rotating nozzles. The jets from the nozzles 13 will reach upwardly-facing portions of the article under treatment. The jets issuing from the transverse nozzles 26, 27 will reach the side surfaces of the article, said nozzles moving up and down in the slots 25 of the housing and in corresponding slots 42 of the casings or boots 43 in which the elevators 38 are contained. As the transverse nozzles 26, 27 move up and down, they will reach a greater width (or height) on the sides of the article than if they were stationary. Also, the fact that the inclination of said nozzles varies during their movement, further increases the width of the strip which they cover or sweep. The arrangement described is therefore very efficient for the treatment, both from above and from the sides, of articles having intricate shapes.

In the construction illustrated by Figs. 4, 5, and 6, the conveyor 10 and the housing 11, 11′ may be of the same character as described above. The spur gear 18′ on the central vertical shaft 19′ drives the spur pinions 17 of two nozzles 13 corresponding to the nozzles 13 of Figs. 1 and 2, that is to say, said nozzles rotate about vertical axes arranged in the longitudinal center of the conveyor passage. The gear 18′ is further in driving engagement with two spur pinions 17′ arranged to rotate about vertical axes on opposite sides of said longitudinal center. These pinions 17′ are connected with rotary nozzles 13′ which may be of the same character as the nozzles 13, but owing to the lateral arrangement of their axes of rotation, these nozzles 13′ will reach portions of the article beyond the sweep of the other nozzles, 13.

The drive of the shaft 19′ may be similar to that of the shaft 19. Thus the said shaft 19′ may have at its upper end a bevel gear 20′ in mesh with a similar gear 21′ on a horizontal shaft 22′ journaled in bearings 23′ and provided with a pulley 24′ to receive a driving belt.

While in Figs. 1, 2 and 3 the transverse nozzles 26, 27 operate in the same region as the rotary (central) nozzles 13, in Figs. 4, 5 and 6 I have indicated a different arrangement of transverse nozzles moving up and down, according to which the articles moving through the passage of the housing 11, 11′ are first subjected to the action of such transverse nozzles, then pass into the zone of action of the rotary nozzles, and finally are again exposed to transverse blasts. Figs. 4 and 5 indicate a pair of transverse nozzles 26′ on one side of the region of the rotary nozzles 13, 13′, and another pair of transverse nozzles 27′ on the other side of said rotary nozzles, that is to say, the transverse nozzles are between the rotary nozzles and the respective ends of the housing. It will also be noted from Fig. 4 that the two pairs of transverse nozzles are on opposite sides of the longitudinal central plane passing through the shaft 19′ and the axes of the pinions 17. Both nozzles 26′, or 27′ are secured rigidly to the same shaft 44, or 45 respectively mounted to rock in bearings 46, 47 respectively, and on each of said shafts is secured a crank arm 48, 49 respectively pivotally connected at 50, 51 respectively with one end of a rod 52, 53 respectively. The other ends of said rods have pivotal connections 54, 55 respectively with cranks 56, 57 respectively on a shaft 58 journaled in stationary bearings 59 and extending lengthwise of the housing 11, 11′. It will be understood that the rock shafts 44, 45 also extend lengthwise of said housing. The shaft 58 may be driven by a bevel gear 60 on the shaft 22′ meshing with a like gear 61 on said shaft 58. Air and sand or other material are supplied to the nozzles 26′, 27′ in any suitable manner, for instance through flexible hose connections 62, 63 respectively.

The transverse nozzles 26′, 27′ move up and down in transverse planes, each of these nozzles moving in a different plane, and their up-and-down motion is accompanied by a change in their inclination, in substantially the same manner as described above in connection with the nozzles 26, 27. This second form of my apparatus is also very efficient for the sand-blasting or similar treatment of various articles, particularly when they are of intricate shapes. Other substances than sand may be used for cleaning purposes, and the features of my present invention may also be utilized in apparatus for projecting other substances against the articles to be treated, for instance such articles may be sprayed with paints, oils, cleaning liquids, etc. It will be understood that various modifications may be made without departing from the nature of my invention as set forth in the appended claims.

I claim:—

1. An apparatus of the class described, comprising a housing with a passage through which the articles to be treated are adapted to travel, nozzles to project jets against the upper surface of said articles, a transverse

nozzle movable up and down for projecting a jet against said articles laterally, an elevator for carrying away the projected material from the bottom of the housing, and an operative connection between said elevator and said transverse nozzle.

2. An apparatus of the class described, comprising a housing having a passage through which the articles to be treated are adapted to travel, a plurality of nozzles for throwing the treating agent directly against those faces of an article situated in a predetermined plane, means to rotate said nozzles, a plurality of nozzles arranged to throw the treating agent against those faces of the articles situated in planes substantially perpendicular to said first named plane and means for oscillating said last named nozzles in planes substantially perpendicular to the axes of rotation of said rotary nozzles.

3. In an apparatus of the class described, comprising a housing having a passage through which the articles to be treated are passed and a plurality of nozzles for throwing a treating agent against said articles, certain of said nozzles being mounted for rotary movement and others of said nozzles being mounted for oscillating movement in planes substantially perpendicular to the axes of rotation of said rotary nozzles.

In testimony whereof I have signed this specification.

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SPRAYING DEVICE

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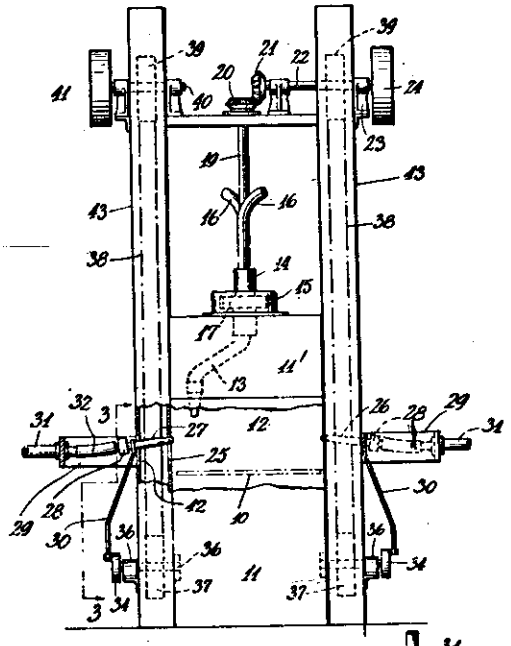

Fig. 1.

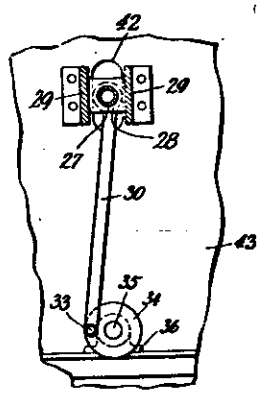

Fig. 3.

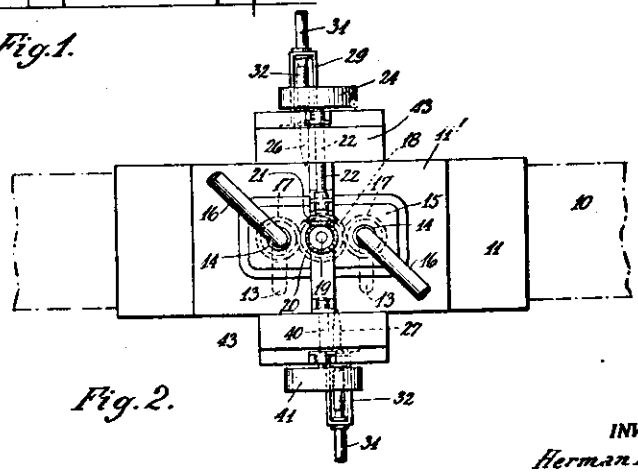

Fig. 2.

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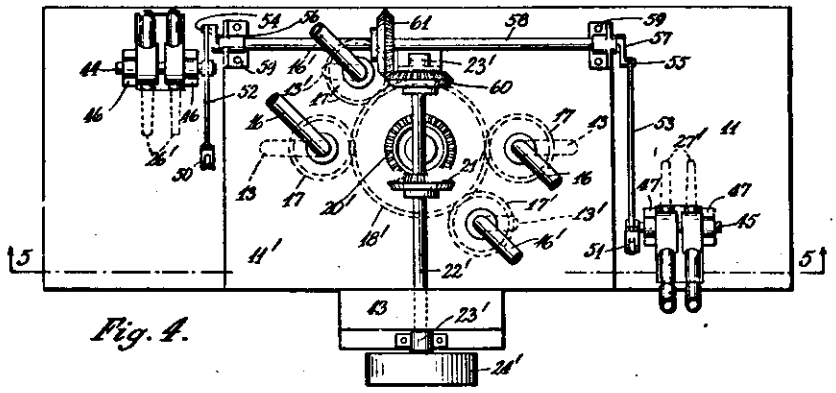

Fig. 4.

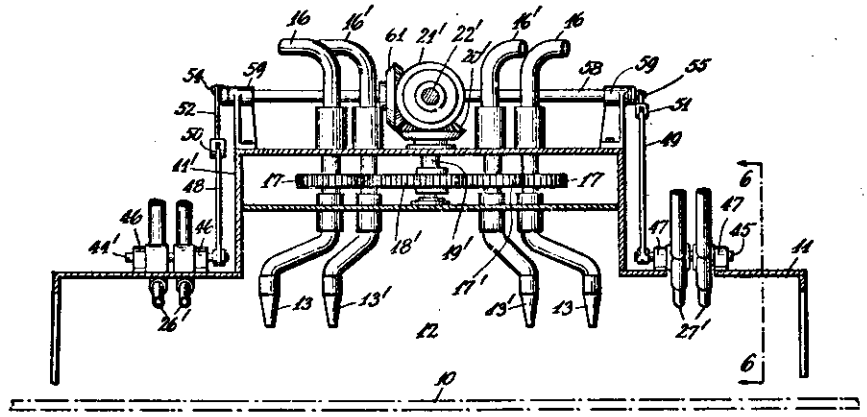

Fig. 5.

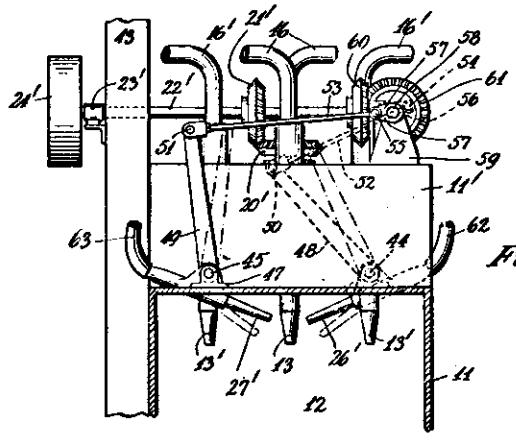

Fig. 6.

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