

Oct. 12, 1937.

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2,095,385

SAND TREATING APPARATUS

Filed May 13, 1936

3 Sheets-Sheet 1

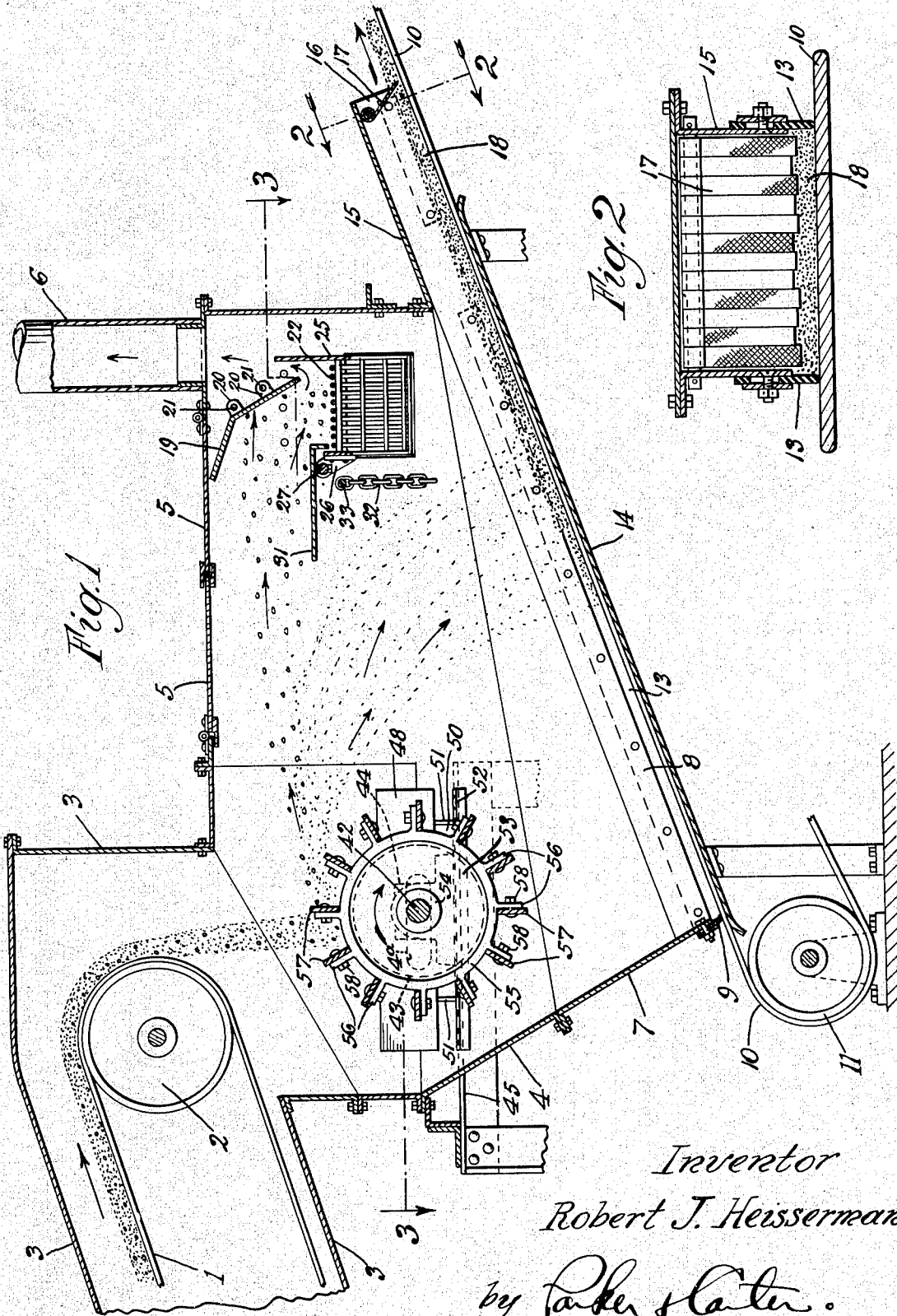


Fig. 1

Fig. 2

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3 Sheets-Sheet 2

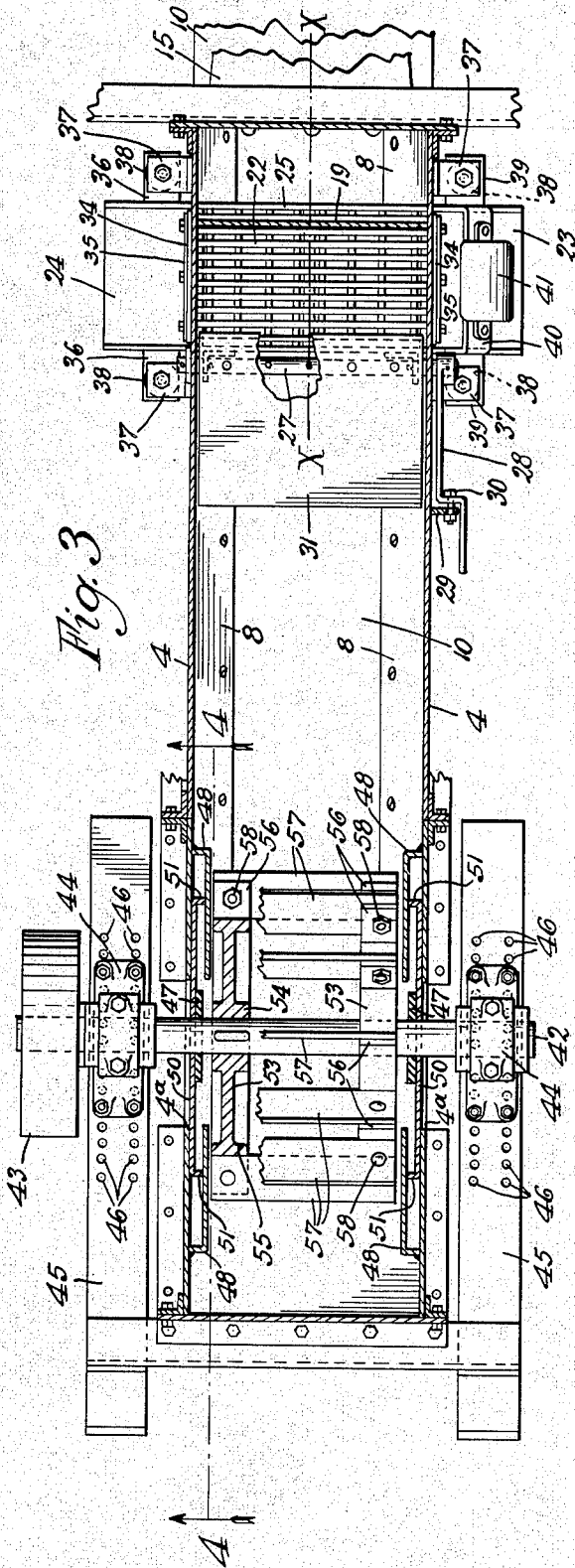


Fig. 3

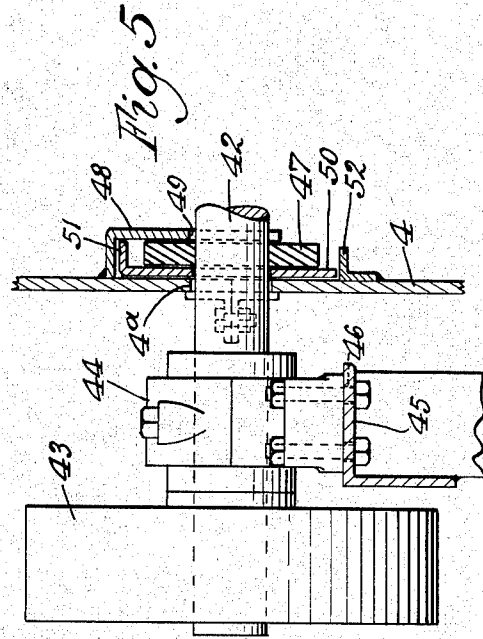


Fig. 5

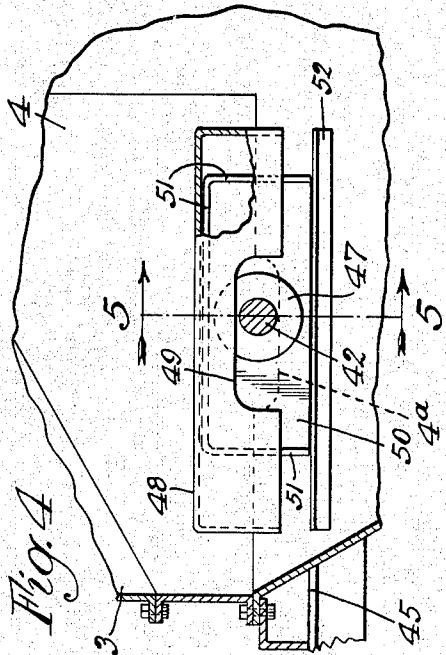


Fig. 4

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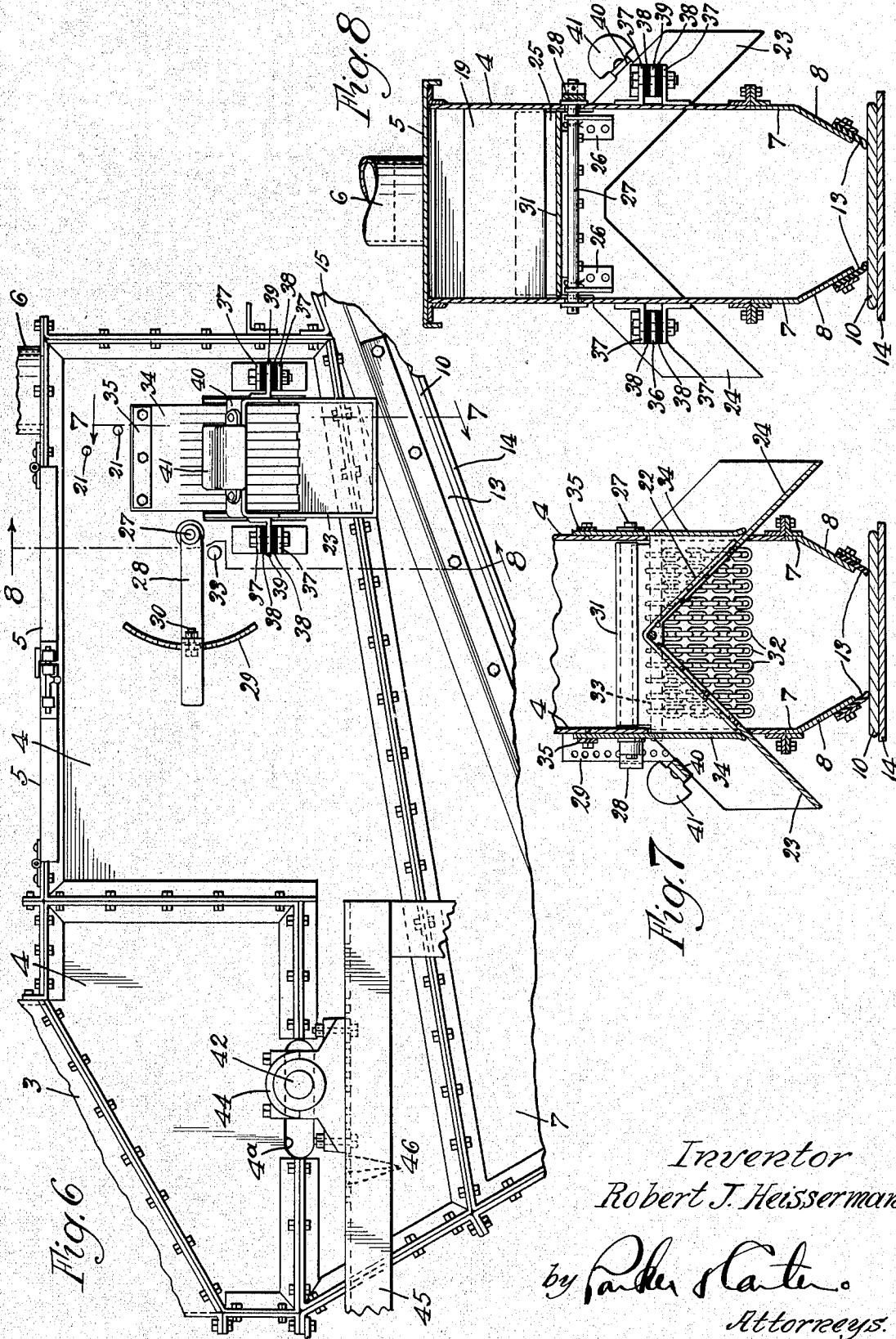
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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

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SAND TREATING APPARATUS

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Application May 13, 1936, Serial No. 79,439

4 Claims. (Cl. 209—120)

This invention relates to an apparatus for treating casting sand and similar or analogous material and has for one object to provide an apparatus of the type indicated which will treat sand which has been used in casting so as to

recondition the sand and to separate from it metal particles which may be mixed with it after its use in casting operations.

Another object is to provide in connection with a device of the type indicated an adjustable sand impeller, adjustable both as to its position and as to the trajectories through which particles struck by the impeller are caused to pass. Another object is to provide in connection with a device of this type a dust-tight housing and to provide vibratory means for screening and for discharging the reclaimed sand.

Other objects will appear from time to time in the specification and claims.

The invention is illustrated more or less diagrammatically in the accompanying drawings, wherein:—

Figure 1 is a longitudinal vertical section through one type of the invention;

Figure 2 is a transverse sectional detail taken at line 2—2 of Figure 1;

Figure 3 is a longitudinal generally horizontal section taken at line 3—3 of Figure 1;

Figure 4 is a longitudinal generally vertical sectional detail, taken at line 4—4 of Figure 3;

Figure 5 is a transverse generally vertical sectional detail taken at line 5—5 of Figure 4, on an enlarged scale;

Figure 6 is a side elevation of the main housing on an enlarged scale;

Figure 7 is a transverse generally vertical sectional detail taken at line 7—7 of Figure 6;

Figure 8 is a transverse generally vertical sectional detail taken at line 8—8 of Figure 6.

In general a housing is shown having an open bottom through which material is discharged to conveyor or stationary means. Sealing means may be provided along the edges of the open bottom to contact the conveyor, if one is present, and to prevent the escape of air and dust and to prevent the discharge or escape of sand, except in the direction of desired discharge. The housing bottom may be inclined or horizontal, depending upon the means to which it is attached. The mechanism in addition to the housing comprises an impeller, means for catching heavier particles such as metal, after they leave the impeller, and means for screening out sand which may have been carried over with the metal particles. An

up-draft dust discharge connection is also provided.

In the particular form shown, 1 is a conveyor belt which passes about a pulley 2. The belt may be driven by any desired means. The belt and pulley is enclosed in a housing 3 which joins and in effect forms a part of a housing 4. This housing 4 may have a pivoted or otherwise movable top door 5, an upper air vent pipe 6 and a downward extension 7, which as here shown is bolted to the housing 4 and may comprise inwardly bent portions 8, as shown particularly in Figures 7 and 8. Positioned across the lower end of the housing section 7 is a flexible sealing member 9 which contacts a sand removal conveyor belt 10 which may be positioned about a pulley 11.

Along the sides of the inwardly bent portions 8 are flexible sealing members 13 which also contact the belt 10. A guide plate 14 is positioned below the upper run of the conveyor belt 10 to hold it in contact with the sealing members 13. An extension 15 is provided from the housing in the direction of sand discharge. It overlies the belt 10 and the sealing members 13 are secured to it. It is open at its discharge end as at 16, except for a sealing curtain 17 which may be made of a plurality of strips, as shown particularly in Figure 2, or might be made of a single sheet of material. This curtain in general projects downwardly sufficiently to extend into the upwardly moving stream 18 of reconditioned sand which lies upon the conveyor belt 10. It thus tends to prevent the passage of air, but may be moved aside to permit sand to be carried through the discharge opening by the conveyor belt.

Fixed within the housing is a baffle 19 which may be secured by ears 20 and rivets 21 to the walls of the housing. As shown in Figure 1 it is formed of two relatively inclined sections. It may be of any suitable shape and its purpose is to direct the heavier particles to the screen structure.

The screen structure preferably has an angular cross section, having a ridge or peak generally along line X—X of Fig. 3 and forms part of a vibratory assembly which includes a bent rod screen 22, and two chute sections 23 and 24. This sub-assembly also includes a baffle plate 25, fixed to one wall of the chute structure. Pivoted on the forward wall of the chute structure upon ears 26 is a shaft 27 which extends outwardly from the housing at one end and carries an adjusting handle 28 which engages a quadrant 29 to which it may be secured in adjusted position by a bolt 30 or by any other desired securing means. The

shaft 27 carries a baffling and guiding plate 31 which is movable with the shaft into any desired position and which forms the guiding line or zone between the metal refuse and the sand, the metal refuse, as shown in Figure 1, passing above the plate 31 and the major part of the sand falling below it. As a protection to the trough assembly against injury and wear from the flying particles and sand there is provided a curtain of chains 32 which as here shown are secured on a bar or rod 33 and hang downwardly more or less into the path of the sand and other particles. Projecting into each of the chutes 23 and 24 is a sealing curtain 34 which may be secured to the housing 4 by a fastening plate 35 or by any other suitable means. As shown particularly in Figure 6 the curtain is preferably made of strips of material although might be made of a single sheet. As shown in Figure 7 it is of such length that its lower margin lies upon the bottom of the chute within which it is positioned to prevent passage of air.

The chute 24 is provided on either side with outwardly projecting lugs 36 which are positioned between lugs 37 secured to the side of the housing 4. Between the lugs 36 and each of the lugs 37 is a cushioning member 38 which may be of rubber or some other cushioning or shock absorbing material of such size, shape and consistency as to permit relative vibration.

The lugs 37 are positioned on the opposite side of the housing 4 and between them the lugs 39 of the chute 23 are positioned. Shock absorbing members 38 are positioned between the lugs 37 and the portions 39, the shock absorbing members on each side of the housing being preferably the same. A saddle 40 extends across and either is secured to or made integrally with the chute section 23. A vibrator 41 is positioned on the saddle 40. The details of this vibrator are not shown as they form no essential part of the present invention. Preferably it is an electric vibrator which vibrates to cause vibration of the entire chute assembly thus vibrating the screen, the chutes themselves, and the baffle 31.

To strike and impel the entering sand there is provided a rotary impeller, which comprises a shaft 42, which may carry at one end a pulley 43 by means of which it may be driven from any suitable source. Bearings 44 support the shaft for rotation and are carried upon bases 45 which as shown are provided with a series of perforations 46 for adjustment. To effectively seal the space around the shaft 42 and to permit of the adjustment just mentioned, there is mounted on each end of the shaft a sealing member 47. A hoodlike member 48 is positioned on the inner side of the housing 4 at each side to overlap and embrace the sealing members 47 as indicated in Figures 4 and 5. The lower margin of the member 48 is notched or cut away as at 49 as shown particularly in Figure 4. A sealing plate 50, having a flange 51 along its top and sides, lies within the hood 48 between the housing 4 and the sealing member 47. It is perforated to fit upon the shaft 42. 52 is a guide member secured on the inner wall of the housing 4 and arranged to be contacted by and to guide the plate 50. The housing is apertured at 4a for the shaft 42.

Fixed on the shaft 42 are two rotor members rims 55, carrying spoke-like projections 56. To each of these projections 56 is secured a slat or vane 57. As shown they are bolted in place by 53, which may be generally solid, provided at their centers with hubs 54, at their outer edges with

bolts 58 but might be otherwise secured. The slats or vanes are the actual impeller parts. They are removable for repair or to permit the substitution of larger or smaller vanes which may be of any desired shape or contour. By the substitution of wide vanes the total diameter of the rotor impeller is altered. Other adjustments and changes will suggest themselves.

It will be realized that whereas I have herewith shown and described a practical operative device, nevertheless many changes might be made in the size, shape, number and disposition of the parts without departing from the spirit of the invention and I wish, therefore, that my showing be taken as in a sense diagrammatic.

In particular the details of the screen structure and its assembly might be changed. There might be but a single chute. The shape and disposition of the screen might be altered. The vibrator means might be omitted or other vibratory means used, but in general there will be some such an assembly and it lies partially within and preferably extends partially outside of the main housing 4 which is apertured suitably to permit the proper positioning of the assembly and the proper discharge of material from it. As shown, the screen and chute assembly is held in place by bolts which pass through suitably aligned perforations in the members 37, 38 and 39. Obviously, these parts might be riveted or otherwise fastened together.

The use and operation of the invention are as follows:

With the device generally as shown, carried on any suitable support or foundation, sand or other analogous material for classification and treatment is conveyed to the treating zone by a belt conveyor 1 or otherwise. With the mechanism in operation the impeller is rotating in the direction of the curved arrow shown upon it in Figure 1. The material falling from the conveyor or otherwise into the impelling zone is struck by the vanes and driven to the right as shown in Figure 1. The heavier particles carry farther than the lighter particles. The heavier particles thus carry above the plate 31 and the lighter particles fall below it. The plate is initially adjusted to effect the desired separation. All the material that passes above the plate either falls directly upon the bar screen or is guided to it by striking the baffle 19. The plate and the screen are preferably vibrated and the heavier particles are discharged over the screen through the chute 23 or 24 and as they move outwardly they displace the curtains 34 sufficiently to permit them to pass. What sand is carried with the heavy particles onto the screen is separated from them and falls through the screen directly onto the sand conveyor 10.

The lighter sand which does not carry to the plate 31 falls directly onto the clean sand conveyor as shown in Figure 1 and moves with that conveyor toward the discharge opening 16 of the housing. This sand current or stream displaces the curtain 17 sufficiently to permit its outward passage. The movement of the rotary impeller acts as a fan, drawing air into the housing and discharging it through the vent 6. Thus dust and light impurities are carried upwardly and out of the housing and vented to any desirable point. In this manner the sand is cleaned of the extremely light particles of impurities. The various other openings to the housing are sealed by the members 9, 13 and 17 on the bottom and by the curtains 34 at the discharge chutes.

Adjustment is generally provided for. In the impeller adjustment is made by moving the shaft backward and forward to the desired position and by changing or adjusting the position of the impeller slats or vanes. The classification is controlled by adjusting the plate 31. The speed of the impeller itself is also adjustable. The sealing members, particularly the sealing members 9 and 13, are adjustable, for example, as shown in Figure 2, the members 13 are slotted and provided with adjustable engaging parts. Any other suitable adjustment may be provided.

The housing itself is adjustable as to shape, since the section 7 might be removed and the belt 15 10 correspondingly adjusted to move in a horizontal or approximately horizontal plane, or arranged to discharge to a stationary means.

The vibration imparted to the screen and chute assembly makes the screening operation successful and prevents clogging of material on the chutes because they are constantly vibrated and material is therefore discharged along them. It is to be understood that the chute sections 23 and 24 begin only at the edges of the screen 22 so that material passing through the screen does not pass into the chute sections but is separated from material which passes over the screen.

The device shown in its operation thus provides means for separating from the sand the metal and other heavy particles by direct mechanical action and provides means for separating the extremely light impurities by pneumatic action, since the air pressure set up is vented through the vent 6 and the stream of air which moves through the vent carries with it and thus separates from the sand the extremely light impurities. The sand is thus completely cleaned and reconditioned for further use.

Air pressure might be set up within the housing by means other than the impeller, such as a blower. It is ordinarily convenient, however, to use the impeller to accomplish the dual purpose of striking and driving the sand and other particles as well as that of setting up a sufficient current of air to effect the cleaning and air separation desired. Means may be provided in vent 6 to regulate the quantity of fine impurities to be removed.

This machine is adapted for use generally upon granular material, sand, cinders or any other material which can be treated, and wherein the specification and claims the word "sand" or "material" occurs it is to be understood as including not merely sand but other material susceptible to treatment by the machine herein described.

I claim:

1. In combination in a material treatment apparatus, a housing, means for discharging material to said housing and for reconditioning it therein, said reconditioning means comprising a rotary impeller positioned to strike the incoming material, a stationary means positioned to receive material from the impeller, screen means for receiving heavy particles from the impeller and for classifying them from the material carried with them, and for discharging them separately in a direction away from the main body of material, said classifying and discharging means comprising an assembly supported upon the housing for relative movement with respect thereto.

2. In combination in a material treatment apparatus, a housing, means for discharging material to said housing and for reconditioning it therein, said reconditioning means comprising a rotary impeller positioned to strike the incoming material, a stationary means positioned to receive material from the impeller, screen means for receiving heavy particles from the impeller and for classifying them from the material carried with them, and for discharging them separately in a direction away from the main body of material, said classifying and discharging means comprising an assembly supported upon the housing for relative movement with respect thereto, and means positioned upon said assembly for vibrating it.

3. In combination in a sand or analogous material treatment apparatus, a housing, means for discharging material to said housing and for reconditioning it therein, said reconditioning means comprising a rotary drum impeller within the housing and positioned to strike the incoming material, means positioned to receive material from the impeller, and pneumatic means including said impeller for carrying off the particles lighter than the said material away from the main body of material.

4. In combination in a material treatment apparatus, a housing, means for discharging material to said housing and for reconditioning it therein, said reconditioning means comprising a rotary impeller positioned to strike the incoming material, means positioned to receive material from the impeller, means for receiving heavy particles from the impeller and for classifying them from the material carried with them, and for discharging them separately in a direction away from the main body of material, and means for vibrating said classifying means.

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