

April 27, 1926.

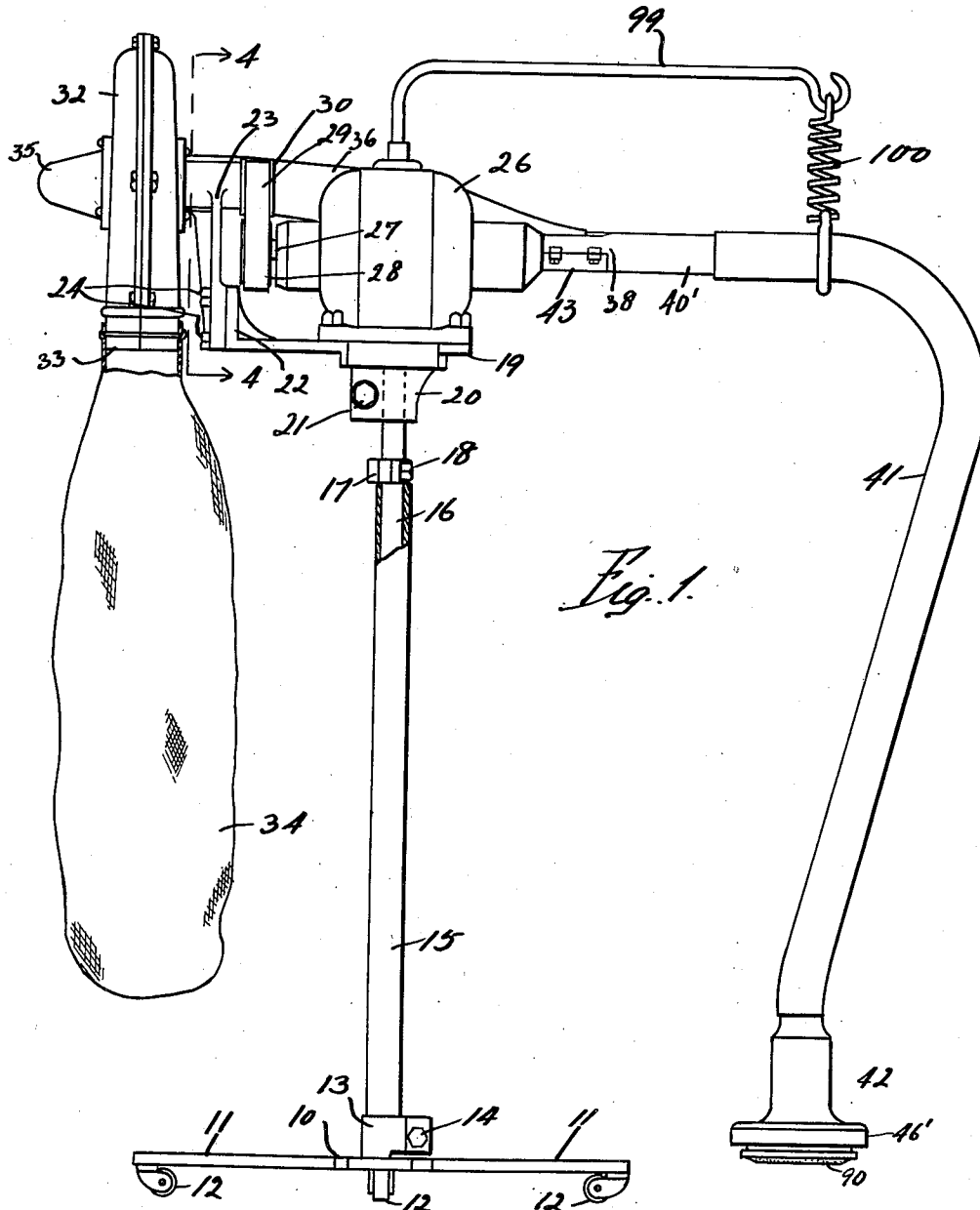
A. P. BENNINGTON

1,582,664

PORTABLE BLACKBOARD RENOVATOR

Filed April 15, 1925

4 Sheets-Sheet 1



INVENTOR
Albert P. Bennington
By W. W. Williamson Atty.

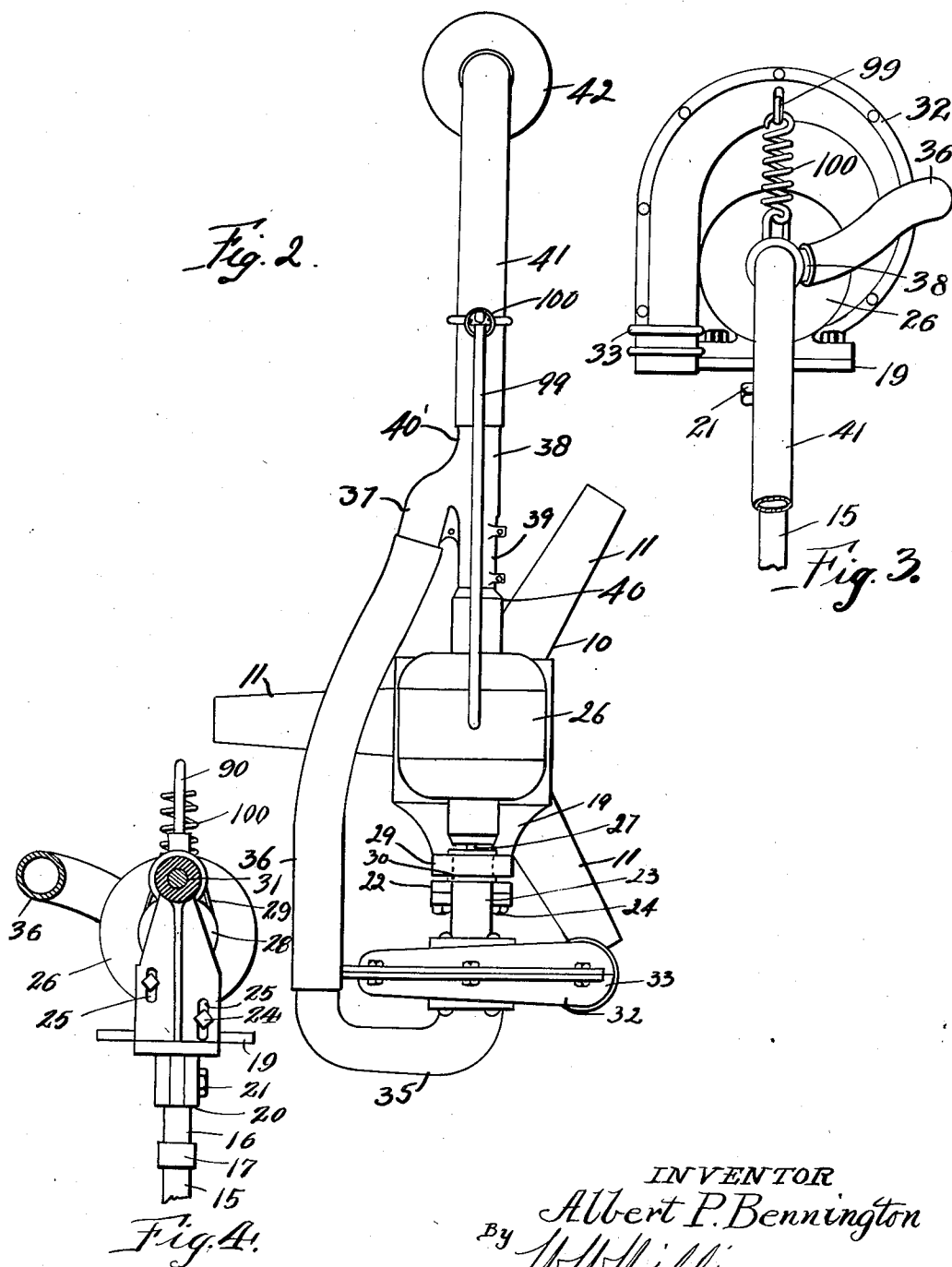
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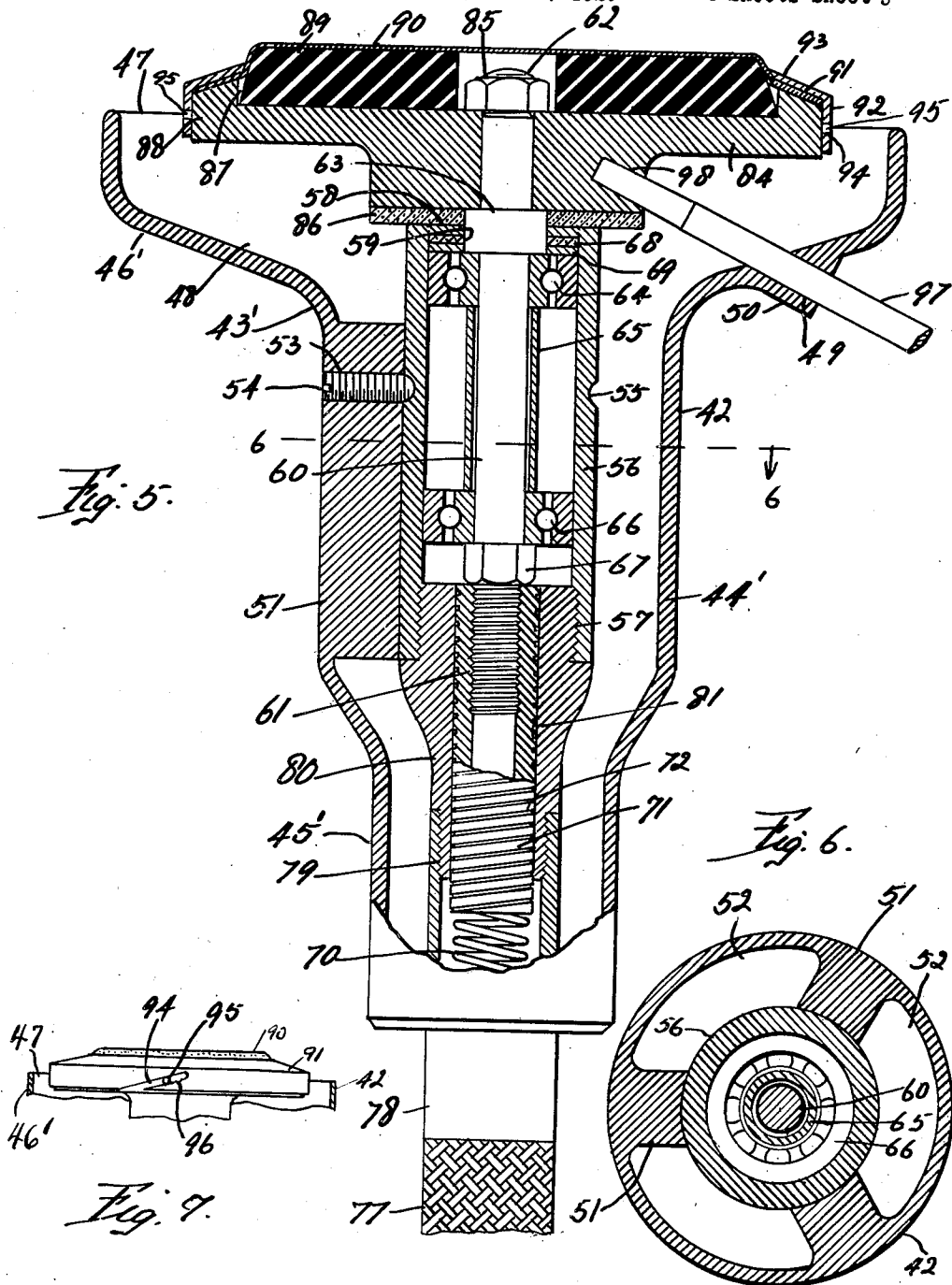
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PORTABLE BLACKBOARD RENOVATOR

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4 Sheets-Sheet 3



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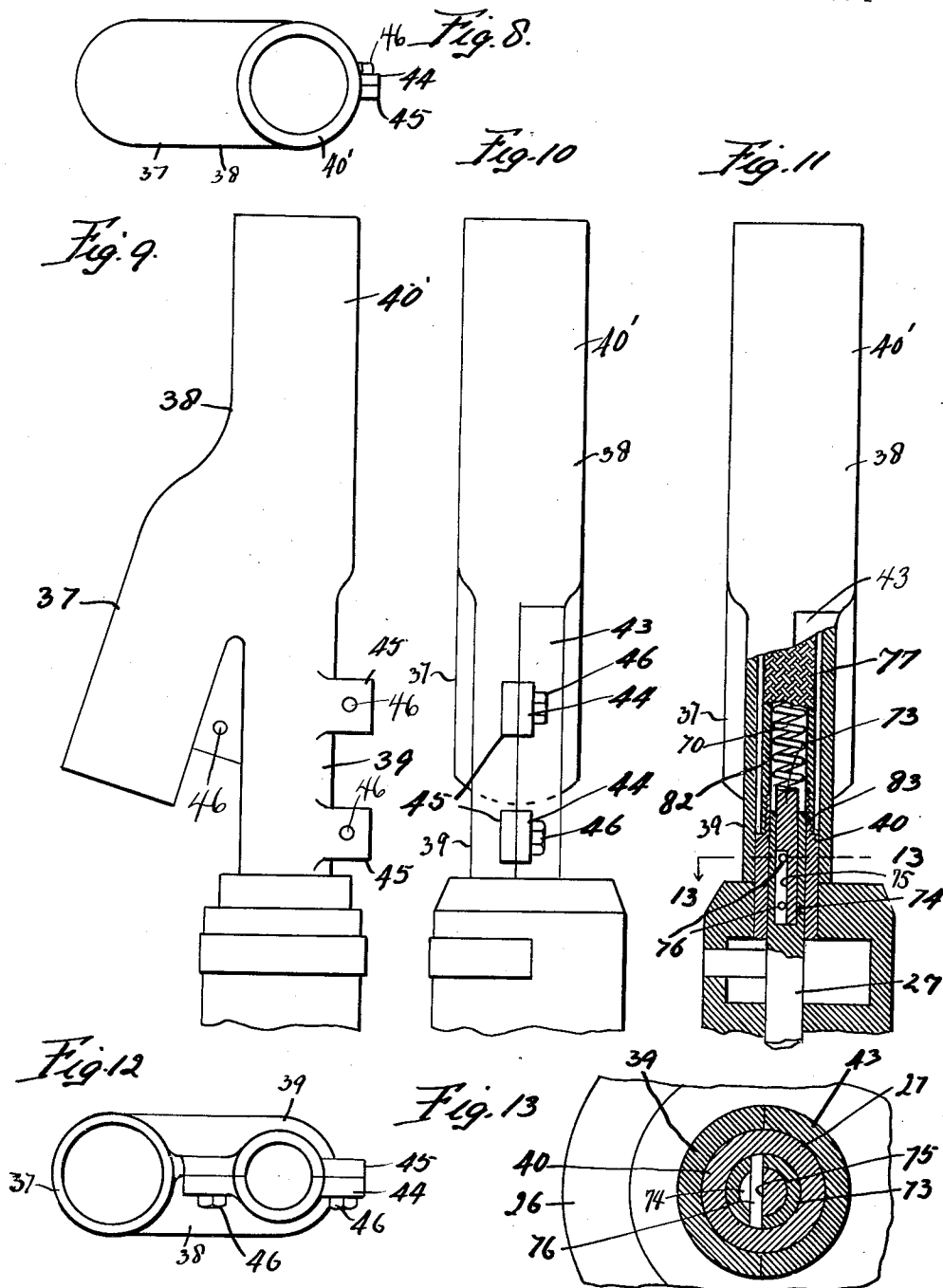
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PORTABLE BLACKBOARD RENOVATOR

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4 Sheets-Sheet 4



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Patented Apr. 27, 1926.

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UNITED STATES PATENT OFFICE.

ALBERT P. BENNINGTON, OF PHILADELPHIA, PENNSYLVANIA.

PORTABLE BLACKBOARD RENOVATOR.

Application filed April 15, 1925. Serial No. 23,217.

To all whom it may concern:

Be it known that I, ALBERT P. BENNINGTON, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented new and useful Improvements in a Portable Blackboard Renovator, of which the following is a specification.

My invention relates to new and useful improvements in a portable blackboard renovator, and has for its primary object to provide a machine for cleaning the surfaces of blackboards which will be compact and convenient to operate as well as portable in order that it may be readily moved from place to place thereby eliminating the necessity of removing the blackboards from the wall or dismantling the same while being cleaned.

Another object of the invention is to so construct the several parts of the machine that different adjustments may be accomplished, particularly as to height, whereby a considerable amount of the strain on the user will be eliminated when used for cleaning blackboards at different elevations.

Another object of the invention is to provide a portable blackboard renovator so constructed that the parts may be disassembled and packed in a comparatively small space for transporting purposes.

Another object of the invention is to provide a renovator of this class including a base of unique construction enabling the operator to place the machine in close proximity to the work being done.

A further object of the invention is to construct a renovator including a base, a two-piece adjustable standard removably connected with the base, a table removably connected with the upper end of the standard to support a motor and suction device, the latter being adjustable in order to give the proper tension to the driving belt, a flexible shaft connected with one end of the motor shaft, a head on the outer end of the flexible shaft, a flexible tube in two parts to form a communication between the head and suction device, and a Y-shaped union surrounding a portion of the flexible shaft and connecting the tube sections.

A still further object of the invention is to provide for supporting, to a slight extent, the flexible shaft and surrounding tube so as to partially relieve the workmen of the weight of these parts and to prevent a too-

sharp bend at the point of connection between the flexible shaft and motor shaft which tends to strain and sometimes breaks the parts at this connection.

One of the main advantages of the renovator, due to its portability and compact convenient arrangement is the fact that the operator may set the machine in close proximity to the blackboard to be renovated and then move the cleaning head over the blackboard surface so as to remove the foreign matter and grind off a portion of the blackboard surface until a smooth flat face has been produced and the material thus removed will be drawn into the cleaning head and through the flexible tube by means of the suction device from which it will be delivered into a suitable receptacle, such as a bag.

Many other advantages or features might be enumerated which will be apparent to persons skilled in this art but the gist of the invention is the provision of a portable, compact and convenient machine which may be readily transported to the work to be done and there operated conveniently and efficiently at a relatively small expense.

With these ends in view, this invention consists in the details of construction and combination of elements hereinafter set forth and then specifically designated by the claims.

In order that those skilled in the art to which this invention appertains, may understand how to make and use the same, I will describe its construction in detail, referring by numerals to the accompanying drawings forming a part of this application, in which:—

Fig. 1 is a side elevation of a portable blackboard renovator constructed in accordance with my improvements, portions of which are broken away and shown in section in order to illustrate certain constructional details.

Fig. 2, is a plan view thereof.

Fig. 3, is a fragmentary front end elevation.

Fig. 4, is a section at the line 4—4 of Fig. 1.

Fig. 5, is an enlarged longitudinal sectional view of the cleaning head with portions left in elevation.

Fig. 6, is a section at the line 6—6 of Fig. 5.

Fig. 7, is a side elevation, on a reduced

scale, of the rotary disc and its component parts with a portion of the surrounding casing or jacket shown in section.

Fig. 8, is an end view of the Y-shaped union.

Fig. 9, is a plan view thereof showing a part of the motor to which it is connected.

Fig. 10, is a side elevation of Fig. 9.

Fig. 11, is a longitudinal sectional elevation thereof.

Fig. 12, is an end view of the union opposite to that shown in Fig. 8.

Fig. 13, is an enlarged section at the line 13-13 of Fig. 11.

In carrying out my invention as herein embodied, 10 represents the base which includes radial legs 11, preferably three in number, which are supported on rollers or casters 12 so mounted as to swing in any direction whereby the device may be readily moved from place to place without having to set the casters or lift the device. By providing the base with three radial legs equally spaced the machine is properly supported while permitting it to be moved into close proximity to an object adjacent the blackboard to be renovated or in many cases one of the legs may be allowed to project beneath an object, such as a desk, where the latter is in proximity to the work being done. With the base is formed an integral split socket 13 whereby it may be fastened through the medium of a bolt 14, or its equivalent, about the lower end of the tubular standard section 15 in which telescopes the other standard section 16 the latter being either a tube or bar. The standard section 16 is held in its several adjusted positions relative to the section 15 by means of an adjustable clamp 17 arranged for slidable adjustable movement upon the section 16 and held in any desired adjustment by the bolt 18, or its equivalent.

A table 19 is provided for supporting certain parts of the machine and on the underside of this table is formed an integral split socket 20 to receive the upper end of the standard section 16 to which it is clamped by means of the bolt 21, or its equivalent. The table is provided at one end with an upturned projection 22 to which is clamped a bracket 23 by means of stud bolts 24, or their equivalent. The bracket 23 is to be vertically adjustable and therefore is provided with vertical slots 25 to receive the stud bolts 24 which latter are threaded into the upturned projection 22.

An electric motor 26 is suitably secured upon the table 19 and on one of the projecting ends of its shaft 27 is fixed a pulley 28 over which runs a belt 29, the latter also running over a pulley 30 on the shaft 31 of the suction device 32, said shaft 31 being journaled in the bearing portion of the bracket 23 which latter is fastened to the

suction device for supporting the same. From the foregoing it will be obvious that by moving the bracket 23 up or down the tension of the belt 20 may be regulated.

The suction device 32 is here shown as a fan which discharges through the exhaust 33 from which it may be directed through suitable means to any desirable point or into a bag 34 adapted to receive the solid particles while permitting air to pass through it. The mouth of this bag may be suitably clamped about the exhaust of the suction device in order that it may be readily removed and replaced.

To the inlet 35 of the suction device is connected one end of a tube section 36 while the other end thereof is connected with the branch 37 of the Y-shaped union 38 while the inner end of the body of this union or the branch 39 is clamped about the bushing or stem 40 surrounding one end of the motor shaft and to the outer end of the body or shank 40' of the union is connected one end of the flexible tube section 41 while to the outer or free end of this tube section is connected the cleaning head 42.

The union 38 as plainly shown in Figs. 8 to 12 inclusive is of tubular construction and the inner end of the body or branch 39 is split longitudinally to provide a removable clamp element or member 43 provided with lugs 44 for coaction with similar lugs 45 on the stationary body portion whereby suitable clamp screws 46 or bolts may be passed through one set of lugs and threaded into the other set. From this it will be noted that air and solid particles drawn into the head 42 by the suction device 32 will pass through the flexible tube section 41 and then through the outer end and branch 37 of the union thence through the tube section 36 and the suction device from which they are discharged into the bag 34.

The cleaning head 42 includes a casing or jacket 43' constructed of generally tubular formation open at both ends and consisting of a body 44' from one end of which projects a reduced shank 45' and from the opposite end projects the enlarged bell 46' to produce a mouth 47 for the entrance of air and particles of solid matter drawn into the casing or jacket by means of the suction device through the medium of the flexible tube connected with the reduced shank 45'. The rear wall 48 of the bell is preferably flared outward or is of outwardly divergent formation and in this wall 48 of the bell is formed a hole 49 for a purpose to be later described and if found desirable said wall may be strengthened in the locality of the hole by the formation of a lug 50. Within the body portion 44' are formed a plurality of longitudinal ribs 51, preferably three in number, spaced about the inner circumference of said body portion so as to form

the passageways 52 between the several ribs, as plainly shown in Fig. 6.

In the body portion, and preferably in the region of one of the ribs is formed a threaded hole 53 in which is positioned the set screw 54 for coaction with the annular exterior groove 55 intermediate the ends of the barrel 56 for positioning said barrel lengthwise and holding the same stationary between the ribs 51.

The barrel 56 is open at its inner end where it is internally threaded as indicated at 57 while the outer end is partially closed by an end wall or inturned flange 58 in which is provided a hole 59. In this barrel is located the rigid stub shaft 60 having a threaded inner end 61 and a threaded outer end 62 with a collar 63 adjacent the outer end which latter is located in the hole 59 but is of sufficient width or thickness that one face projects outside and the other face inside of the end wall 58. On the stub shaft 60 between the collar and the inner end of said shaft is mounted a ball bearing 64 so as to abut the inner face of said collar in cooperative relation to the shaft and barrel. A tubular spacer washer 65 surrounds the shaft 60 with one end in engagement with the ball bearing 64 while another ball bearing 66, surrounding the shaft 60, engages the opposite end of said spacer washer and these parts are held in place by a nut 67 having threaded engagement with the inner end of the shaft. In order to fill the space between the end wall or flange 58 of the barrel and the outermost ball bearing 64 a compressible washer 68 is interposed between said end wall and a metallic washer 69 coacting with the outer face of the bearing 64.

The reference numeral 70 represents a flexible shaft of any well known make or construction to an end of which is fixed one end of a tubular connector 71 while the opposite end of said connector is internally threaded for connection with the inner threaded end of the stub shaft 60 and said tubular connector is provided with an external spiral groove 72 which acts as a conveyor to urge any matter outward with relation to the lower end of the barrel 56.

The flexible shaft 70 passes through the flexible tube section 41 and through the body or branches 39 and 40 of the Y-shaped union 38 and to its other or inner end is fixed, in any suitable manner, a rod or plug 73 for insertion in the socket or bore 74 formed in one end of the motor shaft 27 and this rod or plug is partially cut away longitudinally a desirable distance from its inner end to provide a flat wall or surface 75 for coaction with pins 76 located across the bore or socket 74 of the motor shaft and thereby keying the flexible shaft to the motor shaft by the insertion of the rod 73 in

the socket whereby when the motor is operated, the flexible shaft will rotate and will in turn rotate the stub shaft 60.

The flexible shaft is surrounded by a flexible sheath 77 generally constructed of latticed or interlaced metal strips and one end of this sheath is fixed to the tubular terminal 78 having threaded connection, as indicated at 79, with the smaller end of the reducing coupling 80 which in turn has threaded connection with the inner end of the barrel 56 by means of its threads 57. The coupling 80 has a bore 81 in which the connector 71 snugly fits and therefore any matter tending to enter the coupling will be carried back into the sheath terminal by means of the spiral conveying groove 72 as will be obvious. The other end of the sheath 77 is connected to another tubular terminal 82 which has threaded connection, as indicated at 83 with a reduced portion of the bushing 40 surrounding the motor shaft thereby connecting the several parts with each other.

On the outer end of the stub shaft 60 is fitted the rotating disc 84 clamped solidly against the collar 63 on the shaft by means of a nut 85 screwed onto the threaded end 62 of said shaft and this rotating disc is preferably provided with a hub which engages the collar. Between the disc, and more particularly its hub, and the end wall or flange 58 of the barrel 56 is interposed a compressible washer 86, such as a felt washer to prevent an accumulation of dust or other foreign matter to the working parts.

The rotating disc has a central cavity 87 thereby providing an annular flange 88 at right angles to the main portion of the disc and the transverse face of this flange is beveled or inclined, as plainly shown in Fig. 5.

In the cavity 87 is located a compressible backing member 89 which is of sufficient thickness to project beyond the beveled face of the annular flange and said backing member has an aperture for registration with the outer end of the stub shaft and the nut thereon. A flexible abrasive disc 90 is placed over the exposed portion of the backing member 89 with its outer end forming a skirt by which the parts may be clamped between the backing member 89 or the disc flange and a clamping ring 91 which includes an annulus 92 and an inwardly projecting flange 93, the former having a plurality of inclined slots 94 for registration with the pins 95 projecting radially from the perimeter of the rotating disc so that after the backing member and an abrasive disc are positioned and the clamping ring placed thereover so that the entrances to the slots 94 register with the pins 95 a slight turn of the clamping ring will draw its flange tightly down upon the skirt of the abrasive disc and thus clamp the parts in place. In order to insure holding the clamping ring

in position on the rotating disc an edge of the annulus wall in the region of each inclined slot is serrated as at 96 and the elasticity of the backing member will cause it to give or compress as the clamping ring is moved into place and this tendency to expand will retain the serrations in contact with the pins.

To place the clamping ring upon the rotating disc or remove it therefrom it is necessary to hold said rotating disc stationary and this is accomplished by passing the holding rod 97 through the hole 49 in the rear wall of the casing bell and inserting the inner end of said holding rod in the hole 98 on the rotating disc, and more particularly in the hub of said disc, said hole being so arranged as to align with the hole 49.

In order to support the flexible shaft adjacent its point of connection with the motor shaft so as to reduce to a minimum the possibility of either of the shafts being damaged or the flexible shaft breaking at this point, I provide a hanger 99 which is carried by or attached to the motor or some other suitable rigid portion of the machine and this hanger extends out a desirable distance beyond the connection between the flexible shaft and the motor shaft from which point depends a suitable suspending member 100, such as a spring, for connection with the flexible tube section 41.

In operation, when the parts are arranged as shown in Figs. 1 and 2, the device is ready for use as soon as electric current is turned on to the motor 26. When the current has been turned on to the motor, the suction device is operated and the rotating disc 84 is revolved rapidly there will be a flow of air into the jacket or casing 44' around the rotating disc by reason of the suction produced by the suction device. After the machine has been started the operator may hold the cleaning head in one or both ends by gripping the intermediate portion of the jacket or casing 44' when the abrasive disk 90 carried by the rotating disc is brought into contact with the blackboard surface to be renovated the accumulated dirt and grease or the like as well as a portion of the blackboard surface will be ground down and remove the particles drawn into the jacket or casing and deposited in the bag or receptacle provided.

It is to be particularly noted that while the machine is in use it may be readily shifted from place to place by rolling the same along on its castors and as the upper standard section with the table and other associated parts is rotatable, due to the resting of the clamp 17 upon the tubular standard section 15 the operator may readily shift from one part or one piece of work to another and again because of the flexible shaft and conduit the operator may easily and

quickly change the position of the cleaning head on the work so that the renovating operations may be carried on without removing the cleaning head from the work within an area accessible for a distance on either side of the machine approximately equal to the length of the flexible shaft. In some instances the blackboards are hung at a considerable height while in others they are fairly close to the floor and to adapt the machine to these varying conditions the clamp 17 may be placed at different positions on the upper standard section 16 which will raise or lower the table according to the desires of the operator.

The portability and compactness of this machine makes it possible to be used for the purpose specified, namely, the renovating of blackboards as such machine may be taken to the place where the work is to be done in a knockdown condition and then assembled after which the operator may readily and conveniently move the device about in order to position it for the best possible operation and as the cleaning head is relatively light and comparatively small the operator has no difficulty in moving it about over the blackboard surface and soon becomes so accustomed to the work that the surface may be readily ground down until quite smooth without the use of gages or other tools. After the renovating work has been completed the machine may be readily disassembled and stored in a small parcel for transportation.

Of course I do not wish to be limited to the exact details of construction as herein shown as these may be varied within the limits of the appended claims without departing from the spirit of my invention.

Having thus fully described my invention, what I claim as new and useful is:—

1. In a portable adjustable blackboard renovator, a movable base, a clamp socket on the base, a tubular standard section removably mounted in the clamp socket, a second standard section rotatably and slidably mounted in the tubular section, a clamp on the second standard section and resting on the upper end of the tubular standard section whereby the second named section may be adjusted or rotated relative to the tubular section, a table removably connected with the second named standard section, a motor clamped on said table, a bracket adjustably connected with the table, a suction device supported by said bracket, means for driving the suction device from the motor, the tension of said means being varied by adjusting the bracket relative to the table, a cleaning head including a rotatable part and a surrounding stationary jacket, a flexible drive shaft connected with the rotatable portion and the shaft of the motor, and a

flexible conduit connecting the stationary portion of the cleaning head with the suction device and surrounding the flexible drive shaft.

- 5 2. In a portable adjustable blackboard renovator, a movable base, a clamp socket on the base, a tubular standard section removably mounted in the clamp socket, a second tubular section rotatably and slid-
10 ably mounted in the tubular section, a clamp on the second standard section and resting on the upper end of the tubular standard section whereby the second named section may be adjusted or rotated relative to the
15 tubular section, a table removably connected with the second named standard section, a motor clamped on said table, a bracket adjustably connected with the table, a suction device supported by said bracket, means
20 for driving the suction device from the motor, the tension of said means being varied by adjusting the bracket relative to the table, a Y-shaped union having one branch

connected with the motor so as to enclose a projecting end of its shaft, a tube section 25 connected to another of the union branches and to the inlet of the suction device, a flexible conduit having one end connected with the other branch of the union, a flexible drive shaft surrounded by the flexible con- 30 duit and having one end connected with the motor shaft, and a cleaning head including a rotatable portion and a stationary surrounding jacket, said rotatable portion being connected with the other end of the 35 flexible drive shaft, and the jacket or stationary part being connected with the outer end of the flexible conduit whereby particles freed by the rotating portion of the cleaning head may be drawn away by the suction 40 device and discharged into a suitable receptacle.

In testimony whereof, I have hereunto affixed my signature.

ALBERT P. BENNINGTON.