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A. EPPLER

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PNEUMATIC SUCTION APPARATUS

Filed May 9, 1924

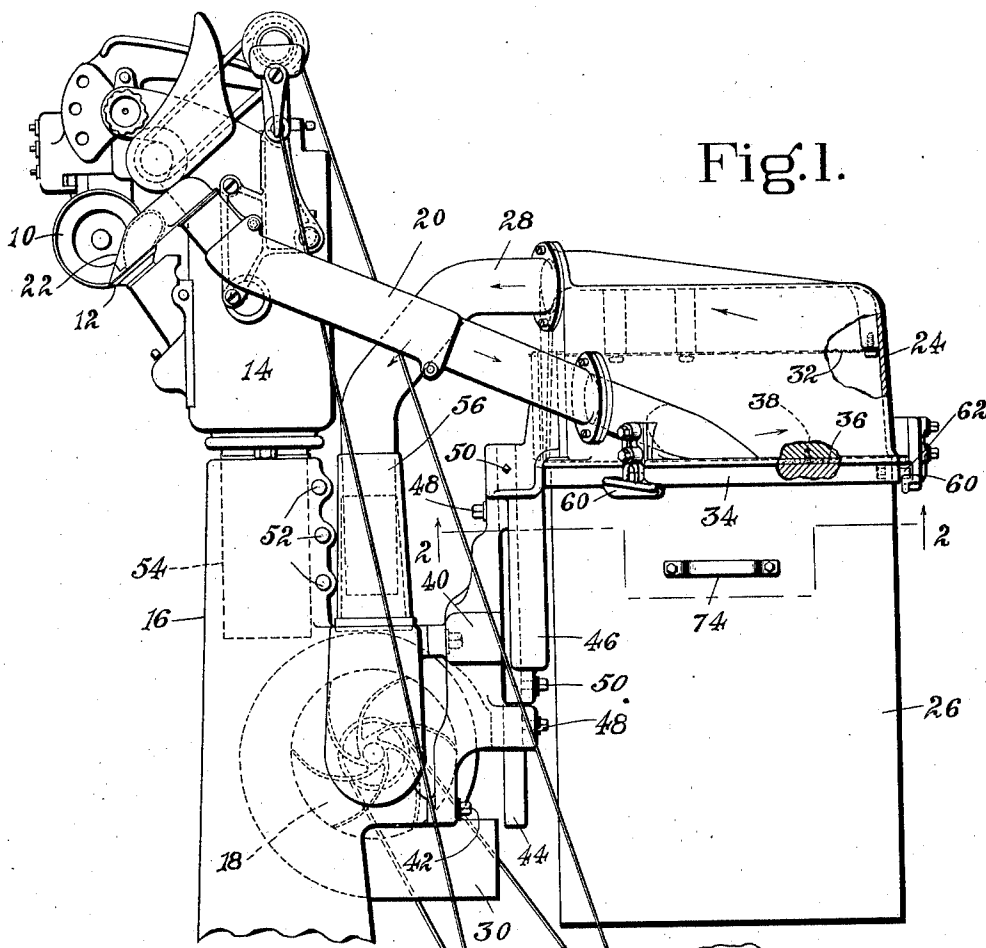


Fig. 1.

Fig. 2.

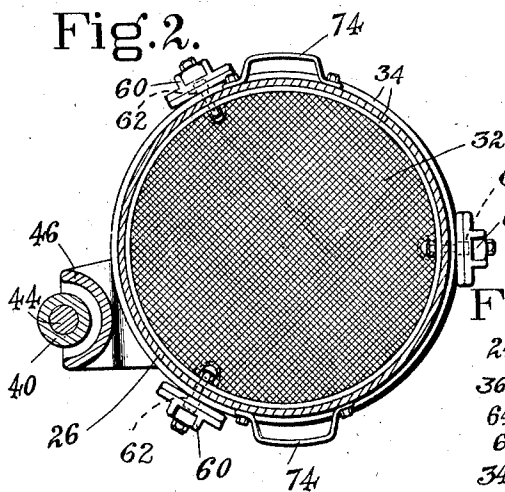


Fig. 3.

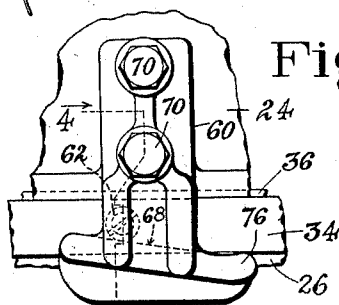
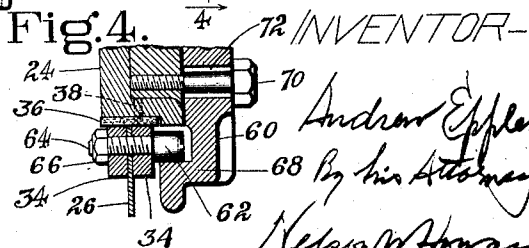


Fig. 4.



UNITED STATES PATENT OFFICE.

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PNEUMATIC SUCTION APPARATUS.

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This invention relates to pneumatic apparatus, and in some respects more particularly to suction apparatus for removing dust, dirt, chips, and any other small light particles and depositing them in a receptacle. For brevity, the substances, whatever they may be, will be hereinafter referred to as dirt, but this term will not be intended to exclude any substance capable of being removed and deposited as aforesaid.

The invention may be used for cleaning purposes or for removing dirt from a particular locality in or adjacent to a machine for operating upon the substance from which the dirt is produced. For purposes of illustration the accompanying drawings show a suction apparatus embodying the invention in a preferred form designed for and applied to a machine for trimming surplus materials from the in-seams of shoes in process of manufacture and in this application the function of the suction apparatus is to remove the cuttings or trimmings, the dust, lint and other particles (hereinafter referred to inclusively as dirt) from the trimming locality to a receptacle provided for their deposit.

An object of the invention is to provide an improved machine comprising means for performing an operation that produces dirt or dust, and means for automatically collecting such dirt and depositing it into a receptacle without recourse to elaborate and costly blower systems.

Accordingly, a feature of the invention consists in an integral or unitary machine organization comprising a frame supporting some means for performing an operation that produces dirt, and suction apparatus supported or carried by the frame and including a detachable receptacle into which the dirt is transferred from said means by pneumatic suction, the receptacle being offset laterally from the frame to be readily accessible, so that one attendant may easily and quickly detach the filled receptacle and carry it to a place where it is to be emptied.

In the illustrated construction, the dirt-receptacle is given as large dimensions and capacity as is consistent with the ability of the average workman to lift it without undue strain. Furthermore, to make the task of attaching and detaching the receptacle as easy as possible provision is made for suspending it from that part of the suction ap-

paratus which is hereinafter referred to as a "dirt-separator" and the latter, moreover, is not only supported by the frame of the machine, but is offset laterally from the frame. Thus, the invention provides an unobstructed space in which a workman may stand so that he may, without the help of an assistant, lift the receptacle up or down incidentally to attaching or detaching it.

Another object of the invention is to provide improved means for insuring a tight connection between two contiguous members each of which is adapted to form a closure for the other, for example, a dirt-separator and a dirt-receptacle. A feature relating to this aspect of the invention consists in providing the members to be connected with a plurality of pairs of cooperative coupling elements formed and arranged to exercise a tightening action simultaneously in consequence of relatively moving the members, and further, in providing for individual adjustment of one or more of said coupling elements to coordinate the tightening effect of all the pairs so that they will function uniformly.

Other features of the invention are hereinafter described and claimed and are shown by the accompanying drawings.

Referring to the drawings:

Fig. 1 is a side elevation including a portion of an in-seam-trimming machine of well-known construction, and a suction apparatus for taking away the dirt from the trimming locality, the suction apparatus embodying novel features of construction and organization with which the invention is concerned; Fig. 2 is a sectional view through the dirt-receptacle as indicated by line 2-2 of Fig. 1;

Fig. 3 is an elevation on a larger scale including abutting portions of the dirt-separator and the dirt-receptacle and one of a plurality of pairs of coupling elements by which the separator and the receptacle may be connected to form a tight joint; and

Fig. 4 is a sectional view indicated by line 4-4 of Fig. 3.

The in-seam-trimming machine shown herewith is of a well-known type and is more fully disclosed in Letters Patent 1,226,872 granted May 22, 1917. This machine includes a rotary cutter 10 (Fig. 1) for trimming off surplus material which, with the dust, lint, chips, and other particles pro-

duced incidentally to the trimming operation, may be regarded as "dirt" to be removed from the trimming locality by suction. The cutter 10 and various other elements of mechanism are mounted on and supported by a head 14 which, in turn, is mounted at the upper end of the frame or supporting column 16.

The suction apparatus for removing the dirt from the trimming locality includes a rotary fan or blower 18 (Fig. 1) the casing of which is preferably fastened rigidly to the frame 16. A suction conduit extends from the dirt-producing locality 12 to the suction generator 18, and comprises a dirt pipe 20 rigidly fastened to the head 14 and having a receiving nozzle 22, an annular dirt-separator 24 offset laterally from the frame 16 to be readily accessible, and a pipe 28 forming communication from said separator to the casing of the fan or blower 18. The discharge portion of the blower casing is indicated at 30.

A screen 32 (Figs. 1 and 2) of fine wire gauze is arranged in the separator 24 to prevent the dirt from passing to the pipe 28. The separator 24 is open at the bottom but is supported at a sufficient height above the floor on which the frame 16 stands to provide an unobstructed and readily accessible space beneath it for the reception of a cylindric dirt-receptacle 26. The latter is open at the top and is constructed to cooperate with the separator 24 to form an air-tight joint below the path of the air. The separator 24 and the receptacle are thus adapted to form closures for each other. The larger particles of dirt that enter the separator 24 drop immediately into the receptacle 26, although some of the fine dirt is carried to the screen 32 by the current of air but is arrested by the screen and eventually drops into the receptacle 26 which is directly under the screen. The vibration produced by the trimming mechanism dislodges much of the fine dirt that is carried to the screen by the force of the suction, but whatever clings to the screen may be dislodged by stopping the blower and tapping the separator 24.

The dirt separator 24 and the receptacle 26 are made as two separable members to permit the latter to be detached from time to time as it becomes necessary to empty the dirt that has accumulated therein, but it is essential to maintain a substantially air-tight joint between them when the suction apparatus is in use. It has been found that the most desirable size for the receptacle 26 is a depth of about two and one half feet and a diameter of nearly two feet, since a larger size would be too cumbersome to be handled easily while a smaller size would require emptying at too frequent intervals. The body of the receptacle 26 is preferably made of thin sheet metal (Fig. 4) for econ-

omy and to avoid excessive weight, but its upper edge or rim is preferably arranged between and reinforced by relatively thick and rigid cast metal rings 34 connected by rivets or screws. Thickness and rigidity of the rings 34 are desirable to provide for a substantially air-tight joint between the separator 24 and the receptacle 26. The separator 24 is preferably made of cast metal to insure rigidity and strength.

As shown by Fig. 4, a flat ring or gasket 36 is interposed between the confronting surfaces of the separator 24 and the receptacle 26 to provide for an air-tight joint. This gasket may be made of any suitable material, leather for example, and is preferably secured to the separator 24. Figs. 1 and 4 show screws 38 for holding the gasket. The heads of the screws are countersunk in the gasket so as not to militate against a tight joint.

To avoid disturbing the suction apparatus incidentally in detaching and attaching the receptacle 26 the separator 24 is supported otherwise than by the receptacle. Accordingly, a supporting bracket 40 (Figs. 1 and 2) is rigidly fastened to the column 16 by suitable means such as bolts 42, and is formed with sockets or bearings to receive a vertical post 44. The separator 24 is provided with a bracket 46 in which sockets or bearings are formed to receive the post 44. Set-screws 48 (Fig. 1) are arranged in the bracket 40 and set-screws 50 (Fig. 1) are arranged in the bracket 46 to engage the post. The brackets 40 and 46 offset the separator 24 and the receptacle 26 laterally from the frame 16 of the machine far enough to enable one workman or attendant to stand so close to the receptacle that he may easily lift it up or down and quickly attach or detach it. Thus, the location of the separator permits the use of a large receptacle without requiring two workmen to handle it and without imposing undue strain upon one workman.

These elements provide for vertical and angular adjustment of the separator 24 about the axis of the post, both of which adjustments are useful in registering the several elements that form the suction conduit. The vertical adjustment is useful also to compensate for vertical adjustment of the operating head 14 (Fig. 1) relatively to the column 16. For example, a tall operator would prefer to adjust the head 14 to a relatively high position while a short operator would prefer to set it at a lower position. The column 16 has a kerf or cleft in its rear side (the right side as viewed in Fig. 1) and is provided with clamping bolts 52 by which it may be tightened to clamp the neck 54 of the machine-head which neck has a telescopic fit in the column.

Furthermore, the suction conduit 28 and

the sleeve portion 56 of the blower-casing are formed to provide a telescopic joint so that as the head 14 is moved up or down, the member 28 will slide up or down in the element 56. Thus, although the casing of the blower 18 remains fixed relatively to the column 16, and although all the intermediate elements of the suction apparatus partake of vertical adjustments of the head 14 the telescopic joint formed by the elements 28 and 56 maintains the integrity of the suction conduit.

The means shown for maintaining the receptacle 26 in cooperative relation to the separator 24 comprises a plurality of pairs of coupling elements, three such pairs being shown in Fig. 2. Each pair comprises a bracket 60 and a lug 62. The three brackets 60 are fastened individually to the separator 24 while the lugs 62 are fastened to the rings 34 at the upper end of the receptacle 26. Each lug 62 has a screw-threaded shank 64 (Fig. 4) that extends through the rings 34 and is provided with a nut 66 to tighten it. The lugs 62 project radially from the outer ring 34 and are arranged to overlap and rest upon shoulders 68 formed on the brackets 60. These shoulders 68 extend inwardly, that is, toward the axis of the receptacle 26. The receptacle 26 may be coupled to the separator 24 by lifting it, while the lugs 62 are out of register with the bracket 60, until it touches or nearly touches the gasket 36, and then turning it about its axis to place the lugs 62 upon the supporting shoulders 68. The receptacle 26 is thus suspended from the separator 24. To provide for making the joint substantially air-tight the supporting shoulders 68 are inclined as shown in Figs. 1 and 3. Simultaneous tightening by all the couplers is obtained by turning the receptacle 26 so that the lugs 62 will move toward the upper ends of the inclined shoulders 68 until the turning movement is arrested by the butting of the rings 34 against the gasket 36.

Since it is practically impossible to machine the parts of so large a receptacle accurately enough to make the joint uniformly tight at all points the invention provides adjustments by which inaccuracies may be counteracted. Accordingly provision is made for adjusting the brackets 60 individually so that if one of them does not tighten the joint to the same extent as another it may be adjusted to correct the faulty condition. The brackets 60 are therefore fastened by bolts 70 which extend through holes 72 (Fig. 4) in the brackets and are screwed into the separator 24. The holes 72 are larger than the shanks of the bolts 70, as shown in Fig. 4, to provide the necessary range of adjustment. When once the several brackets 60 have been adjusted to function equally and simultaneously as the receptacle 26 is

turned to tighten the joint no subsequent adjustment will be necessary since they will operate repeatedly as desired regardless of the number of times the receptacle 26 is detached and replaced, provided it is always replaced in the same position.

Any desired means may be provided to indicate a definite standard position in which to replace the receptacle 26. For example, a mark may be stamped or painted on its exterior to register with some mating mark or element of the separator 24. Still, since it is desirable to provide the receptacle 26 with two handles 74 by which to carry and turn it and to locate these handles at diametrically opposite points the handles will serve as well as anything to indicate the standard position of the receptacle.

Although the lower portion of the column 16 is omitted from the drawing it is to be understood that it maintains the bottom of the receptacle 26 at a considerable distance above the floor on which the machine stands. Consequently, when the receptacle 26 is turned to release the coupling it may be lowered far enough to clear the brackets 60 when it is being carried away. The lower ends of the inclined shoulders 68 are preferably formed with upturned extremities 76 to prevent the lugs 62 from slipping off accidentally.

The described construction is such that the frame of the trimming machine supports the suction apparatus and the dirt-receptacle in cooperative relation to the trimming means and maintains this relation even when the machine is moved from place to place.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. The combination with a machine having a dirt-producing instrumentality and a frame in which it is arranged, of a suction apparatus comprising a suction generator, a suction conduit extending from the dirt-producing locality to said generator, a dirt-separator interposed in said conduit, to prevent fine dirt from reaching said generator, said dirt separator being fastened to and supported by said frame and offset laterally therefrom to provide an unobstructed space beneath it and being open at the bottom, a portable dirt-receptacle open at the top and adapted to occupy said space, said separator and said receptacle having cooperative portions adapted to form an air-tight joint, and means for supporting said receptacle in said space in cooperative relation to said separator.

2. A suction apparatus comprising a joint-forming separator and receptacle, a plurality of lugs projecting from one of the aforesaid elements, and a plurality of coupling members affixed to the other one, said lugs and said coupling members being formed

and arranged to be interengaged by relatively turning the receptacle and separator, said coupling members having inclined surfaces for acting on said lugs to tighten the receptacle and separator against each other, and one or more of said coupling members being individually adjustable to coordinate the tightening effect of all.

3. A machine comprising a supporting frame, means carried thereby for performing an operation that produces dirt, and suction apparatus supported by said frame, said apparatus including a suction-operated dust separator into which fine dirt from said means is transferred by pneumatic suction, and a receptacle detachably suspended from said separator to receive fine dirt arrested by the latter, said separator being offset laterally from said frame to facilitate attaching and detaching said receptacle.

4. A suction apparatus comprising supporting means adapted to stand on a floor, a pneumatic suction conduit including a dirt-separator supported by said means at a considerable height above the floor level to provide an unobstructed space under it, a dust arrester in said separator, and a receptacle of large capacity adapted to go into said space, said separator and said receptacle being formed with communicating openings for the passage of dust and coarse dirt and having a plurality of pairs of cooperative disconnectible coupling elements by which the receptacle may be suspended from said separator and by which the receptacle may be tightened against the separator in consequence of turning the receptacle relatively to the separator.

5. A suction apparatus comprising supporting means, a dirt-separator supported thereby, said separator being open at the bottom and having an unobstructed space under it, and a receptacle open at the top

and adapted to go into said space, said separator and said receptacle having a plurality of pairs of cooperative disconnectible coupling elements by which the receptacle may be suspended from said separator and by which the receptacle may be tightened against the separator in consequence of turning the receptacle relatively to the separator, one or more of said coupling elements being individually adjustable to coordinate the tightening effect of all said pairs.

6. A suction apparatus comprising a dirt-separator open at the bottom and a dirt-receptacle open at the top to form a joint, supporting means to which said separator is fastened in a position to provide a space under it for said receptacle, and cooperative disconnectible coupling elements fixed respectively to said separator and said receptacle for suspending the latter, said elements being formed and arranged to be interengaged and to tighten said joint in consequence of moving said receptacle relatively to said separator.

7. The combination, in a machine having a frame and means supported thereby for performing an operation that produces dirt, of a pneumatic suction conduit supported by said frame to conduct the dirt away from said means, a portion of said conduit being offset laterally from said frame above a clear unobstructed space, a dirt screen arranged in said offset portion to separate fine dirt from the air by which such dirt is carried to the screen, and a readily accessible receptacle detachably suspended in said space from the under side of said offset portion below the path of the air and under said screen to receive the fine dirt that falls from the latter.

In testimony whereof I have signed my name to this specification.

ANDREW EPPLER.