

April 28, 1959

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2,883,694

SOOT BLOWER

Filed June 13, 1955

2 Sheets-Sheet 1

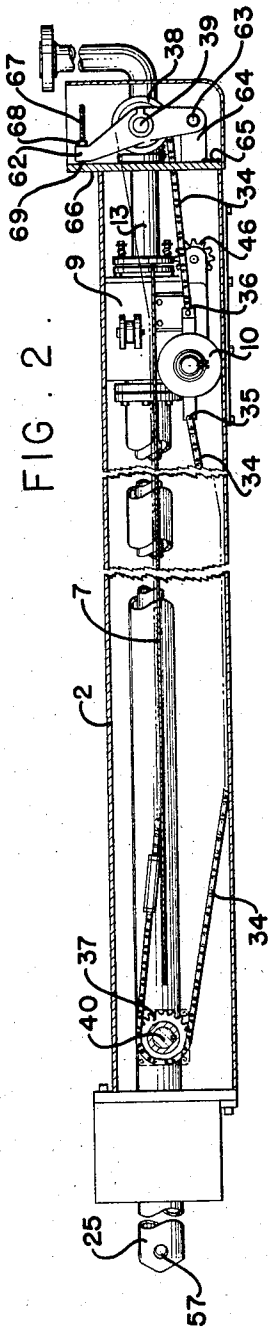


FIG. 2

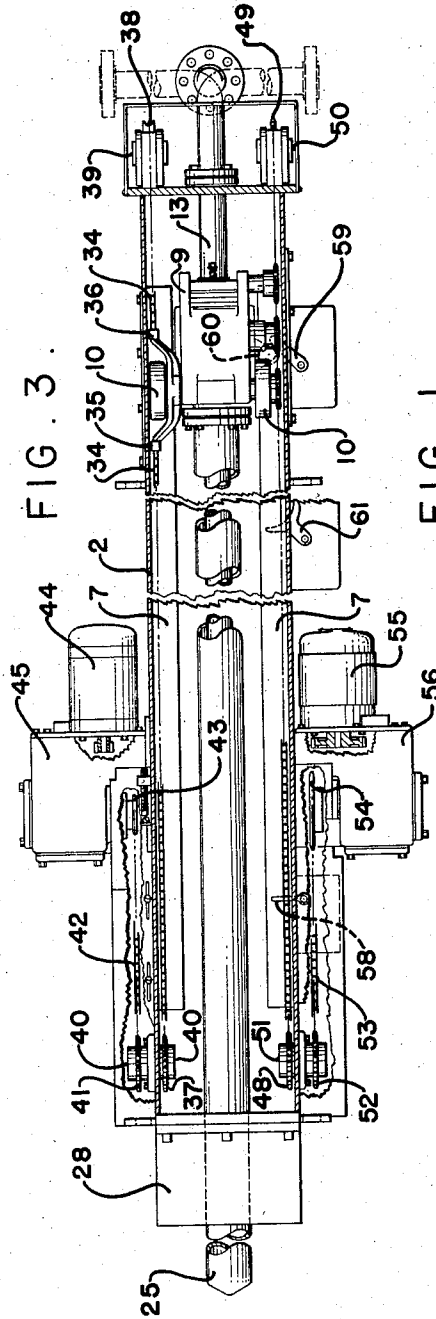


FIG. 3

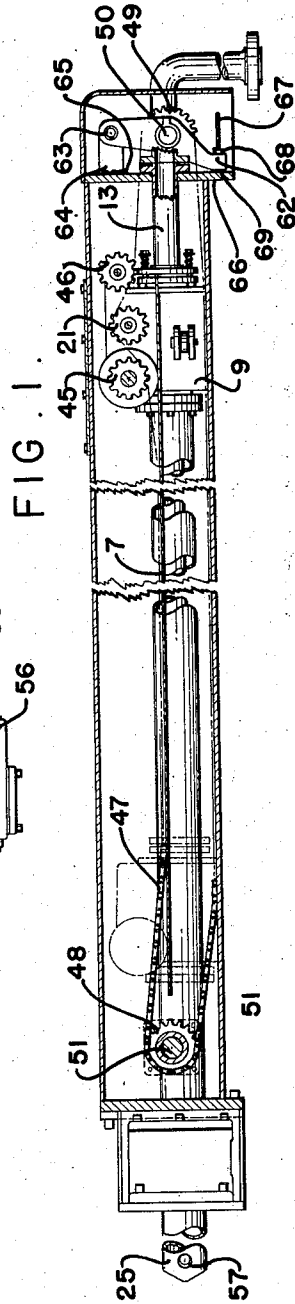


FIG. 1

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FIG. 5.

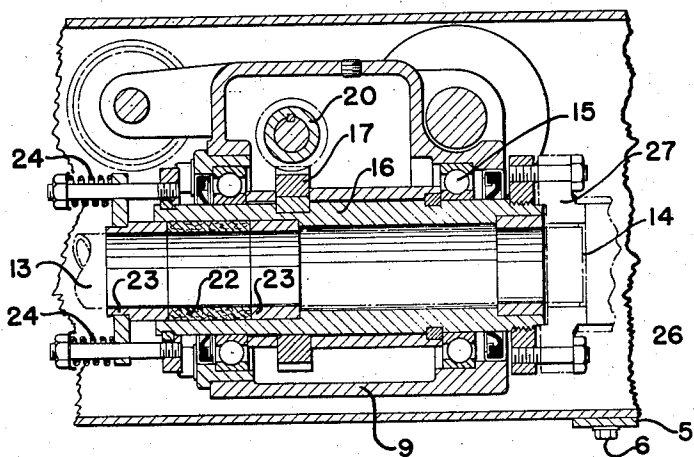


FIG. 8.

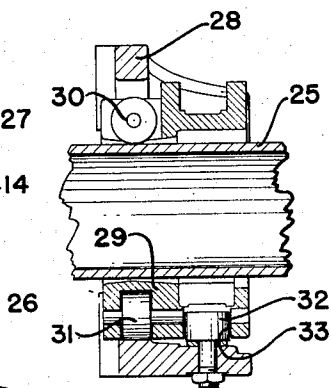


FIG. 4

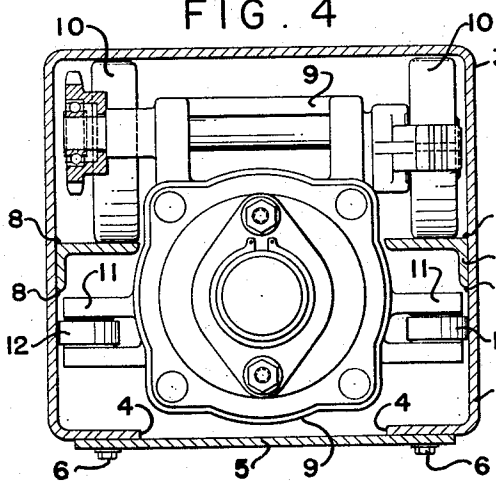


FIG. 6.

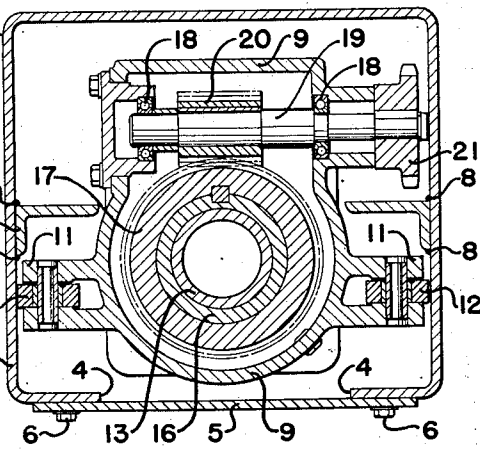
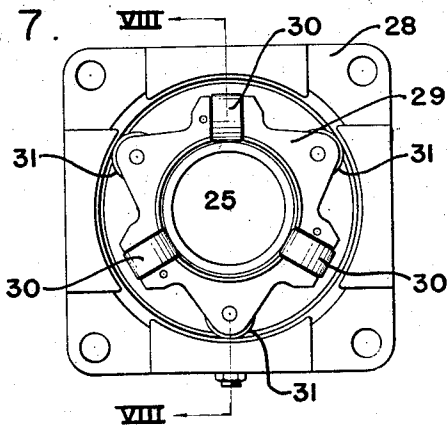


FIG. 7.



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SOOT BLOWER

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Application June 13, 1955, Serial No. 514,938

5 Claims. (Cl. 15—317)

This invention relates to soot blowers and particularly to soot blowers of the retractable type having certain novel features contributing to improved and more reliable operation and increased life.

Our soot blower is preferably mounted in a casing which protects operating elements of the soot blower and contributes importantly to improved operation. Desirably a carriage operates in the casing, the lance of the soot blower being connected with the carriage and communicating with a supply conduit for soot blowing medium. Means are preferably provided for moving the carriage along the casing, the lance being projectable from and retractable into the casing upon movement of the carriage along the casing. The carriage may be moved along the casing by an endless driving element.

Preferably the lance is rotated. We may provide means for turning the lance and means extending generally longitudinally of the lance connected with the turning means actuating the turning means to turn the lance upon relative longitudinal movement between the lance and the actuating means. The turning means may comprise a rotary member turnable about an axis generally transverse to the lance. We preferably provide gearing in the carriage, a source of power and a connection between the source of power and the gearing for turning the lance. Both the means for moving the carriage along the casing and the means for turning the lance may comprise a flexible endless element such as a sprocket chain.

We also provide an improved bearing for the lance adjacent the end of the casing where the lance projects therefrom, the bearing having means guiding the lance in projecting and retracting movements and having a plurality of circumferentially spaced generally cylindrical rollers bearing against a portion of the casing whereby the bearing is rotatable relatively to the casing, means being provided holding the bearing against substantial axial movement.

We further provide limit switch means positioned in the path of the carriage to be engaged thereby as the carriage moves to the respective ends of its travel to reverse the direction of operation of the carriage moving means. We still further provide means for controlling the flow of soot blowing medium through the lance together with operating means for the control means positioned in the path of the carriage to be engaged thereby as the carriage moves along the casing whereby the control means are operated to admit soot blowing medium to the lance after the lance has been projected from the casing a predetermined distance and to shut off the flow of soot blowing medium after the lance has been retracted a predetermined distance.

Other details, objects and advantages of the invention will become apparent as the following description of a present preferred embodiment thereof proceeds.

In the accompanying drawings we have shown a present preferred embodiment of the invention in which—

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Figure 1 is a vertical cross-sectional view through a soot blower;

Figure 2 is a view partly in vertical cross section and partly in elevation of the same soot blower as shown in Figure 1 but mounted in a position inverted with respect to the position of Figure 1;

Figure 3 is a view partly in horizontal cross section and partly in plan of the soot blower when oriented as shown in Figure 1;

Figure 4 is a view partly in end elevation and partly in vertical cross section of the soot lower when oriented as shown in Figure 1;

Figure 5 is a fragmentary vertical longitudinal cross-sectional view through the carriage of the soot blower;

Figure 6 is a vertical transverse cross-sectional view through the carriage;

Figure 7 is an elevational view of the bearing for the lance at the end of the casing through which the lance projects; and

Figure 8 is a cross-sectional view taken on the line VIII—VIII of Figure 7.

Referring now more particularly to the drawings, the soot blower is mounted in an elongated casing designated generally by reference numeral 2. The casing is of generally square cross-sectional shape as shown in Figure 4. The particular casing shown in the drawings consists of a casing member 3 bent into generally square shape with an opening 4 along one side of the casing and a second casing member in the form of a closure member 5 closing the opening 4, the casing members 3 and 5 being connected together by bolts 6. Normally the soot blower is oriented as shown in Figures 1 and 4 with the closure member 5 at the bottom although it is possible to install the soot blower in inverted position with the closure member 5 at the top as shown in Figure 2.

The casing 2 has projecting inwardly thereof opposed tracks 7 extending parallel to the length of the casing and shown as being in the form of angle members welded to the interior of the casing at 8. The tracks cooperate with the top of the casing viewing Figure 4 to guide in movement along the casing a carriage designated generally by reference numeral 9 and having wheels 10 riding on the tracks 7. As shown in Figure 4 the wheels 10 have only slight clearance at their upper portions so they guide the carriage equally well by riding on the casing when the soot blower is inverted. The carriage also has laterally projecting yokes 11 in which are journaled rollers 12 adapted to roll against the sides of the casing to aid in properly positioning the carriage in the casing when the carriage is moved therealong. Actually the wheels 10 and rollers 12 and the cooperating parts of the casing make it possible to install the soot blower with the casing in any orientation.

There is shown at 13 a supply conduit for soot blowing medium, such, for example, as high pressure steam, the conduit 13 entering the casing at the right-hand end thereof viewing Figures 1, 2 and 3 and extending through the carriage generally centrally of the casing and terminating at 14 as shown in Figure 5. The supply conduit 13 for soot blowing medium remains stationary relatively to the casing 2 while the carriage 9 during operation of the soot blower moves back and forth relatively to the casing and to the supply conduit.

Rotatably mounted within the carriage 9 in bearings 15 is a sleeve 16 to which is connected a worm wheel 17. Disposed generally transversely of the carriage 9 and rotatably mounted therein in bearings 18 is a shaft 19 to which is fastened a worm 20 which is in mesh with the worm wheel 17. Also fixed to the shaft 19 is a sprocket 21. When the sprocket 21 is turned it turns the shaft 19 which through the worm 20 and the worm wheel 17 turns the sleeve 16. The sleeve 16 is coaxial

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with the supply conduit 13. It is sealed to the supply conduit 13 by packing 22 compressed between packing gland members 23 under the action of springs 24 as shown in Figure 5. Thus the sleeve 16 is a part of the carriage 9 and moves back and forth over the supply conduit 13 in sealed relation to the supply conduit.

The lance of the soot blower is shown at 25 and is welded at 26 to a bracket 27 bolted to the sleeve 16. The lance 25 is as shown in Figure 5 of greater diameter than the supply conduit 13 and when the carriage 9 is retracted toward the right viewing Figures 1, 2 and 3 the lance 25 moves telescopically over the supply conduit 13. The end 14 of the supply conduit 13 is always in communication with the interior of the lance so that in all relative positions of the supply conduit and the lance the supply conduit may supply soot blowing medium to the lance.

Figures 7 and 8 show the bearing for the lance disposed at the end of the casing 2 where the lance projects from the casing. The bearing comprises a cage 28 bolted to the casing 2 and having therein a bearing member 29 having three equally circumferentially spaced cylindrical rollers 30 guiding and supporting the lance for back and forth movement and having three equally circumferentially spaced cylindrical rollers 31 operating in the cage providing for turning of the bearing member due to turning of the lance as will presently be described. The bearing member is held against substantial axial movement by a roller 32 carried by the cage and operating in a groove 33 in the bearing member. Thus the bearing provides anti-friction means for advancing and retracting movement of the lance and other anti-friction means permitting rotation of the bearing member due to rotation of the lance. The rollers employed in connection with the bearing are of great advantage in a soot blower as they remain clean much longer than ordinary ball bearings. The cylindrical rollers engaging the lance do not trap soot but tend to grind it off of the surface of the lance as the lance moves back and forth and turns. The bearing is what may be termed a non-clogging cage type bearing and is an important improvement in the soot blower art.

The carriage 9 is adapted to be moved back and forth in the casing 2 by a chain 34 having one end dead-ended to the carriage at 35 and the other end dead-ended to the carriage at 36, the chain intermediate its ends passing about a driving sprocket 37 at the left-hand end of the soot blower viewing Figures 1, 2 and 3 and an idler sprocket 38 at the right-hand end. The idler sprocket 38 is mounted on a stub shaft 39. The driving sprocket 37 is fixed to a shaft 40 which extends through the wall of the casing 2. Another sprocket 41 is fixed to the shaft 40 outside of the wall of the casing 2 and is driven by a sprocket chain 42 which also passes about a sprocket 43 driven by a motor 44 through reduction gearing 45. Thus when the motor 44 operates in one direction the sprocket chain 34 moves the carriage 9 in one direction in the casing 2 and when the motor 44 operates in the opposite direction the carriage is similarly moved in the opposite direction in the casing.

In the carriage 9 in addition to the sprocket 21 are idler sprockets 45 and 46. At the side of the casing 2 opposite the side at which the sprocket chain 34 is disposed is a sprocket chain 47 which is guided about the sprocket 21 by the idler sprockets 45 and 46 as shown in Figure 1 and also passes about a driving sprocket 48 and an idler sprocket 49. The idler sprocket 49 is mounted on a stub shaft 50. The driving sprocket 48 is fixed to a shaft 51 which extends through the wall of the casing 2. Another sprocket 52 is fixed to the shaft 51 outside of the wall of the casing 2 and is driven by a sprocket chain 53 which also passes about a sprocket 54 driven by a motor 55 through reduction gearing 56. Thus the motor 55 through the mechanism just described including the sprocket chain 47 drives the shaft 19 and

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hence the lance 25 in turning movement about its axis. The lance may be driven in such turning movement at the same time as it is being advanced or retracted. Indeed, even if the motor 55 is stopped, advancing and retracting movement of the lance will cause it to turn since movement of the carriage 9 relatively to the stationary chain 47 will result in turning of the shaft 19 and hence of the lance. However, it is desired to drive the lance by the motor 55 since by so doing the lance does not travel at all times in a fixed helical path. The lance is provided at its extremity with nozzles 57 through which soot blowing medium such as steam under pressure is emitted. Thus as the lance is simultaneously advanced and turned the jets of steam will cover virtually the entire surface to be cleaned. The lance travels at different speeds, and hence the jets trace different helical paths, in the projecting and retracting movements of the lance, respectively, because of the arrangement of the means for turning the lance as above described.

The motor 44 operates alternately first in the direction to project the lance and then in the direction to retract the lance. The motor is reversed by limit switch 53 which may be of conventional form and positioned in the path of a roller 60 in the carriage 9. As the carriage moves toward the left viewing Figure 3 the roller 60 engages the limit switch 53 and operates it to reverse the direction of operation of the motor whereupon the carriage moves toward the right until the limit switch 59, which also may be of conventional form and positioned in the path of the roller 60, is operated to stop the carriage. The wiring for the limit switches may be conventional and such as could easily be installed by any person skilled in the art with the above explanation.

Similarly a valve (not shown) is provided for controlling the supply of soot blowing medium. It is desired that soot blowing medium pass through the lance when the soot blower is in operation but not when the lance is retracted within the casing. We provide a blowing medium valve control switch 61 which is also disposed in the path of the roller 60. The switch 61 is shown in Figure 3. As the carriage moves toward the left viewing that figure the roller 60 turns the switch in the counterclockwise direction and opens the valve. The valve remains open until the carriage moves back past the switch 61 when the switch is again operated by the roller 60 to shut off the supply of soot blowing medium.

The chains 34 and 47 are adapted to be maintained taut by mounting the shafts 39 and 50 for the respective idler sprockets 38 and 49 in levers 62 pivoted at 63 to brackets 64 welded at 65 to the end plate 66 of the casing 2. Adjusting screws 67 having lock nuts 68 applied thereto are threaded through the ends of the levers 62 and their extremities are adapted to bear at 69 against the end plate 66 so that by adjusting the screws 67 the tension in the chains may be controlled.

While we have shown and described a present preferred embodiment of the invention it is to be distinctly understood that the invention is not limited thereto but may be otherwise variously embodied within the scope of the following claims.

We claim:

1. A soot blower comprising a supply conduit for soot blowing medium, a projectable and retractable lance communicating with the supply conduit, the lance having means adjacent its extremity for ejecting in a generally lateral direction a jet of soot blowing medium, means for projecting and retracting the lance, means for turning the lance, means extending generally longitudinally of the lance connected with the turning means causing turning of the lance when the lance is projected or retracted, even when the means extending generally longitudinally of the lance remains stationary, and means for moving the means extending generally longitudinally of the lance to turn the lance independently of projection or retraction of the lance, whereby the path of the jet can be controlled so as

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to be directed in any desired direction at any point along its travel.

2. A soot blower comprising a supply conduit for soot blowing medium, a projectable and retractable lance communicating with the supply conduit, the lance having means adjacent its extremity for ejecting in a generally lateral direction a jet of soot blowing medium, means for projecting and retracting the lance, means for turning the lance, such turning means comprising a rotary member turnable about an axis generally transverse to the lance, means extending generally longitudinally of the lance connected with the rotary member turning the rotary member to turn the lance when the lance is projected or retracted, even when the means extending generally longitudinally of the lance remains stationary, and means for moving the means extending generally longitudinally of the lance to turn the lance independently of projection or retraction of the lance, whereby the path of the jet can be controlled so as to be directed in any desired direction at any point along its travel.

3. A soot blower comprising a supply conduit for soot blowing medium, a projectable and retractable lance communicating with the supply conduit, the lance having means adjacent its extremity for ejecting in a generally lateral direction a jet of soot blowing medium, means for projecting and retracting the lance, means for turning the lance, endless means connected with the turning means causing turning of the lance when the lance is projected or retracted, even when the endless means remains stationary, and means for driving the endless means to turn the lance independently of projection or retraction of the lance, whereby the path of the jet can be controlled so as to be directed in any desired direction at any point along its travel.

4. A soot blower comprising a supply conduit for soot blowing medium, a projectable and retractable lance communicating with the supply conduit, the lance having means adjacent its extremity for ejecting in a generally lateral direction a jet of soot blowing medium, means for projecting and retracting the lance, means for turning the

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lance, such turning means comprising a rotary member turnable about an axis generally transverse to the lance, endless means connected with the rotary member turning the rotary member to turn the lance when the lance is projected or retracted, even when the endless means remains stationary, and means for driving the endless means to turn the lance independently of projection or retraction of the lance, whereby the path of the jet can be controlled so as to be directed in any desired direction at any point along its travel.

5. A soot blower comprising a supply conduit for soot blowing medium, a projectable and retractable lance communicating with the supply conduit, the lance having means adjacent its extremity for ejecting in a generally lateral direction a jet of soot blowing medium, means for projecting and retracting the lance, means for turning the lance, such turning means comprising a sprocket turnable about an axis generally transverse to the lance, an endless sprocket chain meshing with the sprocket turning the sprocket to turn the lance when the lance is projected or retracted, even when the sprocket chain remains stationary, and means for driving the sprocket chain to turn the lance independently of projection or retraction of the lance, whereby the path of the jet can be controlled so as to be directed in any desired direction at any point along its travel.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 2,883,694

April 28, 1959

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It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 2, line 11, for "lower" read -- blower --; column 5, line 26, for "retacting" read -- retracting --.

Signed and sealed this 1st day of September 1959.

(SEAL)

Attest:

KARL H. AXLINE
Attesting Officer

ROBERT C. WATSON
Commissioner of Patents