May 3, 1949. K. L. KRIEG ET AL 2,468,984

MACHINE FOR SANDBLAST CLEANING OF TUBULAR GOODS

Filed May 31, 1947 3 Sheets-Sheet 1

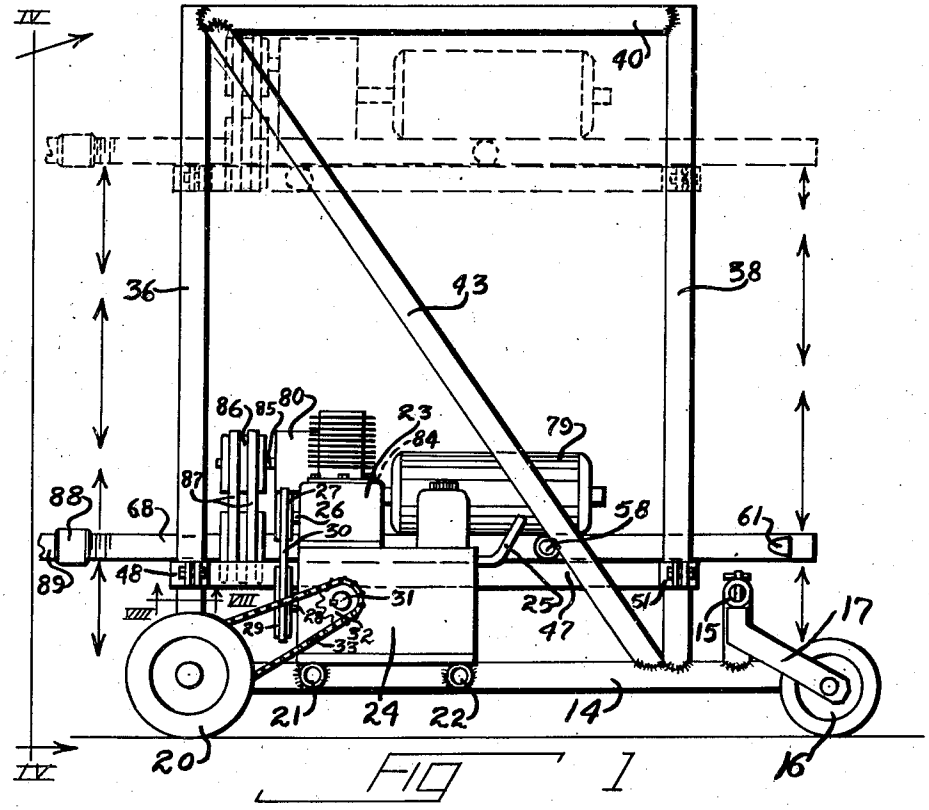


FIG. 1

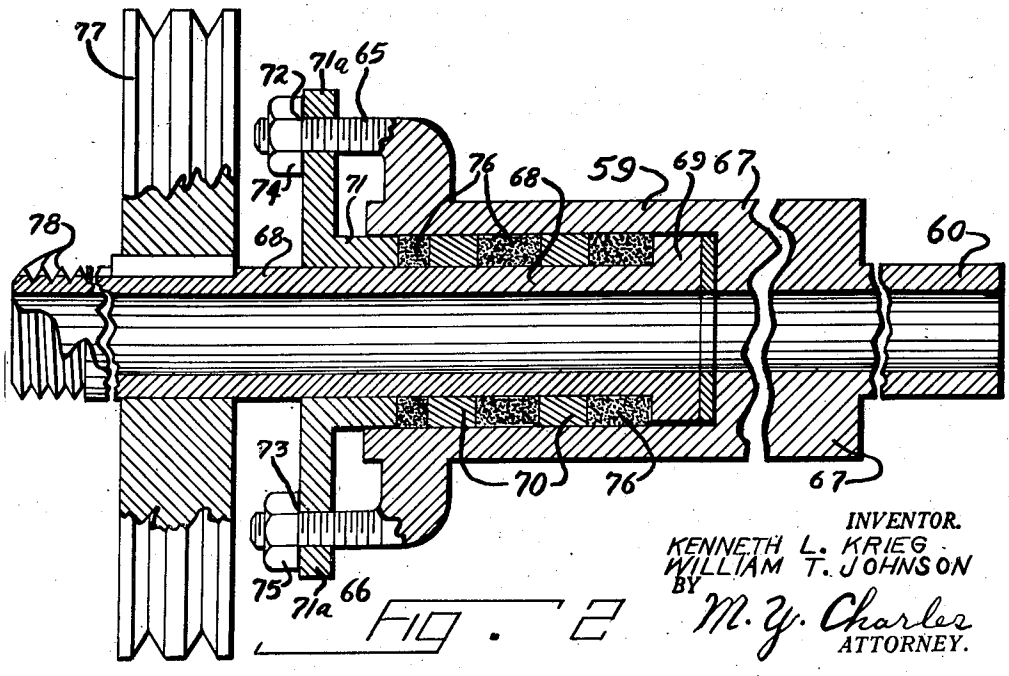


FIG. 2

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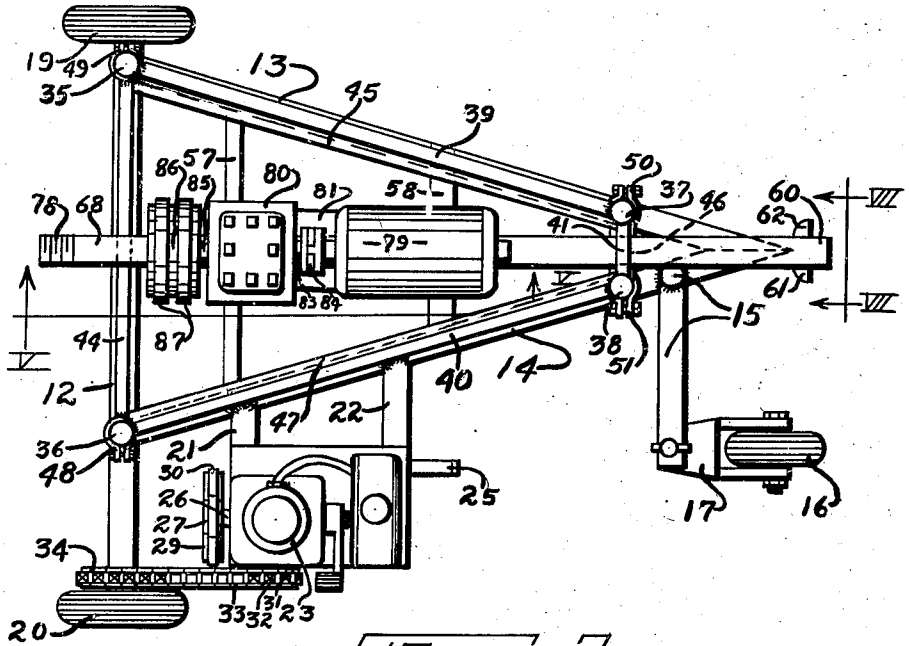


FIG. 3

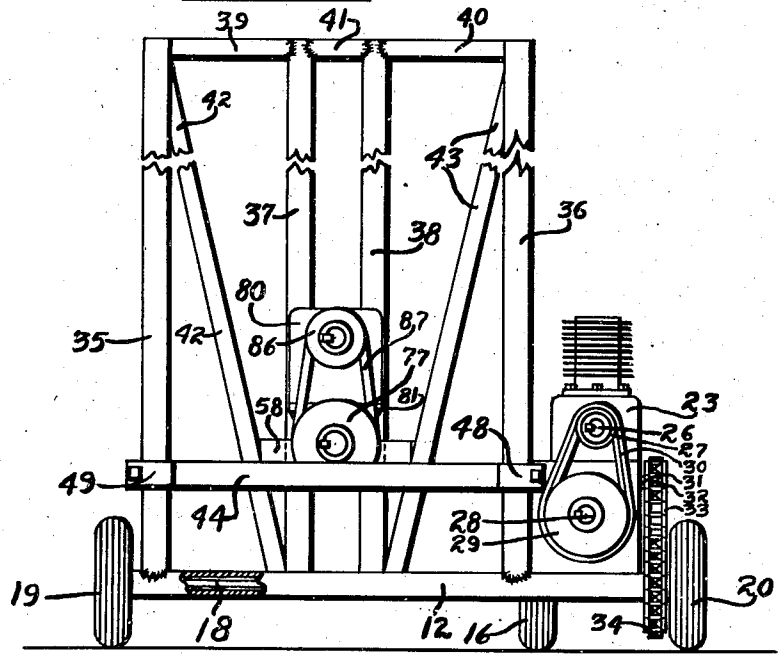


FIG. 4

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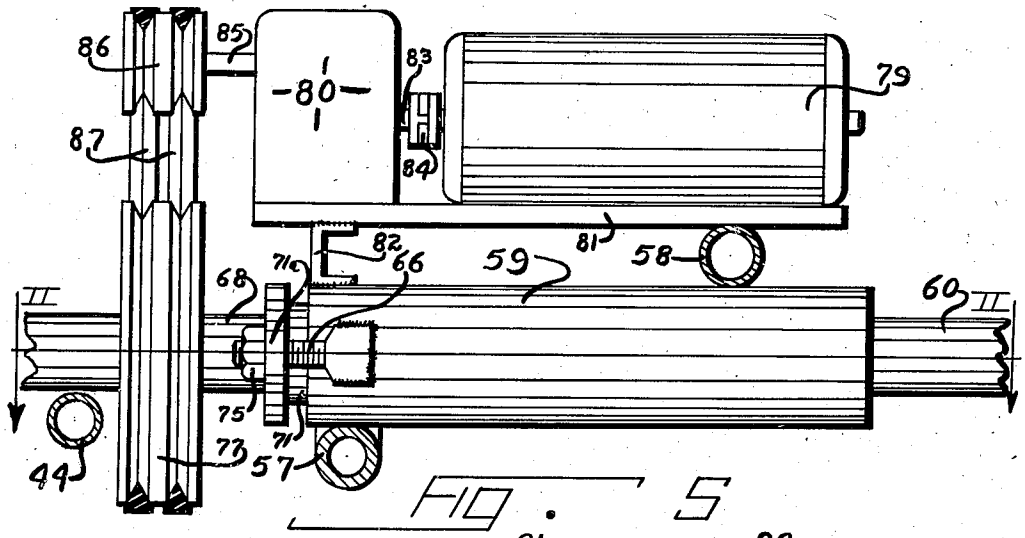


FIG. 5

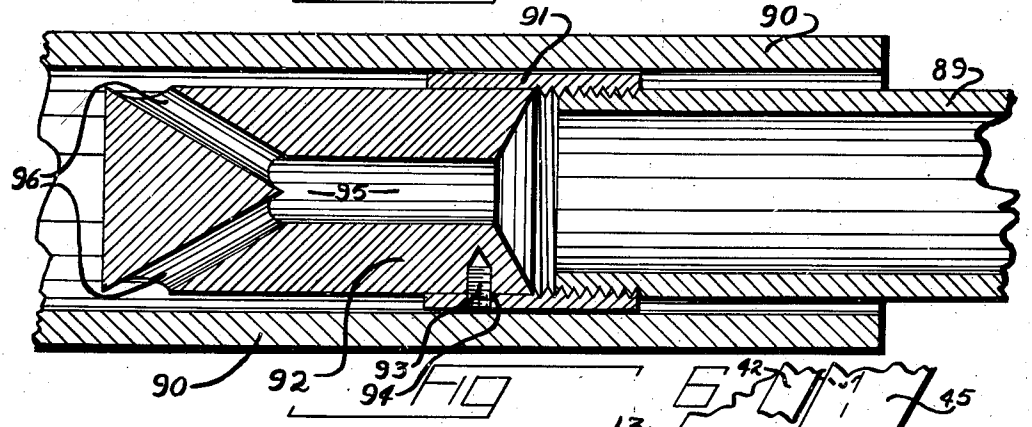


FIG. 6

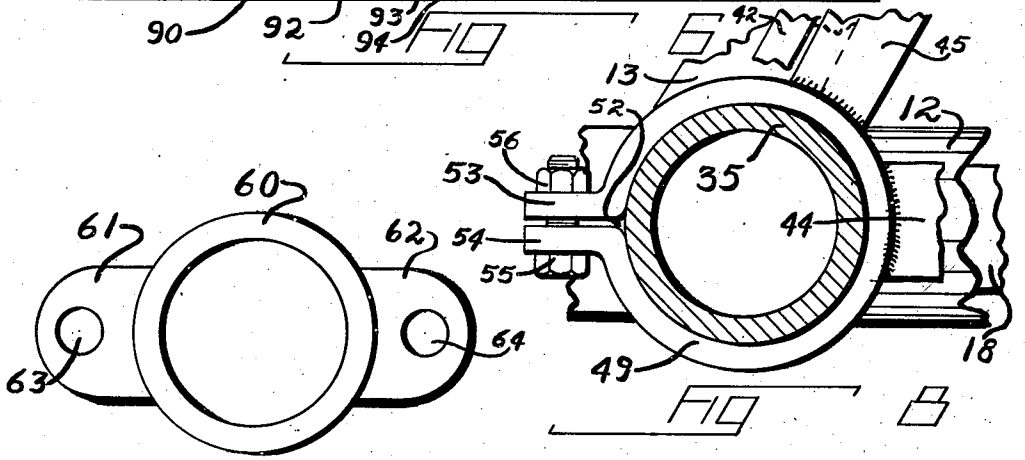


FIG. 8

FIG. 7

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MACHINE FOR SANDBLAST CLEANING OF TUBULAR GOODS

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Application May 31, 1947, Serial No. 751,512

4 Claims. (Cl. 51—8)

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This invention relates to a process of sand blasting and cleaning the interior of length of tubing such as used in oil wells and the like. The invention also includes a type of machine that will carry out the process of cleaning the tubes while the tubes are in a pile and the process of cleaning is carried out without moving or shifting the tubes in the pile.

A further object of the invention is to provide a process whereby the machine may be taken out in the field to the pile of tubing and the process of sand blasting and cleaning be there carried on and thereby eliminate the job of hauling or moving the tubing from one place to another to be sandblasted and cleaned.

Another object of our invention is to provide a process of sand blasting and cleaning the tubes, and a machine for carrying out the process in which the process of cleaning the tube begins at one end of the tube and slowly advances with uniform speed through the length of the tube so as to do an equal and uniform job of cleaning and sand blasting at every point throughout the length of the tube. A still further object is to provide a machine of the kind mentioned that is simple, light in weight, durable and long lived, simple to use and inexpensive to make and sell. These and other objects will be more fully explained as this description progresses.

Now referring to the accompanying drawings in which similar numerals of reference designate the same parts throughout the several figures of the drawings.

Fig. 1 is a side view of the preferred form of the machine.

Fig. 2 is an enlarged detail sectional view through the swivel joint of the sand blast tube and revolvable driving means therefor, the view being as seen from the line II—II in Fig. 5 and looking in the direction of the arrows.

Fig. 3 is a top plan view of the machine shown in Fig. 1.

Fig. 4 is a front elevational view of the machine shown in Fig. 1.

Fig. 5 is an enlarged detail side view of the sand blast tube swivel joint and means for revolving the sand blast tube.

Fig. 6 is an enlarged detail sectional view through a portion of tubing that is to be cleaned and showing the sand blast tube and sand blast nozzle in position therein to carry out the process of sand blasting and cleaning the tubing.

Fig. 7 is an enlarged detail view of the means for attaching the sand blast hose to the machine, the view being as seen from the line VII—VII in

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Fig. 3 and looking in the direction of the arrows.

Fig. 8 is an enlarged detail view of the clamp means employed in holding sand blast tube and revolving means therefor in its elevated adjusted positions.

In the drawings the machine is shown as having a triangular shaped frame that is preferably made of tubing, the frame comprising an axle housing tube 12 to which the other two side members 13 and 14 of the triangle are welded. One end of an L-shaped caster support bracket 15 is welded to the rear apex portion of the triangle frame 12, 13 and 14 so as to hold the horizontal leg of the bracket 15 in parallelism with the front axle housing 12. The machine is provided with a castor wheel 16 and castor hanger 17 that is swivelly mounted on the outer end of the horizontal leg of the support bracket 15. Revolvably carried within the axle housing 12 is an axle 18 on the outer ends of which are rigidly mounted supporting wheels 19 and 20. The triangle leg 14 is provided with a pair of outwardly extending support members 21 and 22 on which is rigidly supported a small power unit 23, preferably an internal combustion engine including a standard transmission and clutch, not shown in detail but housed in the case 24, the clutch and transmission being operable by the lever 25. The power unit 23 has a drive shaft 26 on which is rigidly mounted a V-belt drive pulley 27. The transmission is provided with a driven shaft 28 on which is rigidly mounted a V-belt pulley 29 that is driven by a V-belt 30 that passes around and engages the two pulleys 27 and 29 for driving purposes. As will be readily understood the transmission is provided with a drive shaft 31 on which is rigidly mounted a sprocket wheel 32 around which passes a drive chain 33 that also passes a second and larger sprocket wheel 34 that is rigidly attached to the axle shaft 18 so that as the axle is revolved by the power from the power unit 23 the wheels 19 and 20 will propel the machine either forwardly or rearwardly, according to the setting of the transmission. The triangle frame 12, 13 and 14 is provided with four vertically positioned standards 35, 36, 37 and 38, the lower end of the standard 35 being welded to the triangle frame substantially at the point of joinder of the frame members 12 and 13, the lower end of the standard 36 being welded to the triangle frame substantially at the point of joinder of the frame members 12 and 14, the lower end of the standard 37 being welded to the rear portion of the triangle frame member 13 and the lower end of the standard 38 being welded to the

rear portion of the triangle frame member 14. The upper ends of the standards 35 and 37 are joined together by a brace member 39, the ends of which are welded to the upper ends of the standards 35 and 37. A second and similar brace member 40 is positioned between the standards 36 and 38, and is welded to the upper ends of the standards 36 and 38. A third brace member 41 is positioned between the upper ends of the standards 37 and 38 and the ends of the brace member 41 are welded to the upper ends of the standards 37 and 38. A diagonal brace member 42 extends from the upper end of the standard 35 to the lower end of the standard 37 and the ends of the brace 42 are welded to their adjacent frame members 13 and 40 to make the rectangular frame 13, 35, 39 and 37 rigid so that it will not rack.

Similarly a second diagonally positioned brace member 43 extends between the upper end of the standard 36 and the lower end of the standard 38 and the ends of the brace member 43 are welded to their adjacent frame members 14, and 40 to make the rectangular frame 14, 36, 40 and 38 rigid so that it will not rack.

The machine is provided with a frame assembly 44, 45, 46, and 47 that fits between the standards 35, 36, 37 and 38 and on each corner of the frame 44, 45, 46 and 47 is rigidly attached, welded, sleeve clamp elements 48, 49, 50 and 51 that are slidably mounted, one on each standard 35, 36, 37 and 38, each sleeve is cut in two as 52 and is provided with a pair of ear like elements 53 and 54 that are positioned, one on each side of the opening 52 and a bolt 55 is passed through the ears 53 and 54 and a nut 56 is threaded on the bolt 55 to draw the ears 53 and 54 toward each other to effect a gripping action of the clamp 49 on its respective standard to rigidly hold the frame 44, 45, 46 and 47 in adjusted elevated positions up and down the standards 35, 36, 37 and 38. The frame 44, 45, 46 and 47 is provided with a pair of cross support elements 57 and 58, the ends of which are welded to the side members 45 and 47 of the frame 44, 45, 46 and 47, the central portion of the support member 57 being curved slightly downwardly and frame member 58, the central portion being curved upwardly for purposes that will later be made obvious.

A cylinder like element 59 is positioned over the support member 57 and under the support member 58 and is rigidly attached, by welding, to the support member 58, and is so held that the axis thereof is in parallelism with the longitudinal dimension of the adjustable frame 44, 45, 46 and 47. The cylinder element 59 is provided with a rearwardly extending tube like element 60 that is integrally formed thereon. The outer end of the tube 60 is provided with a pair of outwardly extending ear like elements 61 and 62 that are welded thereto and are provided with holes 63 and 64 to receive clamping bolts to hold a sand blast hose, not shown thereon.

The front end of the cylindrical element 59 is provided with a pair of forwardly extending bolt like elements 65 and 66 for purposes that will later be described. In the rear end of the cylinder 59 is a thrust washer 67, also within the cylinder 59 is revolvably positioned the rear end portion of a sand blast tube 68, the rear portion of which is provided with an outwardly extending annular flange 69 that is revolvably fitted against the inner wall of the cylinder 59 and bears against the thrust washer 67. On the sand blast tube 68 is a packing clamp sleeve 71 that fits within the cylinder 59 and is provided with a pair of outwardly extending ear like portions 71a that are provided with holes 72 and 73, through which the bolt elements 65 and 66 slidably pass and nuts 74 and 75 are threaded thereon to bear against the ear like elements 71a to press the packing sleeve 71 into the cylinder 59. Between the end of the packing sleeve 71 and the first ring 70 and between each successive ring 70 and between the last ring and the flange 69 is a packing material 76, all of which is clamped together by pressure of the packing sleeve 71 which is created by the turning of the nuts 74 and 75 on the bolts 65 and 66. This assembly forms an air tight joint between the stationary cylinder 59 and the revolvable sand blast tube 68. A V-belt pulley 77 is rigidly mounted on the sand blast tube 68 for the rotary driving thereof, as will later be described. The outer end of the sand blast tube 68 is threaded as at 78 to receive a coupling that will later be described. Above the cylinder 59 and in parallelism therewith is positioned an electric motor 79 and any standard gear speed reduction chain carried in a case 80. The motor 79 and gear case 80 being rigidly mounted on a platform 81, the rear end of which is supported on the cross frame member 58 and the front end is supported on a short channel shaped piece 82 that is positioned between the platform 81 and the top side of the front end of the cylinder 59.

The driven shaft 83 of the gear speed reduction chain is connected with the drive shaft electric motor 79 by means of a flexible coupling 84. The outer end of the gear speed reduction chain drive shaft 85 is provided with a V-belt pulley 86 that is rigidly mounted thereon and V-belts 87 pass around the pulleys 86 and 77 for driving purposes, as will later be explained. A coupling 88 is threaded on the revolvable sand blast tube 68 and the rear end of a long sand blast tube extension 89 is threaded into the coupling 88, the tube 89 is long enough to reach through the entire length of a piece of tubing 90, the inside of which is to be sand blasted and cleaned. The outer end of the sand blast extension tube 89 is threaded to receive a sand blast nozzle coupling 91 that is threaded thereon and a sand blast nozzle is slipped into the coupling 91 and is rigidly held therein by means of a set screw 93 that is threaded through the coupling 91 and extends into a hole 94 in the nozzle 92. The nozzle 92 is cylindrical in shape and is provided with an axially positioned passage 95 that extends part way through the nozzle body 92 to join with diagonally positioned passages 96 that extend from the front end of the passage 95 forwardly through the side walls of the nozzle body 92 at a point adjacent the front end thereof so as to direct the sand blast flow diagonally against the inner surface of the tube 90.

In setting up the machine for use, the sand blast hose from any sand blast machine is connected to the rear end of the tube 61 and the electric motor 79 is supplied with power, either from a battery or a generator that is on the air compressor of the sand blast machine. This having been done the machine is placed behind a pile of tubing that is to be cleaned. The nuts 56 may be loosened and the frame 44, 45, 46 and 47 may be raised along the standards 35, 36, 37 and 38 to a point where the center axis of the sand blast tube 60—68 is in alignment with the center axis of the selected tube 90 in the pile of tubes 90 that

is to be cleaned, whereupon the nuts **56** may be tightened, to rigidly hold the frame **44**, **45**, **46** and **47** in its adjusted position. This having been done the sand blast nozzle on the end of the extension tube **89** may be entered into the tube **90** that is to be cleaned and the rear end of the extension tube **89** may be threaded into the coupling **88**. This having been done the power unit **23** may be started, also the sand blast machine may be started to force a blast of air and sand through the tubes **60**, **68**, **89** and **95**, also the electric motor may be started, whereupon the tube **68**, extension tube **89** and nozzle **95** thereon is revolved. The transmission lever **25** may also be thrown to engage the power from the power unit **23** to drive the wheels **19** and **20** to move the machine forward at a selected speed toward the pile of pipe **90**, and as the machine advances the sand blast nozzle **95** rotates and also advances through the length of the pipe **90** with a uniform speed, whereby every point of the inner surface of the tube **90** receives an equal and uniform sand blast cleaning. When the machine has advanced to the point where the nozzle **95** has traversed the full length of the tube **90**, the gear shift lever **25** is thrown to discontinue the power from the power unit **23**, whereupon the movement of the machine will stop and the machine may be moved rearwardly either by hand or if desired, the transmission in the cas **24** may have a reverse gear in it, whereby the machine may be driven rearwardly by power to retract the nozzle **95** through the tube **90** and finally withdraw the nozzle **95** entirely from the tube **90** whereupon the tube **90** has been sand blasted and cleaned and the nozzle may then be entered into another tube **90** whereupon the frame **44**, **45**, **46** and **47** may be readjusted if necessary to acquire the alignment of the tubes **60**, **68**, **89** and **95** with the center axis of the new tube **90** that is to be sand blasted and cleaned, whereupon the foregoing described process may be repeated for each tube in the pile thereby sand blasting and cleaning the entire pile of tubing without having to shift or move any of the tubes in the pile.

From the foregoing description it is obvious that an entire pile of tubing can be very speedily and thoroughly cleaned with a minimum of effort. While the machine described is probably the preferable form of the machine, it is to be understood that such modifications of the machine and process may be employed as lie within the scope of the appended claims without departing from the spirit and intention of the invention. Now having fully shown and described our machine and process, what we claim is;

1. In a machine for carrying out the described process of sand blast cleaning, a power driven carriage supported on wheels, said carriage having an elevatable frame thereon, and means for holding said frame in adjusted elevated positions, a stationary cylinder and sand blast tube carried on said frame, and a revolvable sand blast tube carried on said cylinder, and power means carried on said frame, and means connected between said power means and the rotatable sand blast tube for rotating the rotatable tube, a rotatable sand blast extension tube and means for connecting the extension tube to the first said rotatable tube, a sand blast nozzle, said sand blast nozzle being mounted on the outer end of the sand blast extension tube in sand blast receiving relationship thereto, and means for connecting a sand blast hose from a sand blast machine to the rear end of the said stationary sand blast tube.

2. In a machine for carrying out the described process of sand blasting tubing, said machine being as described in claim 1, said cylinder having packing means therein to form an air tight joint between the said stationary sand blast tube and the revolvable sand blast tube.

3. In a machine for sand cleaning the inner surface of tubular goods; said machine having a frame work, ground traction wheels carried by, and for the support and propulsion of said machine, a power unit carried by said frame, and means connecting between said power unit and traction wheels for the controlled driving of the wheels, a carriage, said carriage being carried by said frame and being adjustable vertically in said frame, a stationary sand blast hose coupling element carried by said carriage, and a revolvable tubular element carried by said carriage and being revolvably connected to the said stationary sand blast hose coupling, and power means carried by said carriage and connected to the said revolvable tubular element for the rotary driving thereof, a sand blast extension tube and a sand blast nozzle detachably attached to one end of the said extension tube, and means for detachably attaching the other end of the sand blast extension tube to the said revolvable tubular element in said blast receiving relationship therefrom.

4. In a sand blast machine for cleaning the inner surface of tubular goods; said machine having a portable frame work and power means for moving said frame work toward and away from the end of a pile of tubular goods, means for receiving a sand blast from a stationary sand blast machine, a sand blast tube and nozzle thereon, said sand blast tube being long enough and small enough to enter and to reach through the tubes in the aforementioned pile of tubular goods, said blast tube being revolvably connected to the said means for receiving a sand blast from a stationary sand blast machine, a carriage, said carriage support the said means for receiving a sand blast and the said sand blast tube, said carriage being adjustable vertically in said frame work to hold the said sand blast tube in alignment with selected tubes in the pile of tubular goods, and power means on the carriage for revolvably driving the said sand blast tube.

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