

Jan. 4, 1938.

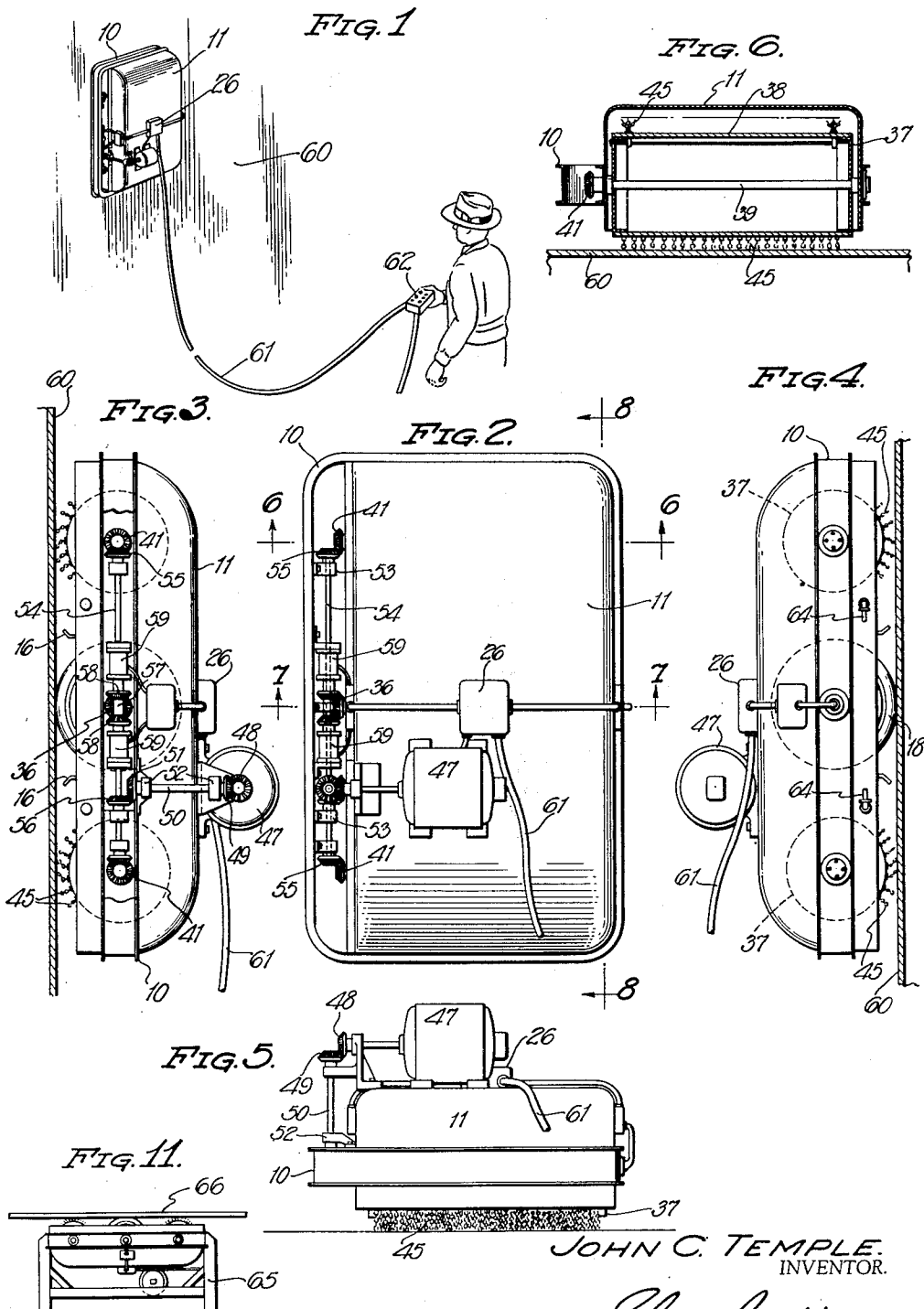
J. C. TEMPLE

2,104,062

SURFACING MACHINE

Filed Oct. 28, 1935

2 Sheets-Sheet 1



WITNESS:

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2 Sheets-Sheet 2

FIG. 7.

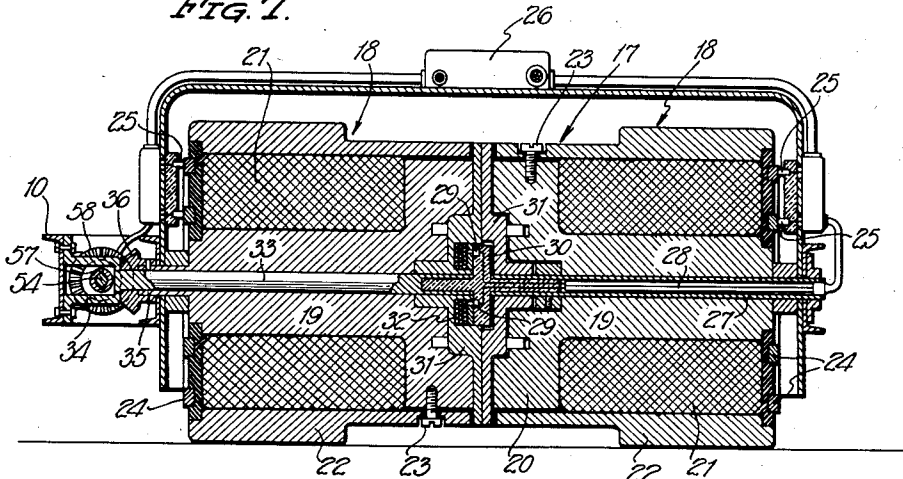


FIG. 8.

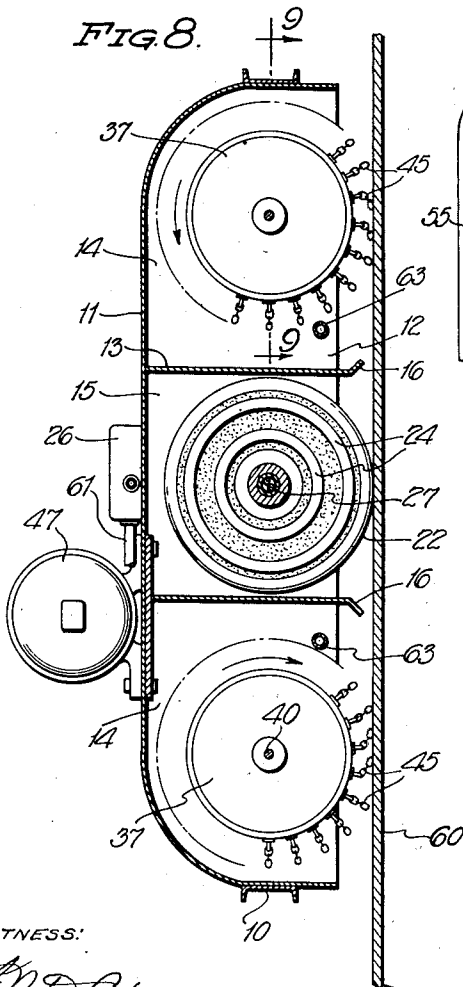


FIG. 9.

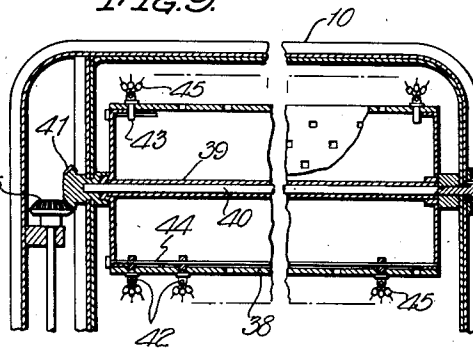
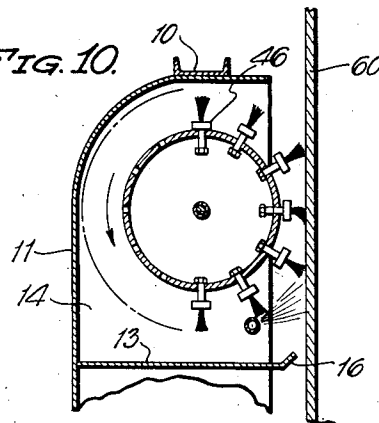


FIG. 10.



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UNITED STATES PATENT OFFICE

2,104,062

SURFACING MACHINE

John C. Temple, New York, N. Y.

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10 Claims. (Cl. 29—81)

This invention relates to a surfacing machine for the cleaning, brushing, scaling, or painting of metallic surfaces.

One of the main features of the invention resides in a machine which utilizes electro-magnetic force for its support when the machine is in use for travel over vertical or inclined surfaces, for the cleaning, brushing, scaling, or painting of metallic surfaces, such as the sides of a sheet metal building, metal roofs, metal storage tanks, ship's hulls, and other like metallic structures.

Another object of the invention is to provide a machine for the above mentioned purposes which may be guided over the metallic surface to be cleaned or painted from a remote distance, which eliminates the costly practice of erecting scaffolding for the reaching of lofty and inaccessible surfaces.

A further feature of the invention is to provide a machine of the above mentioned character which relies upon a magnetic roller for tractive purposes and which magnetic roller adheres to the metallic surface with which it engages to operatively support the machine against the force of gravitation.

Another feature of the invention is to provide a magnetic roller which may be mounted stationary for use as a feeding means in the processing of metal sheets.

With these and other objects in view, the invention resides in the certain novel construction, combination and arrangement of parts, the essential features of which are hereinafter fully described, are particularly pointed out in the appended claims, and are illustrated in the accompanying drawings, in which:

Figure 1 is a perspective view of the surfacing machine illustrating the same in use.

Figure 2 is a top plan view of the surfacing machine on an enlarged scale.

Figure 3 is a side elevational view of one side of the machine with a portion broken away.

Figure 4 is a side elevational view of that side opposite to that shown in Figure 3.

Figure 5 is an end elevational view.

Figure 6 is a transverse sectional view on the line 6—6 of Figure 2.

Figure 7 is an enlarged transverse sectional view on the line 7—7 of Figure 2.

Figure 8 is an enlarged longitudinal sectional view on the line 8—8 of Figure 2.

Figure 9 is a detail vertical sectional view on the line 9—9 of Figure 8.

Figure 10 is a detail vertical sectional view

showing the paint brush attachment feature of the work surfacing roller.

Figure 11 is a side elevational view showing the invention mounted on a stationary support for use as a conveyor of metallic sheets.

Referring to the drawings by reference characters, the numeral 10 designates a substantially rectangular shaped chassis frame which supports a substantially rectangular shaped shell body 11, one side of which is open as at 12. The interior of the shell like body 11 is divided by a pair of spaced transverse partitions 13—13, into a pair of end compartments 14—14 and an intermediate compartment 15. The partitions 13—13 extend slightly beyond the plane of the open side of the casing as shown in Figure 8, the projecting ends of which are bent in reverse angular directions to provide guards 16 for shielding the compartment 15 from the surfacing elements housed within the compartments 14—14 and which will be hereinafter fully described.

Rotatably mounted within the intermediate compartment 15 and journaled transversely of the chassis frame 10 is a magnetic traction roller 17. The magnetic traction roller 17 is composed of two substantially identical magnetic roller sections 18—18. Each roller section 18 includes a central core 19 provided with an inner enlarged head 20. The core 19 is enclosed within the magnetic winding 21, while the periphery of the head 20 and the windings are enclosed in an annular metallic tread 22. The tread 22 is secured to the head 20 by a set screw 23. The winding 21 of each roller section receives its current from a pair of collector rings 24 set in the outer end of the roller section and suitably insulated from the winding. Brushes 25 have wiping contact with the rings 24 and electric wires from the brushes 25 are lead to a junction box 26 mounted on the exterior of the shell body 11.

One of the roller sections 18 is rotatably mounted upon a tubular shaft 27 through which electric wires 28 pass to a pair of brush contacts 29 set in a disk of di-electric material 30 and which disk is interposed between a pair of metallic clutch plates 31—31 carried by the inner surfaces of the adjacent heads 20—20 of the two roller sections. The brush contacts 29 supply current to the winding 32 which together with the plates 31—31 constitutes a magnetic clutch. When the winding 32 is energized, the magnetized clutch plate will attract the other clutch plate 31, causing the two roller sections 18—18 to be joined and rotate as a unit. By shutting off the supply of current to the winding 32, the

magnetic clutch is deenergized, thus the roller sections 18—18 may turn relative to each other to effect a differential between the two roller sections which is desirable when the machine is to be turned or guided over the metallic surface to be acted upon.

Whereas one of the roller sections 18 is mounted on a tubular shaft, the other roller section is mounted on a solid shaft 33, the outer end of which is yoke shaped as at 34, and is fixedly secured to the chassis frame 10 as illustrated in Figure 7. The core 19 of the roller section mounted on the shaft 33 is formed with a reduced hub 35 which extends beyond a side wall of the shell like casing and has fixed thereto, a beveled gear 36.

Mounted within the end compartment 14—14, are work surfacing elements 37—37. In the drawings, the elements 37 are identical so that a description of one will suffice for the other. Each element 37 includes a cylindrical drum 38, having a central tubular sleeve 39 through which a shaft 40 extends, the shaft 40 having its bearing in the chassis frame and casing. A cylindrical drum is fixed to the shaft 40 for turning movement therewith and the said shaft at one end, is provided with a beveled gear 41. The beveled gear 41 of the pair of elements 37 extends on the same side of the machine and in the same plane as the beveled gear 36 of the magnetic roller 17.

The periphery of each drum is provided with a series of radially extending scraping elements 42, each of which includes a stud 43 extending radially through the periphery of the drum and which is keyed in position by key rods 44. The outer end of each stud 43 carries a plurality of chain sections 45, which are thrown outwardly by centrifugal force during rotation of the drum. The chain sections are adapted to strikingly contact the surface of the metallic plates being worked upon as is apparent by reference to Figure 8 of the drawings. Although the elements 37 have been shown as having scraping element on the periphery, by reference to Figure 10, it will be seen that brush members 46 may be loosely mounted in the drum and extend radially with respect to the axis of the drum so as to be thrown outwardly by centrifugal force for brushing the scale or surface dirt from the metallic surface to be worked upon, or for the spreading of paint.

Mounted exteriorly upon the shell body 11 is an electric motor 47, the drive shaft of which is provided with a beveled gear 48 which is in constant meshing engagement with a pinion gear 49 fixed to one end of a shaft 50, the other end of the shaft carrying a beveled gear 51. The shaft 50 is mounted in bearings 52 disposed on that side of the casing from which the pinion gears 36 and 41 extend. Extending lengthwise of the machine and journaled in bearings 53 carried by the chassis frame 10, is a shaft 54, of which are provided with beveled gears 55 for meshing engagement with the respective beveled gears 41 of the surface work elements 37. The pinion 51 is in constant mesh with a pinion gear 56 fixed to the shaft 54. From the system of gearing so far described, it will be seen that the motor 47 when turned on, will effect a continuous rotation of the elements 37 in the direction of the arrows shown in Figure 8. The elements 37 although rotating simultaneously, turn in opposite directions, and their direction of rotation cannot be changed. However, it is desired to drive the magnetic traction roller 17 in either direction in order

to cause it to move up and down or back and forth over the surface to be acted upon. For this purpose, a tubular shaft 57 is provided with spaced opposed beveled gears 58, one of which may be engaged with the pinion 36, at a time. The splined shaft 57 is under the influence of a pair of electric solenoids 59, the wires from which lead to the junction box 26 hereinbefore mentioned. Thus it will be seen by energizing one of the solenoids 59, one of the gears 58 may be brought into meshing engagement with the beveled gear 36 and the reverse operation will occur upon energizing of the other solenoid. By this arrangement of magnetic gear shift, it is possible to selectively actuate the traction wheel 17 in either direction of rotation.

In Figure 1 of the drawings, I have illustrated the machine in use upon a vertical metallic wall or surface designated by the numeral 60. Extending from the junction box 26 is a cable 61 which leads to a control switch 62 which may be held in the hand of an operator. The push buttons of the switch 62 may be actuated to selectively control the various electric circuits, such as the circuit which controls the actuation of the magnetic clutch between the roller sections 18—18, and the circuits in which the solenoids 59 are arranged. A push button will also be provided in the switch 62 for controlling the actuation of the electric motor 47.

In practice, the magnetic roller 17 is energized by the windings 21 and when placed in contact with an iron or steel surface such as shown at 60, the machine will adhere to the surface in the same manner that an ordinary steel or iron pin will adhere to a common horse shoe magnet. After energization of the magnetic roller, the motor 47 may be placed in operation, thus power will be transmitted to the traction roller to propel the machine in the direction desired. The solenoids 59 are selectively controlled from the switch 62 so that an operator may cause the machine to move in either direction. At the same time the power is transmitted to the magnetized traction roller 17, the elements 37 are rotated in the direction of the arrows shown in Figure 8. The scaling elements in the form of the chains 45 contact the metallic plates 60 to scrape the same free of scale, which operation is often necessary preparatory to the painting of a metallic surface. After the scale has been removed in this manner, the brush attachment such as shown in Figure 10 may be substituted for the scaling elements, and which brushes may be of wire, for further cleaning of surface, or of paint brush materials, for painting the surface and may be employed to spread the paint which can be sprayed onto the metallic surface from jets 63 which extend transversely of the compartments 14—14 and are disposed between the elements 37 and the adjacent partitions 13—13. The spray jets 63 are in the form of transversely disposed pipes having spaced openings therein. By reference to Figure 4 it will be seen that one of the ends of these pipes extends beyond one side of the machine and are provided with couplings 64 to which hoses (not shown) may be connected, and the hoses in turn may be operatively associated with a pressure supply of paint. The guard members 16 serve to protect the magnetic traction roller 17 from scalings which may be released from the metallic surface being worked upon.

As before mentioned, when it is desired to steer the machine or turn the same, the magnetic

clutch between the two roller sections 18 is de-energized for it will be recalled that only one of the roller sections 18—18 is directly driven from the power derived from the electric motor 47.

5 Although I have shown one system of gearing which connects the driven parts with the source of power produced by the electric motor 47, it will be understood that other systems which are capable of producing the same result may be
10 resorted to and that the ratio between the gears may be varied, depending upon the speed of operation desired.

The same principle of magnetized traction roller herein shown and described may be uti-
15 lized in connection with a stationary support, whereby such type of roller may be used as a conveyor for propelling or feeding metallic sheets. This use of the invention is shown in Figure 11 of the drawings, wherein the machine
20 is mounted on a support 65 with the open side of its shell body facing upward. In this position, the machine may be utilized in association with a processing unit in the treatment of metallic plates, one of which is shown as being fed
25 by the magnetic roller and which plate is designated by the numeral 66. The magnetic roller not only conveys or feeds the plate passing over it but is capable of guiding the plate relative to any processing units with which it may be used.
30 Also, by reason of the gears and control means, the traction roller may be operated at various speeds and in reverse directions.

While I have shown and described what I consider to be the most practical embodiments of
35 my invention, I wish it to be understood that such changes and alterations as come within the scope of the appended claims may be resorted to if desired.

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

1. A surfacing machine for use upon metallic surfaces comprising in combination, a chassis, a magnetic traction roller mounted on said chassis, said traction roller including two roller sections, means for simultaneously magnetizing
45 both of said roller sections, means for releasably clutching said roller sections together to turn as a unit or to cause a differential turning movement between said roller sections, rotatable
50 surfacing means on said chassis, and motor driven means for simultaneously rotating one of said magnetized roller sections and said rotatable surfacing means.

2. A surfacing machine for use upon metallic surfaces comprising in combination, a chassis, a magnetic traction roller centrally mounted on
55 said chassis, a pair of cylindrical members rotatably mounted on said chassis and respectively
60 disposed on opposite sides of said traction roller for balancing the chassis, work surfacing elements on the peripheries of said cylindrical members, means for simultaneously rotating said cylindrical members in opposite directions, and means
65 for selectively rotating said magnetic traction roller in either direction.

3. A surfacing machine for use upon metallic surfaces comprising in combination, a shell body open at one side, a pair of transverse partitions
70 dividing said shell body into a pair of end compartments and an intermediate compartment, a pair of cylindrical surface work elements, said elements being respectively disposed in the end compartments and rotatably mounted in said
75 shell body, an electrically magnetized traction

roller disposed in said intermediate compartment and journaled in said shell body, the peripheries of said cylindrical surface elements and said traction roller extending beyond the plane of the open side of said shell body, and means
5 carried by said shell body for simultaneously imparting rotation to said cylindrical work elements and said magnetized traction roller.

4. In a machine of the class described, a traction roller including two independent co-axially
10 alined electro-magnetic roller sections, means for simultaneously energizing said magnetic roller sections, and a releasable electro-magnetic clutch for connecting said roller sections together to turn as a unit.

5. In a machine of the class described, a traction roller including two independent co-axially
15 alined electro-magnetic roller sections, means for simultaneously energizing said magnetic roller sections, and a releasable electro-magnetic
20 clutch for connecting said roller sections together to turn as a unit, and drive means operatively connected to one of said roller sections.

6. In a machine of the class described, a magnetic roller mounted in a stationary support and
25 over which metallic plates are adapted to pass, said magnetic roller including two independent co-axially alined electro-magnetic roller sections, means for simultaneously energizing said magnetic roller sections, means for selectively causing
30 said magnetic roller sections to turn as a unit or relative to each other to control the guiding of metallic plates passing over said magnetic roller, and means for rotatably driving one of said magnetic roller sections.

7. A machine for use upon metallic surfaces comprising in combination, a chassis, rotatable work surfacing elements mounted on said chassis, magnetic traction means mounted on said chassis including a pair of axially alined magnetic rollers for tractive contact with a metallic surface
40 to be worked upon, means for energizing said magnetic rollers, means for simultaneously driving both of said magnetic rollers to cause the machine to travel in a straight ahead direction,
45 means for disconnecting the drive to one of said magnetic rollers to cause the same to idle during driving of the other magnetic roller to effect a turning of the machine for steering purposes, and means for imparting rotation to said
50 rotatable work surfacing elements.

8. In a machine for use upon metallic surfaces having a chassis and surface working elements carried by said chassis, magnetic traction
55 means for causing the machine to adhere to a metallic surface being worked upon including a pair of axially alined magnetic rollers, means for energizing said magnetic rollers, means for simultaneously driving both of said magnetic rollers in either direction of rotation to cause the
60 machine to travel in a straight forward or backward direction, and means for disconnecting the drive to one of said magnetic rollers to cause the same to idle during driving of the other magnetic roller to effect a turning of the machine for steering purposes.

9. In a machine for use upon metallic surfaces having a chassis and surface working elements carried by said chassis, a pair of magnetic traction devices mounted on said chassis and respectively
70 disposed on opposite sides of the longitudinal axis thereof, means for energizing said magnetic traction devices, driving means for simultaneously operating both of said magnetic traction devices to cause the machine to travel in a
75

straight away direction, and means for rendering the driving means to one of the magnetic traction devices inoperative to cause the same to idle during the driving of the other magnetic traction device to effect a lateral turning of the machine for steering purposes. •

10. In a machine for use upon metallic surfaces comprising in combination, a chassis, surface work elements carried by said chassis, a pair of electro-magnetic traction devices mounted on said chassis and respectively disposed on op-

posite sides of the longitudinal center thereof, remote control means for energizing and deenergizing said electro-magnetic traction devices, and selective remote control means for driving said electro-magnetic traction devices simultaneously or for driving one of said electro-magnetic devices relative to the other for respectively causing the machine to travel in a straight direction or to turn for guiding purposes.

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