

June 5, 1934.

R. B. CLOSE

1,961,336

ROAD MAGNET

Filed July 22, 1931

2 Sheets-Sheet 1

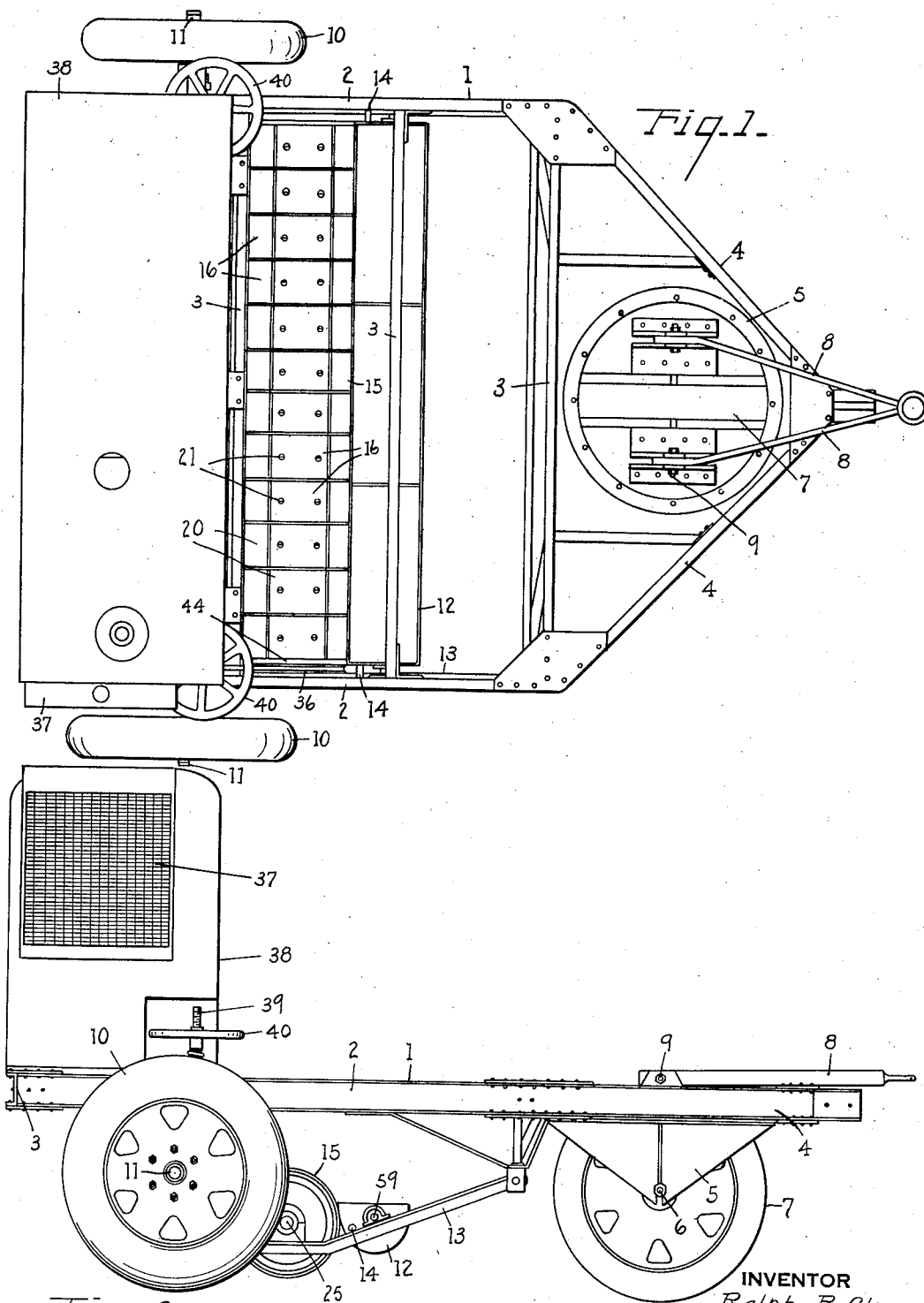


Fig. 2.

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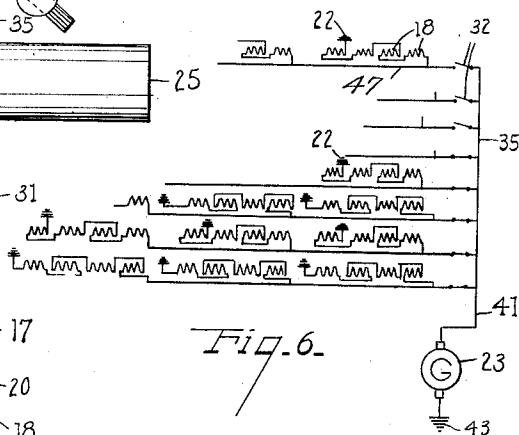
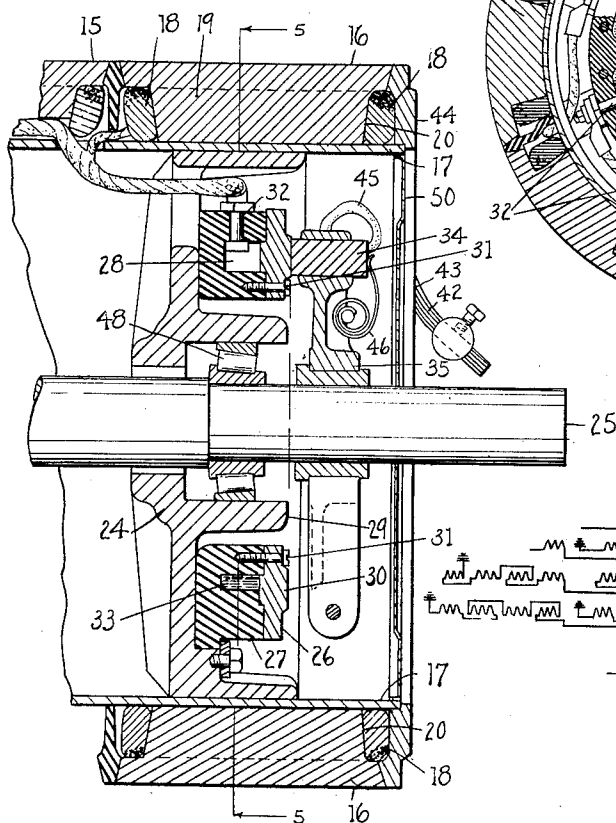
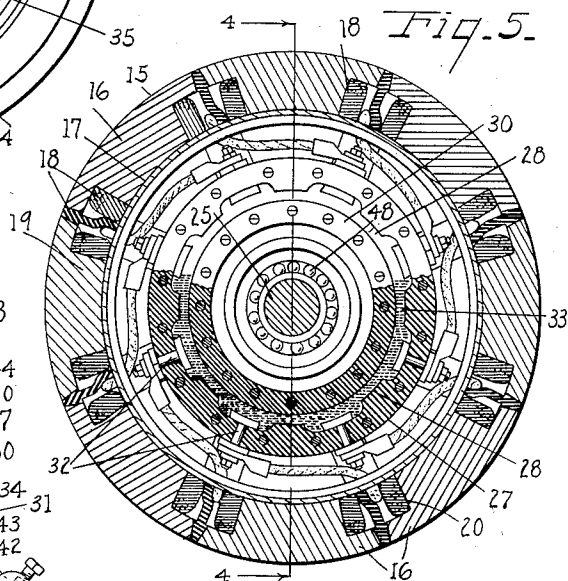
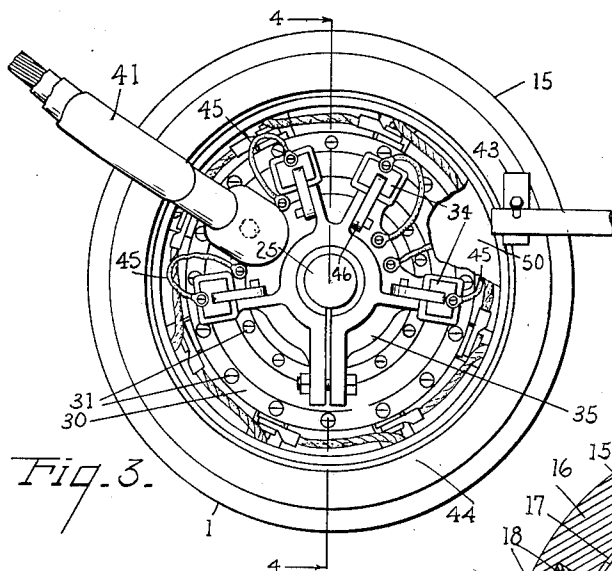
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2 Sheets-Sheet 2



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1,961,336

ROAD MAGNET

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Application July 22, 1931, Serial No. 552,435

2 Claims. (Cl. 209—219)

My invention relates to magnet for picking up metal objects such as nails and the like, and it has for its main object to provide a magnet which is highly efficient, simple and economical in structure, and easily operated.

Another object of my invention is to provide a switch for operatively connecting and disconnecting electromagnets to and from a generator that is rugged in construction and serviceable in operation.

Objects relating to details and economies of my invention will appear from the description to follow. The invention is defined and pointed out in the claims.

A structure which is a preferred embodiment of my invention is illustrated in the accompanying drawings, in which:

Fig. 1 is a top plan view of my improved highway or street cleaning apparatus.

Fig. 2 is a view in side elevation of the device.

Fig. 3 is a fragmentary end elevation of the rotary magnet, illustrating the switch.

Fig. 4 is an enlarged fragmentary vertical section on 4—4 of Figs. 3 and 5.

Fig. 5 is a view partly in elevation and partly in section on 5—5 of Fig. 3, showing details of the switch assembly, and

Fig. 6 is a fragmentary simplified electric circuit diagram illustrating the electrical connections of my device.

Referring to the drawings, the frame 1 of the apparatus, in the embodiment illustrated, comprises side members 2 connected at their upper ends by cross pieces 3 and having integral draft bars 4 extending forwardly therefrom, these draft bars being disposed so as to converge together at the forward end of the truck. The forward ends of the draft bars 4 are provided with a turntable 5 in which is mounted an axle 6 for the single pneumatically tired front wheel 7. The trailer is drawn by connecting rods 8 which are pivoted to the turntable at 9 and are connected at their forward ends. The carrying wheels 10, which are pneumatically tired, are mounted for rotation on the rear axle 11.

A receptacle 12 is pivotally mounted between side members 13, this receptacle being rotatable about the axis 59 for dumping material that has been collected therein. Pins 14, extending from the side walls of the receptacle 12, coact with the upper surface of the side members 13 to prevent the receptacle from rotating into binding engagement with the drum 15. The drum 15 is rotatably journaled between the side members 13 and comprises a plurality of individually detach-

able segmental electromagnet units 16, these units being carried by the inner drum 17. Coils or windings 18 encircle the cores 19 of the electromagnet units in the recesses 20. The cores 19 are mounted on the drum 17 by means of screws 21 that engage threaded openings provided therefor in the drum.

A plurality of the coils are electrically connected together in series and have one terminal grounded to the drum, as indicated at 22 by Fig. 6. The coils are connected in sets of four in series with the source of supply 23 to take care of voltage requirements. Spiders 24 are journaled on the stationary shaft 25 to rotatably support the inner drum 17, the coils being arranged on the outside of the inner drum. Roller bearings 48 are disposed between the shaft 25 and the spiders 24, the latter being rotatable with the drum.

The rotary switch 26 preferably comprises an annular groove 28 concentric with the hub 29. The groove 28 is preferably of the shape indicated by Fig. 5 for purposes that will be more fully set forth below. Mounted on the outside of the member 27 is a cover plate 30 that is preferably held in place by means of screws 31 that extend through the plate and into the member 27. The plate is insulated from the spider 24 by means of insulation of the member 27. A plurality of spaced contact members or studs 32 are carried by the member 27 which extend into the annular groove 28.

The studs 32 are insulated from the cover plate by means of the insulation of member 27 and they are sunk into the inner walls of the annular groove 28, as indicated in the drawings. The annular opening 28 is partially filled with a conducting liquid 33, such as mercury. Sufficient mercury 33 is placed within the opening 28 so that, as the contact members come to the top by the rotation of the drum and switch, they clear the mercury bath and break the conducting path formed by the mercury.

The cover plate 30 is of conducting material against which the brushes 34, carried by the brush supporting member 35, are adapted to bear. The brushes 34 are connected to the member 35 by flexible conductors 45 so that they are free to be pressed inwardly by the brush springs 46. The contact studs 32 are severally connected, as indicated by Fig. 6, to the horizontal rows of coils 18 mounted on the drum by conductors 47. In order that the proper rows of coils will be de-energized at the proper position so that the collected material will be free to fall into the collecting basket 12, the rows of coils are connected to the

contact studs, as diagrammatically illustrated by Fig. 6.

For example, the contact stud in the upper part of the ring in the position shown by Fig. 4 is clear of the liquid bath and therefore the coil to which it is connected is de-energized. This coil is placed as shown in the figure just above the collecting receptacle, so that the material is released and falls freely into the material collector 12. The other rows of coils are similarly connected to the other contact studs.

I prefer to place sufficient mercury in the opening so that at least four of the contact studs are bathed in mercury leaving at least two above the level of the mercury.

The drum 15 is provided with a belt 36 that passes over a pulley (not shown) mounted on the axle of the carriage so that the drum is rotated with the rear wheel as the vehicle is moved over the road.

The generator 23 is preferably mounted on the top of the cross pieces 4, as indicated by Fig. 1. This generator is driven by any suitable source of power such as an internal combustion engine, the radiator of which is indicated by the numeral 37. The entire generator and motor assembly is covered by a casing 38 to improve the appearance of the device and for protecting it from dust and the elements. Means are provided for raising and lowering the drum consisting of screws 39 threaded to brackets mounted on the frame 1. The screws 39 are provided with convenient hand wheels 40 whereby the adjustment may be conveniently made.

The contact studs are shaped so that they have, in effect, a sharp edge for facilitating the discharge of the mercury therefrom as the contacts are moved above the surface of the mercury bath. Their efficiency in this case is further increased by providing annular recesses in the peripheral walls of the opening. The thin or narrow edges of the contact studs are mounted so as to lie in these recesses, as shown by Fig. 5. The edges of the contact studs are sharpened so as to guide the mercury to drop therefrom at a point which is furthest from the switch body and as nearly as possible in the center of the annular groove so that any arcing will not burn the switch body. With this arrangement the mercury switch is made highly efficient and will stand up under the abuse to which the apparatus may be subjected.

With the arrangement illustrated, the electromagnet units are energized through a substantial portion of the rotation of the drum, but they are de-energized when in operative relation to the box or receptacle 12. The edge of the receptacle 12 constitutes a doctor bar which is not a scraper in the sense of freeing the articles from the drum, because they are freed at this point by virtue of the fact that the electromagnet units are de-energized. The doctor bar constitutes a guide to prevent collected material from falling back to the ground in the gap between the rotary magnet and the receptacle in case of the existence of such a gap. The units are, however, energized when they are in proximity to the ground and this continues until they are brought into operative relation with the doctor bar by rotation of the drum, so that metal objects are picked up from the surface of the highway or street, carried by the drum, and automatically discharged into the receptacle, from which they may be dumped by turning the receptacle.

My improved road cleaning apparatus is high-

ly efficient in picking up metal objects of varying sizes and, as these are discharged at each rotation of the drum, they are not likely to rattle off or loosen, thereby falling upon the surface to be cleared.

As shown by Fig. 6, the generator 23 has one terminal 41, connected to the stationary brush carrier 35 of the rotary switch and the other terminal 32 connected to ground at 43, which preferably is the non-magnetic end closure rim 44 of the drum. One end of the coils 18 is connected, as shown by Fig. 6, to the contact studs of the rotary switch, while the other end is connected to ground which conveniently is the metal inner drum. The electrical circuit, then, is from the generator to the switch, from the switch through the coils to ground, and finally through ground back to the other terminal of the generator. This circuit for each row of coils is connected and disconnected by the rotary switch as described above.

A closure plate 50 is provided at the end of the inner drum 17 for preventing excessive dust from entering the inside thereof. The closure plate 50 is provided with an opening for the passage of the conductor 41 leading to the brush carrier.

While the mercury switch body is preferably of non-conducting material, it will be appreciated by those skilled in the art that suitable conducting material, such as iron, may be used, the several elements constituting the switch being insulated from each other to prevent short circuiting of the current therebetween.

I have not attempted to illustrate or describe various embodiments or adaptations of my improvements because it is believed that this disclosure will enable those skilled in the art to embody or adapt my improvements as may be desired.

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

1. In a road magnet, the combination with a shaft, of spiders rotatably mounted on the ends of said shaft, an annular member of insulating material having an annular groove secured to one of said spiders, spaced contact members mounted on said member and extending into said groove, a cover ring of conducting material secured to said member over said groove constituting an annular opening of the latter, a body of liquid conducting material partially filling said opening, a brush carrier mounted on said shaft, brushes carried by said carrier engaging said ring, a drum mounted on said spiders, detachable electromagnetic units mounted on said drum comprising cores and windings, insulating means separating said units, shields detachably mounted on said units, conductors connecting terminals of said windings to said contact members, means connecting terminals of said windings to said drum, an end ring of conducting material secured to said drum, a brush carrier disposed adjacent said end ring, a brush carried by said carrier engaging said ring, and means for supplying electrical energy to said brushes.

2. In a road magnet, the combination with a shaft, of spiders rotatably mounted on said shaft in spaced relation to each other, an annular member of insulating material having an annular groove and secured to one of said spiders, spaced contact members mounted on said member and extending into said groove, a cover ring

of conducting material secured to said member over said groove, liquid conducting material partially filling said groove, a brush carrier mounted on said shaft, a brush carried by said carrier and engaging said ring, a drum mounted on said spiders, electro-magnetic units mounted on said drum and comprising windings, conductors connecting terminals of said windings to said contact members, means connecting terminals of said windings to said drum, an end ring of conducting material secured to said drum, a stationary brush engaging said end ring, and means for supplying electrical energy to said brushes. 80

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65	140
70	145
75	150