June 10, 1930. C. R. CHURCHILL ET AL 1,763,457

ROAD WORKING APPARATUS

Filed April 16, 1928 2 Sheets-Sheet 1

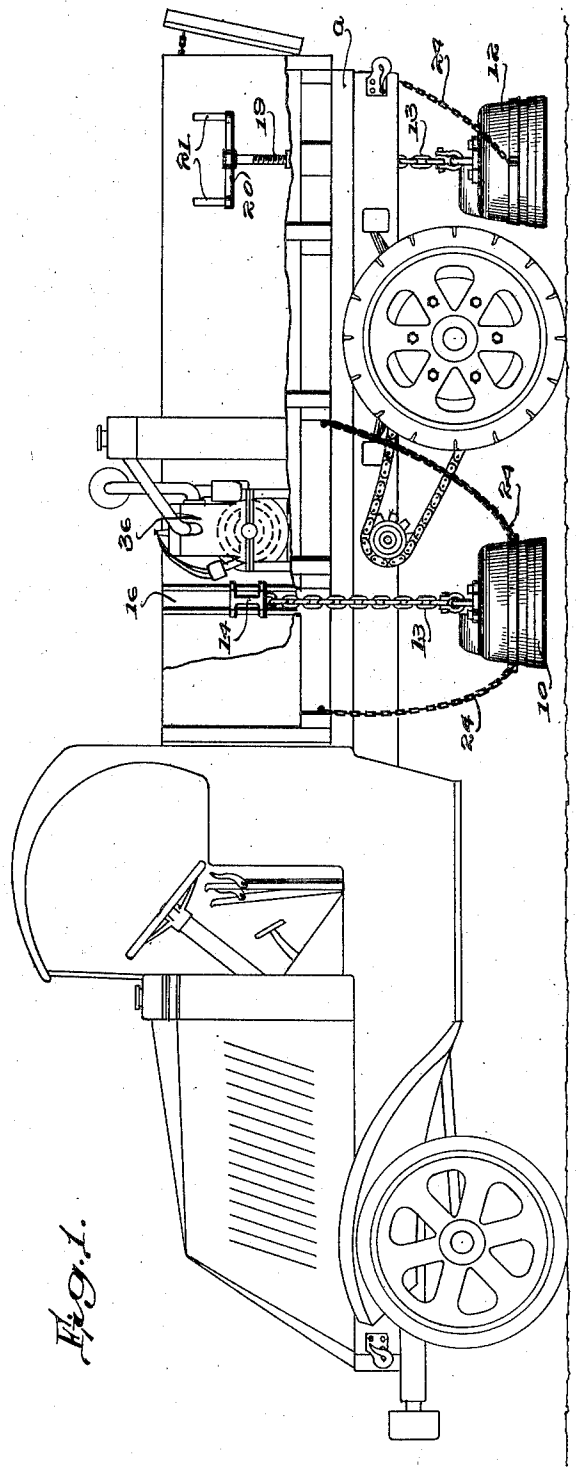


Fig. 1.

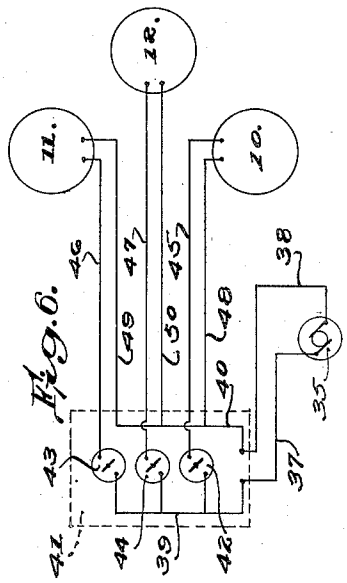


Fig. 6.

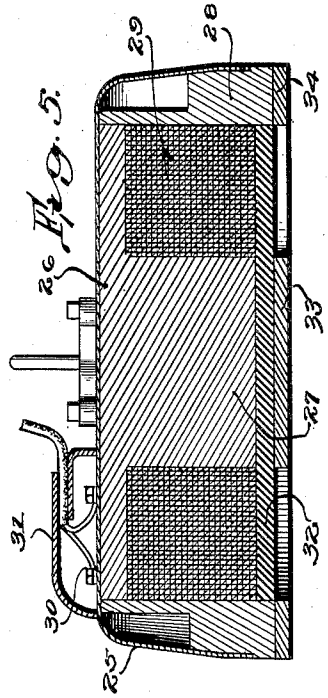


Fig. 5.

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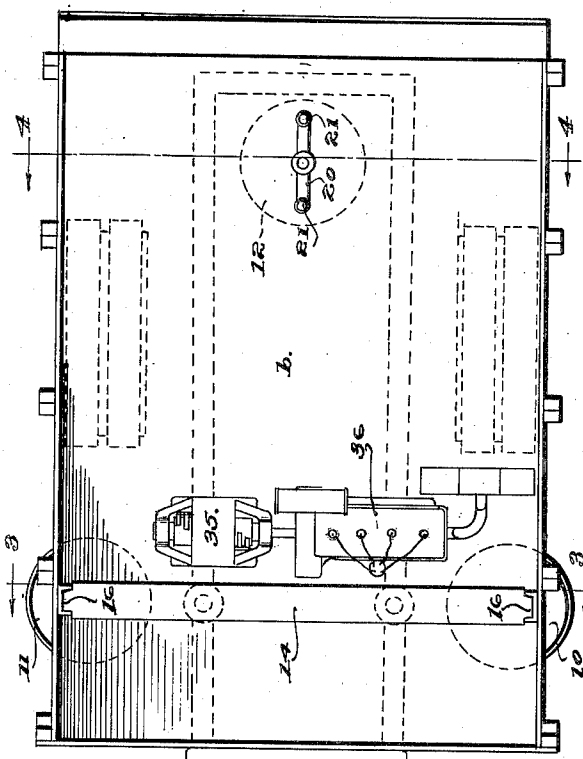


Fig. 2.

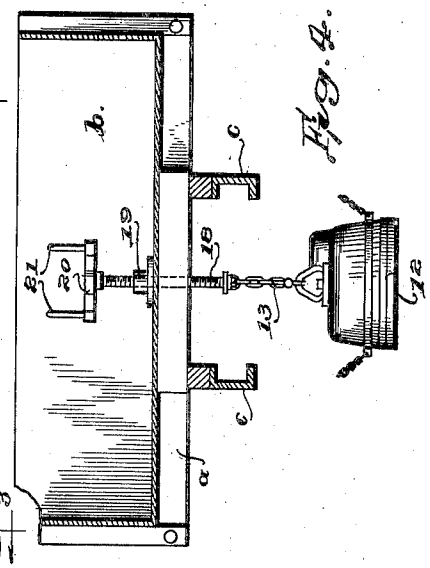


Fig. 4.

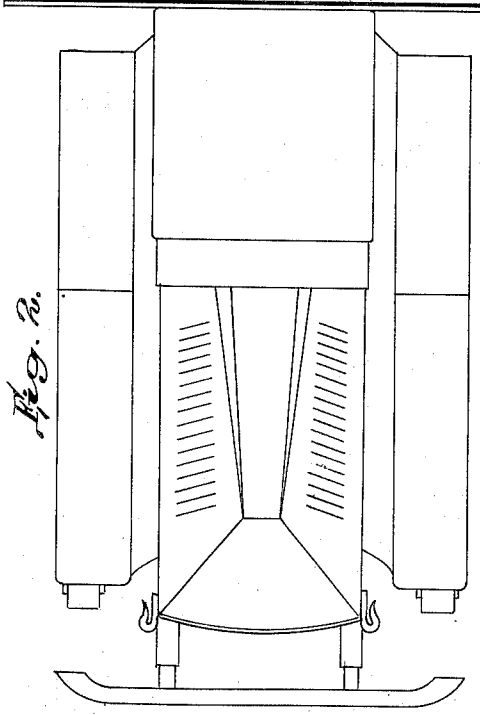
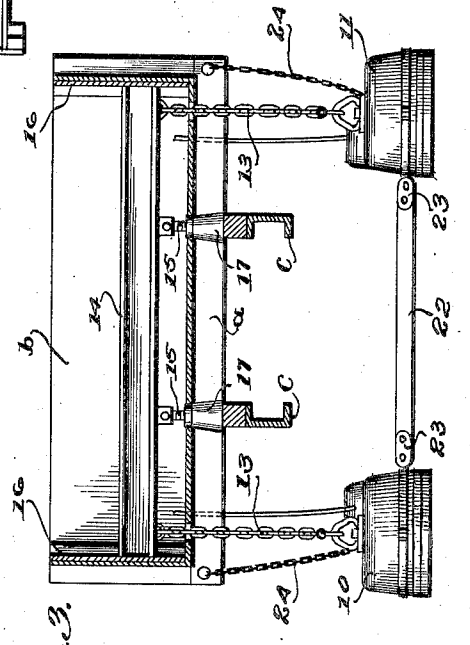


Fig. 3.



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UNITED STATES PATENT OFFICE

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ROAD-WORKING APPARATUS

Application filed April 16, 1928. Serial No. 270,454.

This invention appertains to improvements in road working apparatus generally, and more particularly to a type of such apparatus as is usually employed in clearing roadways and the like of ferrous materials, or substances of all classes and descriptions.

An object of the invention is to provide an apparatus of the class set forth, which is comparatively simple, but durable in construction, easy to operate, and extremely powerful and efficient in use, and which will have the advantage of being readily controlled and operated by but one operator, if desired or necessary.

Another object of the invention is to provide for an apparatus as hereinbefore characterized, which is preferably in the form of a power operated vehicle having an electromagnetic means adjustably mounted thereon, so as to be transported thereby along a roadway for picking up all ferrous materials or substances, which are ever a source of constant danger to the safe travel over the roadway of motor vehicles and the like, and otherwise injurious to and obstructive to the pneumatic type of tires usually employed on such vehicles.

A further object of the invention is to provide for an apparatus of the character as hereinbefore mentioned, wherein electromagnetic means is in the form of a plurality of electromagnetic units arranged to cooperate one with the other in a manner to be effective in removing ferrous materials from a space substantially one-half of the full width of an average or standard width roadway, when the vehicle on which they are mounted is propelled along a roadway at one side of its center.

Another object of the invention is to provide a means for adjusting the several electromagnetic means or units, one independently of the other, and in a manner to render the same uniformly effective for their intended purposes when being transported over uneven or high-crowned roadways.

A further object of the invention is to provide a means, which may be directly under the control of the operator of the vehicle from his usual position thereon, whereby the several electromagnetic units aforesaid may be energized or de-energized, as the case may be, one independently of the other, after the units have been adjusted for proper operation over a particular or given section or length of roadway.

With the foregoing and other equally important objects and advantages in view, the invention resides in the certain new and useful combination, construction and arrangement of parts as will be hereinafter more fully described, set forth in the appended claims, and illustrated in the accompanying drawings, in which:

Figure 1 is a side elevation of a conventional form of motor truck or the like, and showing a practical embodiment of the invention installed thereon, a portion of the bed or body of the truck being broken away to show the power generating plant for the electromagnetic means or units, and the adjusting means for the latter,

Figure 2 is a top plan view thereof,

Figure 3 is a vertical transverse section taken on the line 3—3 of Figure 2,

Figure 4 is a similar view taken on the line 4—4 of Figure 2,

Figure 5 is a vertical enlarged sectional view through one of the electromagnetic means or units, and

Figure 6 is a diagrammatical view of the circuit connections between a source of current supply, the control switches and the electromagnetic means or units.

Referring to the drawings, wherein like characters of reference designate corresponding parts throughout the several views thereof, the embodiment of the invention, as shown therein by way of example, comprises generally three electromagnetic means or units 10, 11 and 12, which are suspended from the frame *a* and the body *b* of the motor vehicle, in a manner that the combined effect of the same will be to draw to them any and all ferrous materials or substances exposed on the surface, or which may be embedded within the surface of a roadway being traversed by the motor truck at a particular or given time in its operation. With the powerful electromagnetic means or units contemplated

by the invention, no trouble will be experienced in having the magnets attract ferrous objects to them, even when such objects are embedded to an appreciable depth within the surface of such roadways, at least when the same are of dirt, sand and gravel, or sand and clay construction. The size of the electromagnetic means or units is preferably such that the combined influence thereof will span a width of a roadway to an extent appreciably greater than the width defined by the points of contact or tread of the wheels disposed at the opposite sides of the truck.

To accomplish the foregoing wide area or coverage of a roadway, the electromagnetic means or units 10 and 11 will preferably be suspended by flexible members or chains 13 from the opposite ends of a transverse member or beam 15, suitably mounted within the forward part of the body *b* of the truck, the intermediate portions of the members or chains 13 being passed upwardly into the body *b* through openings formed in the bottom wall of the latter for the purpose.

This transverse member or beam 14 is preferably adjustable vertically within the truck body *b*, and to that end is supported on the upper ends of a pair of screw jacks or the like 15, which are spaced apart equally to either side of the transverse center thereof. In a movement of adjustment, the opposite ends of the member or beam 14 are guided against lateral displacement in guides 16, which are preferably in the form of suitable lengths of channel iron secured at the inner sides of the opposite side walls of the body *b*. The bases or bodies 17 of the screw jacks 15 are preferably supported in position on the longitudinal side bars *c* of the main frame of the truck with their upper ends projecting through the bottom wall of the bed or body *b*. The heads, at the upper ends of the screw jacks 15, are provided with the usual diametrically arranged openings for the engagement therethrough of suitable handles or bars (not shown).

The electromagnet 12 is also suspended from the bed or body *b* of the truck, but preferably toward the rear end thereof, and in the plane of the longitudinal center of the same. This arrangement places the electromagnet 12 in a plane midway between the electromagnets 10 and 11, so that the magnetic fields set up in each of the latter, when energized, will, in effect, slightly overlap the area to be acted upon by the magnetic field of the former, in the forward direction of travel of the truck. The flexible suspension member or chain 13 of the electromagnet 12 has its upper end connected to the lower end of a screw shaft 18, which is passed vertically through the bottom wall of the body *b* of the truck member, and through a member 19 secured on the upper side of the said bottom wall. Secured on the upper end of the screw shaft 18 is a cross bar 20, which has a pair of hand grips or the like 21 rising from its upper side from points immediately adjacent the opposite ends thereof.

As shown in Figure 3, the electromagnets 10 and 11 are preferably maintained in properly spaced relation by means of a connecting member or bar 22, which has its opposite ends secured to attaching members or lugs 23, carried on the inner opposed sides of the magnet housings. Also to limit the swinging movements of each of the several electromagnets 10, 11 and 12, flexible members or chains 24 are attached to the same and to suitable points on the bed or body *b*.

Each of the electromagnets 10, 11 and 12 are of identical construction, and, as shown in Figure 5, are constituted in a casing or housing 25, which is preferably of circular form and open at its lower side. Mounted concentrically within the casing or housing 25 is a central iron core 26, which is formed to provide a centrally disposed circular pole piece 27. Encircling the central core 26 is an outer annular core 28, which has its inner end portion arranged in abutting relation to the inner peripheral edge of the center core, so that the magnetic circuit is completed therebetween. Seated within the annular depression formed between the central pole piece 27 of the inner core 26 and the opposed wall of the outer annular core 28 is a suitable magnetizing coil 29, which has its terminals passed outwardly of the upper wall of the casing or housing 25, and attached to terminal posts 30. These terminal posts 30 are preferably enclosed within a protective metal housing 31 secured on the outer side of the upper wall of the casing or housing 25, a suitable opening or passage being provided in the housing 31 for the insertion therethrough of a two-conductor lead from a source of electric current supply. The lower end of the central pole piece 27 and the corresponding side of the coil 29 are preferably enclosed by a protective disc of insulation 32, while secured on the outer face of the latter is a central pole shoe 33 of the same diameter as that of the pole piece 27, and on the lower face of the outer core 28 an annular pole shoe 34. These shoes 33 and 34 are preferably formed of hardened steel to withstand hard usage, and to otherwise prevent injury to the softer metal from which the cores 26 and 28 are formed.

A source of current supply for energizing the electromagnets 10, 11 and 12 is carried on the truck, and is preferably independent of the usual electrical system of the same. As shown in Figures 1, 2 and 6, this source of current supply is preferably in the form of a generator 35, which is operatively coupled to a prime mover, in the form of an internal combustion engine or the like 36, and both the generator and prime mover are secured in

position within the forward end portion of the bed or body *b* of the truck, so as to be conveniently placed for easy operation by an attendant.

As shown in Figure 6, the generator 35, preferably has the leads 37 and 38, from its brushes, connected to a pair of bus bars 39 and 40 respectively, mounted on a switch board or panel 41, which is to be located on the truck at a point convenient to the position of the operator of the latter, or to an attendant who may be present to give individual attention to the operation of the electromagnets.

The electromagnets 10, 11 and 12 are preferably to be independently controlled, and to this desired end, a corresponding number of single pole switches 42, 43 and 44 are mounted on the switch board or panel 41, and have one of their contacts each electrically connected to the bus bar 39, with the other of the contacts thereof similarly connected by conductors 45, 46 and 47 respectively, to one of the terminals 30 of the electromagnets 10, 11 and 12, the remaining terminals 30 of the electromagnets are electrically connected by conductors 48, 49 and 50 respectively, to the other of the bus bars 40.

With the apparatus as thus constructed and arranged, the operator of the truck, or the attendant in charge of the electromagnets 10, 11 and 12, at the start of a road clearing operation will effect the proper adjustment of the latter with respect to the road surface to the cleared, by manipulating the jack screws 15 and 18 for the purpose. After adjusting the height of the electromagnets with respect to the road surface, the prime mover 36 will be started up for the delivery of electric current from the generator 35 to the bus bars 39 and 40 on the switch board or panel 41. Upon the starting up of the truck on a section of road to be cleared, the electromagnets 10, 11 and 12 can now be energized by closing the switches 42, 43 and 44, and will immediately thereupon become active by attracting to themselves any and all ferrous material and substances, which may be present on the road surface or embedded therein. With sufficent power applied to the magnets, particles or bits of iron or steel will be readily attracted to the pole shoes 33 and 34, and even withdrawn from the road surface. When the pole shoes 33 and 34 become loaded with materials lifted from the roadway, the latter may be deposited in suitable receptacles (not shown) positioned beneath the truck for the purpose, by manipulating the switches 42, 43 and 44 to open circuit position, and for the consequent de-energization of the magnets, or, if desired, the material may be released and deposited directly on the road surface, and shoveled into the body of the truck or another vehicle.

Without further description, it is thought that the features and advantages of the invention will be readily apparent to those skilled in the art, and it will of course be understood that changes in the form, proportion and minor details of construction may be resorted to, without departing from the spirit of the invention or its scope as claimed.

Having thus fully described the invention what is claimed is:

1. The combination with a motor vehicle, of a vertically adjustable support extending transversely of the body of the vehicle and within the same, electromagnets suspended in spaced relation from said support, another electromagnet suspended below the said body in rear of said first named electromagnets and in line with the space therebetween, a vertically adjustable support carried centrally of the rear end portion of the said body for sustaining said last named electromagnet in suspended position, and means for controlling the operation of said electromagnets.

2. The combination with a motor vehicle, of a vertically adjustable support extending transversely of the body of the vehicle and within the same, electromagnets suspended in spaced relation from said support, another electromagnet suspended below the said body in rear of said first named electromagnets and in line with the space therebetween, a vertically adjustable support carried centrally of the rear end portion of the said body for sustaining said last named electromagnet in suspended position, and means for controlling the operation of said electromagnets one independent of the other.

3. The combination with a motor vehicle, of vertical guides carried at the inner side of the opposite side wall of the body of the vehicle, a vertically adjustable support extending between said guides transversely of the said body, electromagnets suspended in spaced relation from said support, another electromagnet suspended below the said body in rear of the first-named electromagnets and in line with the space therebetween, a vertically adjustable support carried centrally of the rear end portion of the said body for sustaining the last-named electromagnets in suspended position, and means for controlling the operation of said electromagnets.

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