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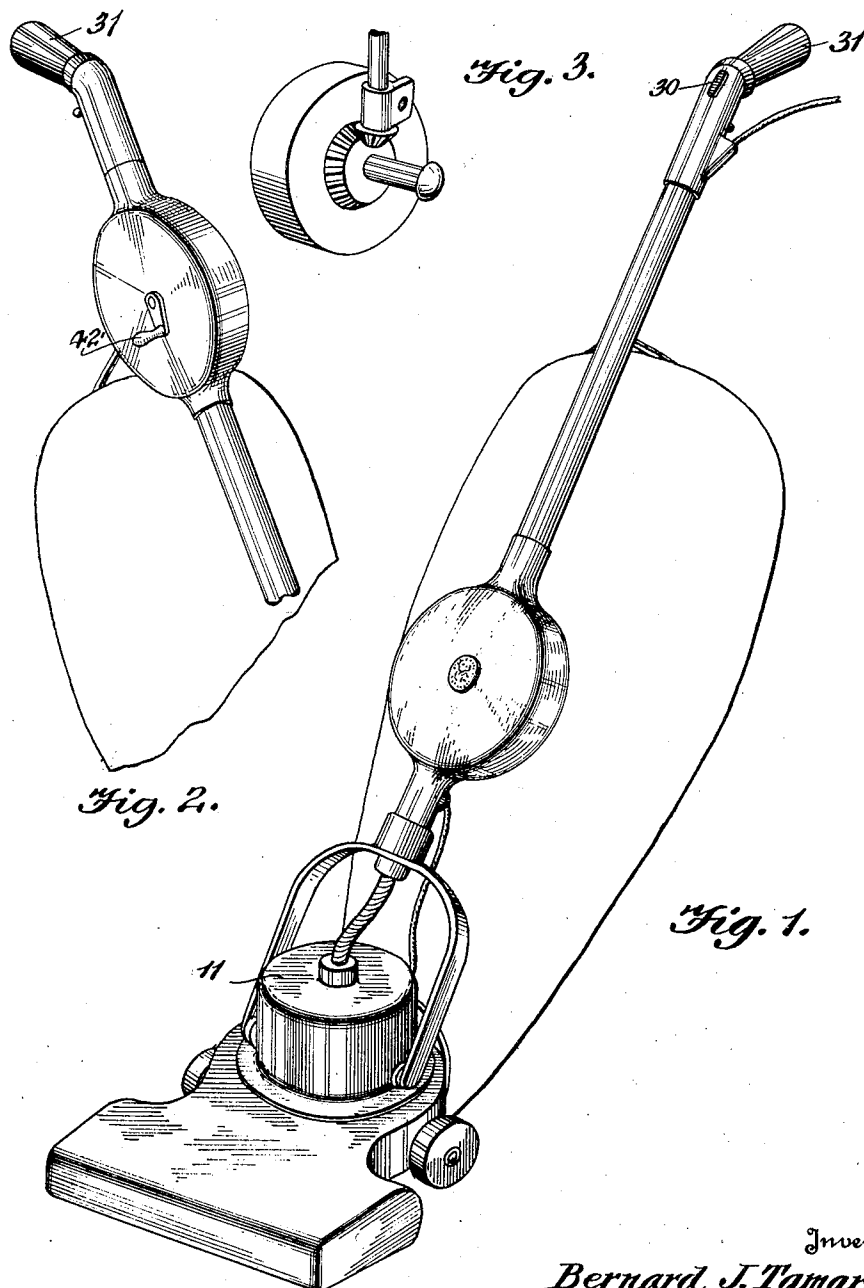
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1,897,087

VACUUM CLEANER CORD CONTROL DEVICE

Filed Dec. 14, 1927

3 Sheets-Sheet 1



Witness  
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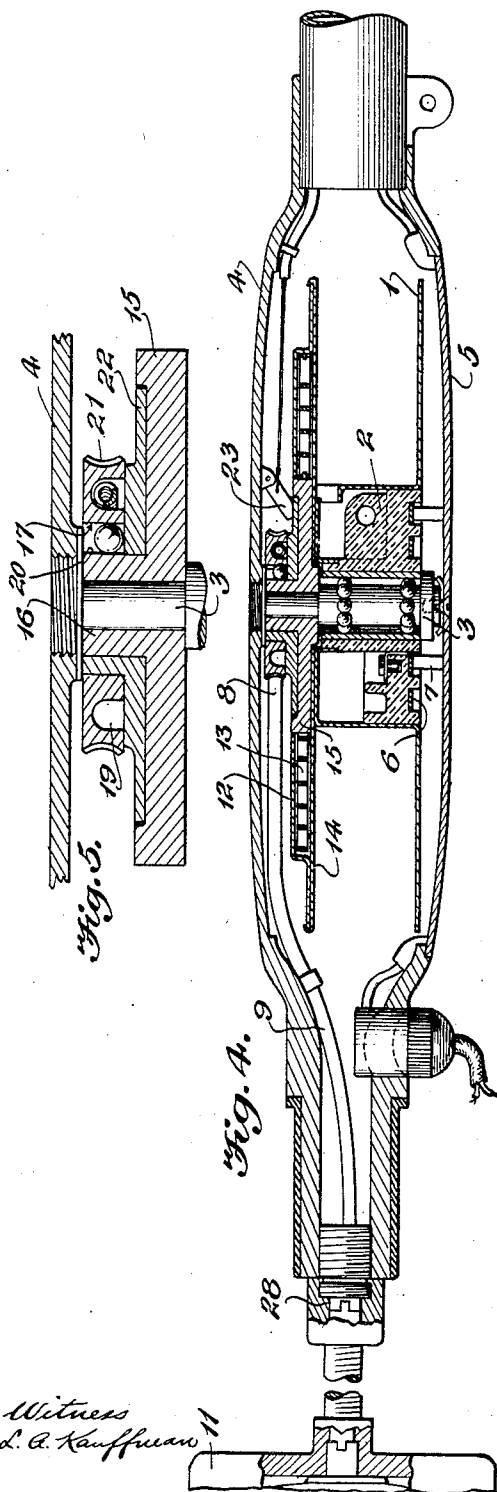
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3 Sheets-Sheet 2



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VACUUM CLEANER CORD CONTROL DEVICE

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3 Sheets-Sheet 3

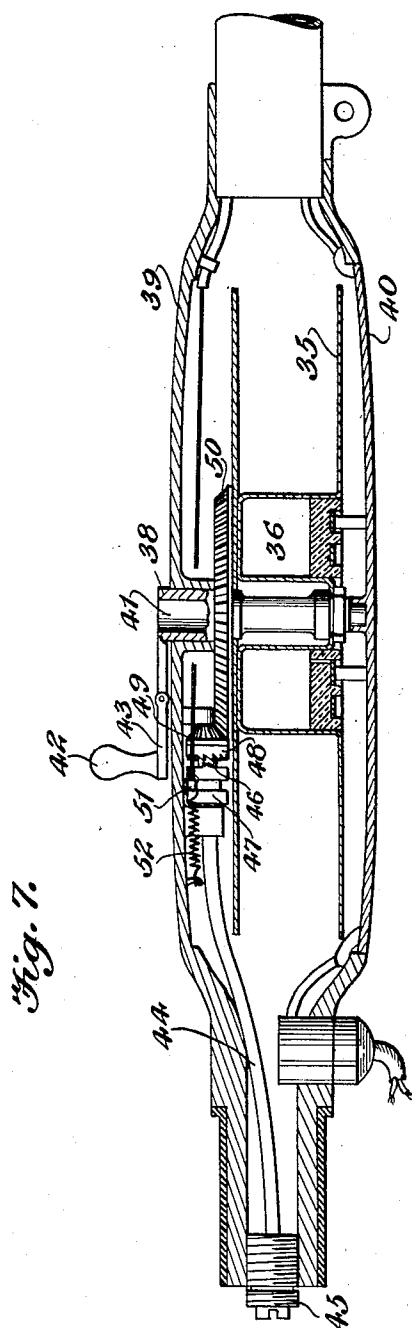


Fig. 7.

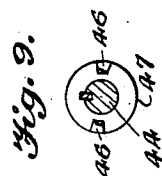


Fig. 9.

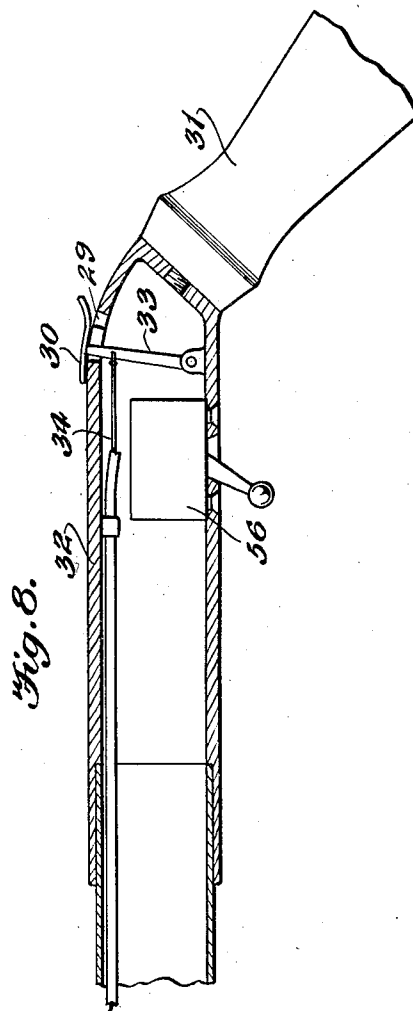


Fig. 8.

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## UNITED STATES PATENT OFFICE

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## VACUUM CLEANER CORD CONTROL DEVICE

Application filed December 14, 1927. Serial No. 240,051.

This invention relates to an improvement in vacuum cleaning machines and more particularly to a control device for the electric cord thereof and has for its primary object the provision of a power or hand operated device that will completely house the entire length of the cord within the vacuum cleaner structure, but capable of efficient operation to enable the proper feed of the cord to or from the vacuum cleaning machine by a continued or intermittent operation.

An object of the invention is the design of a cord take up structure that may be operated directly by the power unit of the vacuum cleaner or jointly by the power unit and an additional power unit or manually.

Another object of the invention is the novel design of drive mechanism manually controlled whereby the actuation of the cord winding structure may be timed to regulate the take up of the cord.

Another object of the invention is the construction and arrangement of component parts enabling the single motor of the vacuum cleaning machine to perform the dual function of operating the suction device of the machine and the improved cord take up device.

Another object of the invention is the novel manner of associating component parts whereby the vacuum cleaning motor and cord take up structure are under the control of associated independently actuated controllers.

Another object of the invention is the novel design of drive mechanism for the cord winding structure that receives its power either from the vacuum cleaner motor or other movable parts of the machine.

A feature of the invention is the provision of duplex power devices co-functioning to accomplish a complete cord rewinding operation.

Besides the above my invention is distinguished in the use of a positively driven cord take up reel under the influence of the remote control associated with the hand grip of the handle of the vacuum cleaning machine.

Another feature of my invention is the

provision of drive mechanism completely exterior of the take up structure and capable of positively driving the take up structure according to the will of the operator.

With these and other objects in view the invention will be better understood from the following detailed description taken in connection with the accompanying drawings wherein,

Figure 1 is a perspective view of my invention illustrated as operated by the power unit of the vacuum cleaning machine,

Figure 2 illustrates my improved device as capable of manual operation,

Figure 3 is a detail view illustrating the structure for operating my improved device from a movable part of the vacuum cleaning machine,

Figure 4 is a longitudinal sectional view of my improved take up structure,

Figure 5 is a longitudinal sectional view through the clutch device,

Figure 6 is a horizontal sectional view through the clutch device and associated parts,

Figure 7 is a longitudinal sectional view of another form of take up structure,

Figure 8 is a sectional view of the remote control and associated parts,

Figure 9 is an enlarged view of that form of clutch structure shown in Figure 7.

Again referring to the drawings illustrating three of the many constructions of my invention and more particularly to Figures 1, 4, 5 and 6, it will be noted that the cord take up structure is directly operated from the power unit of the vacuum cleaning machine and incorporating a second power element capable of co-functioning with the machine power unit to assure a complete cord take up operation. As clearly set forth in my copending application filed October 9, 1928, Serial Number 311,377, the reel proper of the take up structure as designated by the numeral 1 includes a hub structure 2 mounted upon a stub shaft 3 fixed in a stationary manner in the casing 4 and lid 5 for the casing. The hub structure 2 carries a contact ring 6 electrically associated with the wipers or brushes 7 carried by the lid 5. As these

structural details are more fully set forth in the above mentioned pending application, a further detailed consideration thereof will be eliminated as various forms of reels and current conveying devices may be utilized with my improved form of drive for the take up structure now to be described.

There are various manners in which the take up structure may be positively driven from the power unit of the vacuum cleaner or the movable parts thereof but for the purpose of illustration I have shown a simplified drive connection clutch controlled so that the take up structure may be intermittently or continuously operated for time intervals. As shown, the clutch structure 8 is directly associated with the take up structure and has a flexible drive connection 9 with the power unit 10 of the vacuum cleaning machine illustrated in this particular case as the motor 11 including an armature 11b having connection with the drive means 9 as hereinafter set forth. I wish it to be understood that although I have shown the power unit in a diagrammatic manner with the flexible connection directly secured to the armature of the motor, this drive connection may be operatively connected to other component parts of the power unit or to any suitable movable parts mounted upon or incorporated in the construction of the vacuum cleaning machine.

As clearly illustrated in Figure 4 of the drawings, I interpose an independent power device such as a spring motor 12 between the clutch structure and the take up structure of the design to be tensioned in the initial operation of the take up structure so that the stored energy may be utilized in conjunction with the operating action of the power unit to assure a complete cord take up operation. This spring motor consists principally of a coiled spring 13 arranged in a housing 14 that is a component part of the reel 1. This spring 13 has one end directly secured to the reel structure and its other end secured to one of the elements of the clutch structure so that in the operation of the latter the spring 13 will be placed under tension to the extent that the stored up energy may be utilized to rotate the take up structure a predetermined number of revolutions after completion of the driving operation of the reel structure by the power unit of the vacuum cleaning machine. In other words the power unit of the vacuum cleaning machine performs all major operations of the take up structure with the spring motor functioning to absorb all initial shocks in the operating of the power unit and to provide a reserve energy for completing the required number of rotations of the take up structure after the electric cord has been disconnected from the socket thereby cutting off current supply to the power unit of the vacuum cleaning machine.

My clutch structure consists of a disc 15

loosely mounted on the stub shaft 3 and fixed to one end of the spring 13 so that in the rotation of this disc upon the stub shaft the spring will be tensioned to function in the required direction to turn the reel structure when the disc has been locked against movement. This disc 15 in its construction includes a cam element 16 provided with cam surfaces 17 coacting with a plurality of locking balls 18 that are mounted for free movement in the grooves 19 formed by the cam surfaces 17 and the cam surfaces 20 provided by the worm wheel 21. A shifter 22 is interposed between the worm wheel and the gears for controlling the shifting of the balls 18 to bring about a binding action between the heretofore mentioned cam surfaces. There are many ways in which the shifter 22 may be stopped or retarded in its movement relative to the associated worm wheel and disc 15 but for the purpose of illustration I have shown a brake element 23 pivotally supported by the casing 4 and having frictional engagement with the shifter 22. Thus it will be appreciated that when the brake element 23 is drawn into binding engagement with the surface of the shifter 22 the latter will be retarded or stopped in its movement so as to shift the balls 18 into binding engagement with the cam surfaces 17 thereby locking the component parts together as a unit for unitary rotation upon the stub shaft 3. This action subjects the spring 13 to a winding operation and accomplishes the turning of the take up structure for retracting the cord onto the reel. To assure the complete releasing of the locked parts I arrange a contractile spring 24 functioning to draw the parts in a direction to displace the balls out of binding engagement with the cam surfaces 17 and 20. The worm wheel 21 is associated with a worm 25 mounted on the stub shaft 26 that forms the terminal for a flexible drive shaft 27 that terminates in a coupling 28 by means of which the flexible shaft may be properly connected to the power unit. If found advantageous in practice, this flexible shaft 27 may be encased in a flexible conduit for the protection thereof and for lubricating the same.

To enable the periodic operation of the take up structure from the remote point to relieve the operator of unnecessary labor, I provide a controller 29 in the form of the thumb piece 30 mounted contiguous to the hand grip 31 of the handle 32 of the vacuum cleaning machine. This control includes in its construction a link 33 directly connected to the brake 23 by the connector 34.

As far as I have proceeded it will be appreciated that the power unit of the vacuum cleaner may be continuously operated during the cleaning action of the machine, but capable of periodic connection with my improved take up structure for the periodic

operation of the latter to accomplish the proper feeding of the cord to and from the structure of the vacuum cleaning machine. It will be appreciated that the power unit in my particular case is utilized to accomplish the dual function of driving the cleaning mechanism of the vacuum cleaner and to operate a reel structure for performing the necessary function in the wrapping and unwrapping of the cord from a point interior of the vacuum cleaning structure. To accomplish these desirable results according to the will of the operator, I provide a remote control device by means of which the direct driving of the reel structure by the motor may be timed. This remote control as heretofore set forth includes the stop means conveniently located contiguous to the hand grip 31 so that the single hand of the operator may be utilized to move the machine over the surface to be cleaned and to manipulate the controller for controlling the feeding and retraction of the cord in unison with the operation of the machine over the surface. Pressure of the thumb piece in the desired direction brings the brake element 23 into the required frictional engagement with the shifter 22 which accomplishes a binding action between the related parts to provide a rigid positive drive between the take up structure and the driving mechanism which in turn positively connects to the power unit for driving operation.

At this point I wish to call particular attention to the fact that the structure just described incorporates two separate and distinct power units co-functioning under certain conditions and operating independently under other conditions to assure the complete retraction of the cord length into the vacuum cleaner structure. It will be noted that in the drawings of the cord from the vacuum cleaning structure, the take up structure is capable of free movement due to the fact that the same is entirely disconnected from the driving mechanism and therefore very little resistance is offered to the cord in its drawing action from the vacuum cleaning machine.

It may be advisable in practice to partially mechanically operate the reel structure and partially manually operate the reel structure thereby allowing the same to be jointly operated mechanically and manually or independently operated mechanically or manually. This somewhat simplifies the mechanical construction of the parts thereby lowering the production cost and besides giving the operator full control of the operating action of the take up reel structure. In Figures 7, 8 and 9, I have shown one form of the construction to accomplish the preceding results and as illustrated consists of a simplified construction of reel 35 including a hub structure 36, carrying the commutator devices 37

for conveying current to and from the take up structure. The reel is fixed to a stub shaft 38 journaled in the casing 39 and cover 40 of the casing and the stub shaft is provided with an opening 41 for the reception of a pivoted handle 42 of a foldable crank arm 43 that is rigidly connected to the stub shaft 38. As will be appreciated, the reel 35 may be effectively rotated by the crank arm for partially or completely winding the cord upon the reel.

To enable the reel structure to be power operated by the power unit or other movable part of the vacuum cleaner, I have illustrated a flexible shaft 44 terminating in a coupling 45 by means of which the shaft may be connected to the motor or other movable parts of the vacuum cleaner. Mounted in the length of the shaft 44 is a clutch device 46 consisting of companion clutch elements 47 and 48, the former slidably mounted for engagement and disengagement of the teeth thereof with the annular series of teeth on the latter. The element 48 is rigidly associated with a pinion 49 that constantly meshes with a bevel gear 50 fixed to the reel 35. A remote control is also utilized in this particular structure and includes a shifter lever 51 operatively associated with the element 47 and spring controlled in its action as illustrated at 52. In this particular construction of my invention, the power unit or other movable part of the vacuum cleaner structure may be utilized to mechanically rotate the reel but should occasions arise where the supply of current to the motor is cut off, the handle 42 may be utilized to rotate the reel structure the required number of revolutions to complete the cord winding operation. The interposing of the clutch device enables the power unit of the vacuum cleaner to properly function at all times and relieve the take up of unnecessary strain during the unwinding of the cord from the reel structure and besides enables the easy manual operation of the reel structure whenever occasion arises.

From the foregoing description taken in connection with the accompanying drawings, it will be appreciated that I have designed a take up structure for vacuum cleaners that may be mechanically, manually or jointly mechanically and manually operated to assure the proper feeding of the cord to and from the vacuum cleaner structure. As will be appreciated, the reel structure receives its motive power from the power unit of the vacuum cleaner or from any movable part thereof such as illustrated in Figure 3 where the flexible shaft 53 has a gear connection with one of the rollers 55 of the vacuum cleaner which roller may be especially designed and mounted as an independent element of the vacuum cleaning machine.

A very important feature of the invention

is the arrangement of the switch 56 controlling the power unit of the vacuum cleaner contiguous to the remote control for the take up structure so that these parts may be independently operated or jointly operated by the same hand that engages the hand grip 31 for manipulating the machine over the surface to be cleaned. It is of course to be understood that various forms of drive mechanism may be utilized for accomplishing a drive connection between the take up structure and a movable part of the vacuum cleaner machine which may be of a flexible connection as illustrated or a rigid connection and various types of clutch devices may be designed for effecting proper coupling of the drive mechanism with the take up structure and besides various other types of take up structures may be utilized in conjunction with novel types of clutch devices and drive mechanism and finally various types of controls may be utilized for controlling the action of the associated parts and therefore I do not desire to be limited in protection in any manner except as set forth in the following claims.

I claim:

1. An attachment for a vacuum cleaning machine comprising a handle adapted for pivotal connection to the machine, a take up in the length of the handle for preventing any slack in the electric cord employed for supplying current to the machine and a controllable means for operating the take up from a movable part of the machine including a driving connection between the handle and the machine.
2. In combination with the operating mechanism of a vacuum cleaning machine, a cord take up structure and means partially power driven and partially manually driven for variably operating said take up structure.
3. In combination with the operating mechanism of a vacuum cleaning machine, an electric cord take up structure and means for selectively driving said take up structure mechanically or manually.
4. In combination with the operating mechanism of a vacuum cleaning machine, a cord take up structure, means for operating said take up structure by a movable part of the vacuum cleaner and means for manually operating said take up structure.
5. In combination with the operating mechanism of a vacuum cleaning machine, a cord take up structure, means for operating said take up structure by a movable part of the vacuum cleaning mechanism and means for manually operating said take up structure, said first means including a manually operated controller.
6. In combination with the operating mechanism of a vacuum cleaning machine, a take up structure supported contiguous to said mechanism, a clutch controlled drive

connection between the take up structure and said mechanism and a hand operated device for operating the take up structure independently of said drive connection.

7. A vacuum cleaning machine comprising a casing, a handle extending therefrom, a cord take up device associated with the casing and handle, electrically operated mechanism for performing the cleaning operation of the machine and adapted to operate said device and a switch element arranged at a predetermined position on the handle, controlling the operation of said mechanism.

In witness whereof I have hereunto set my hand.

BERNARD JACQUES TAMARIN.