April 1, 1952 J. C. TROTTER 2,591,388

GARBAGE DISPOSER

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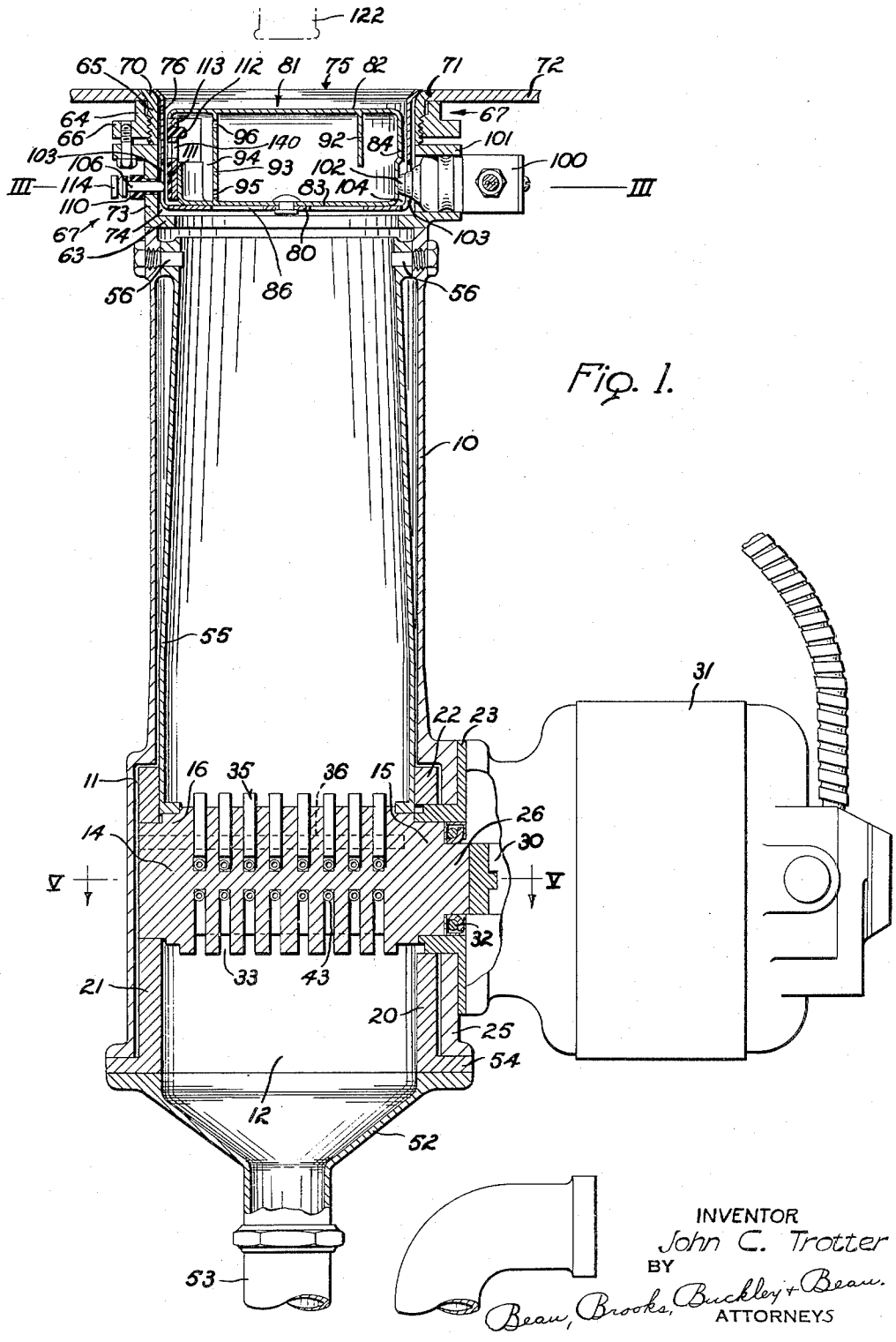



Fig. 1.

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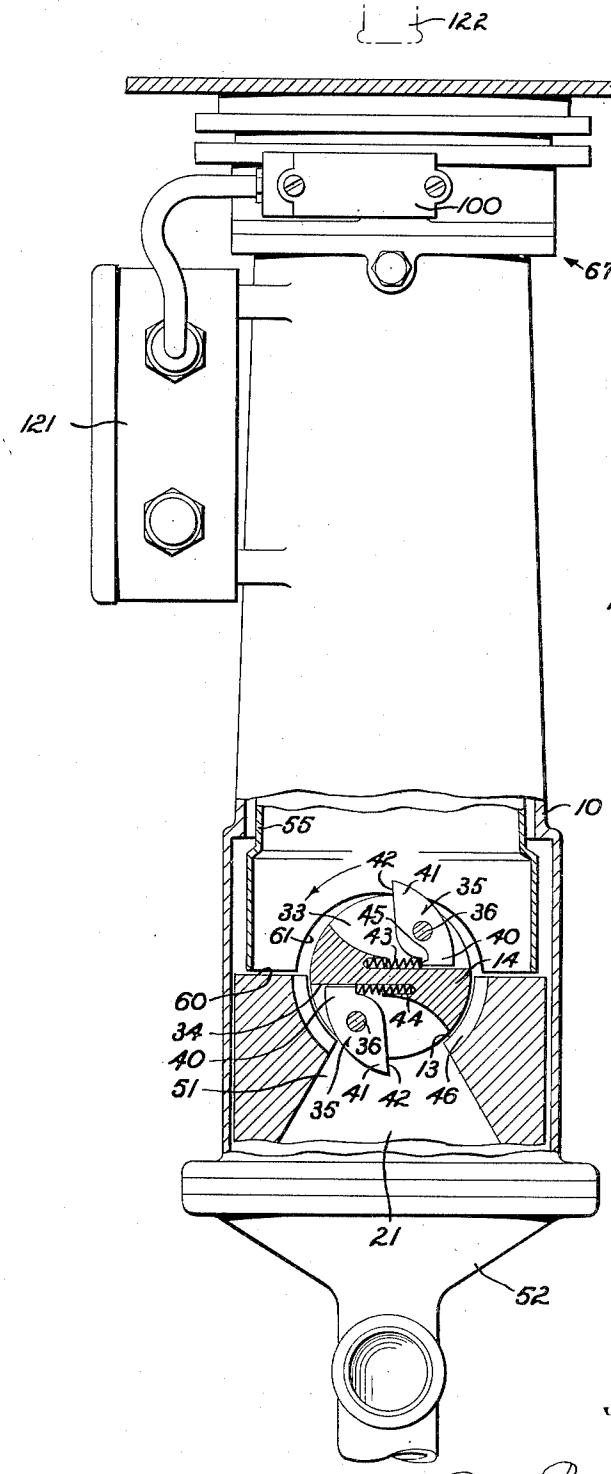



Fig. 2.

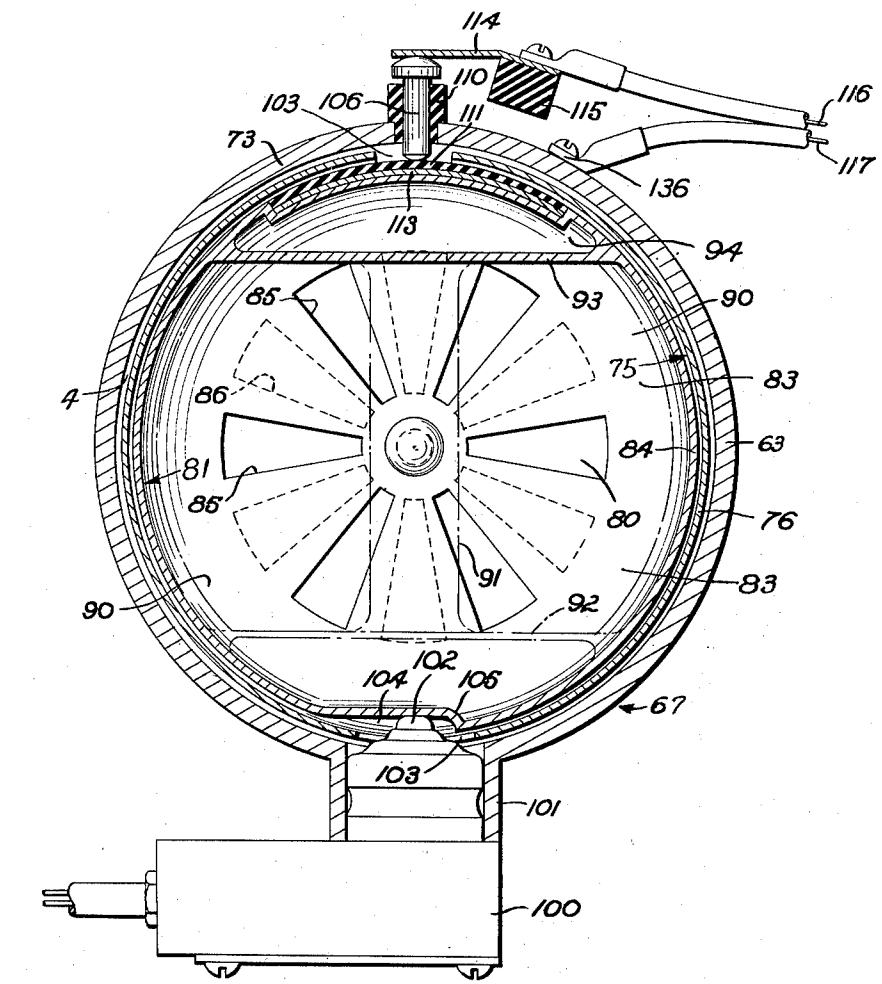
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GARBAGE DISPOSER

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Fig. 3.



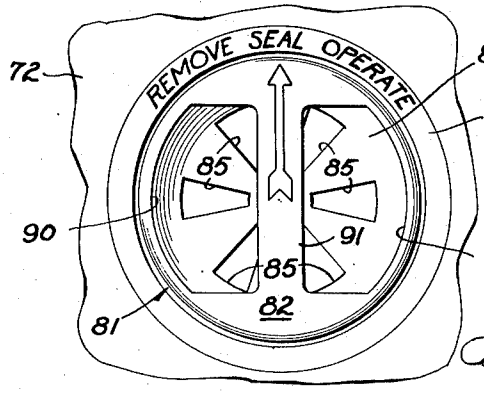




Fig. 4.

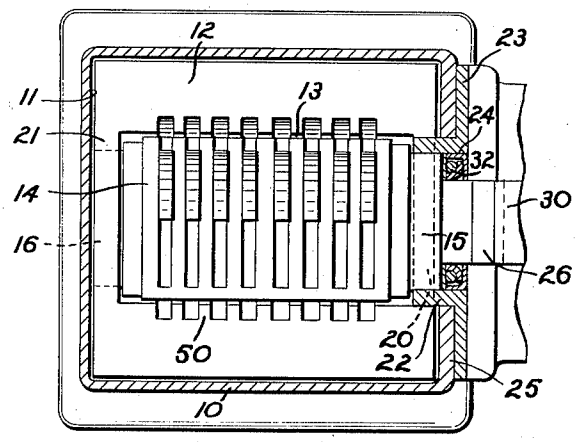
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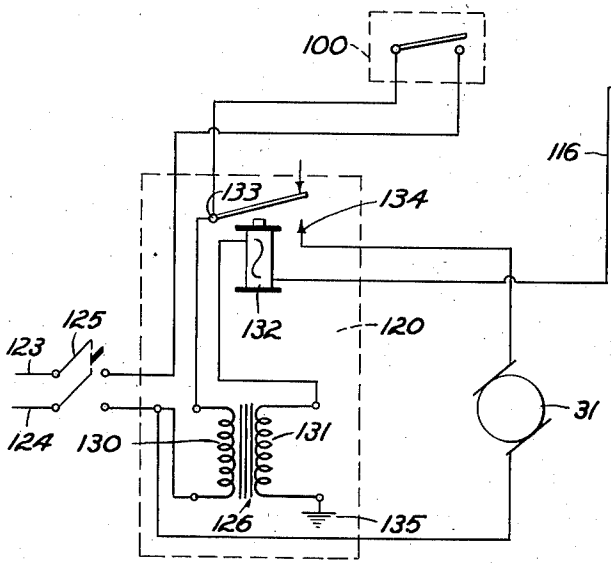
April 1, 1952 J. C. TROTTER 2,591,388

GARBAGE DISPOSER

Filed Oct. 23, 1946 4 Sheets-Sheet 4

Fig. 5.



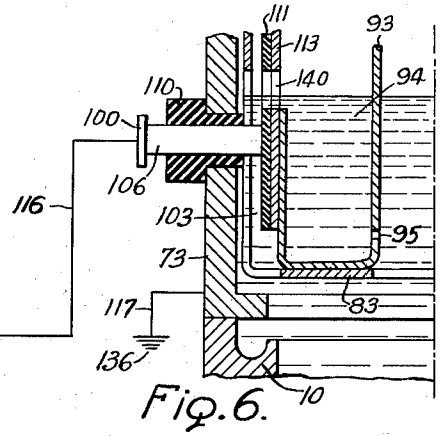




Fig. 6.

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Patented Apr. 1, 1952 2,591,388

# UNITED STATES PATENT OFFICE

2,591,388

## GARBAGE DISPOSER

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Application October 23, 1946, Serial No. 705,170

1 Claim. (Cl. 146—123)

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My device relates in general to garbage disposal units, and in particular to that type of disposal unit in which the garbage and other waste materials are comminuted by a cutting or shredding device, and thereafter disposed of through the sewer drain.

It is well known that garbage disposal units of the present art usually have cutter blades which are rigidly carried by the cutter head and the electric power means mounted beneath the cutter head in substantial vertical alignment with the cutter head. In such installations, the cutter head must be started substantially under full load if the disposal unit contains a quantity of garbage, which requires the use of a motor of a type possessing the necessary starting torque; and due to the wear on the bearings of the disposal unit and the shaft packing thereof, leakage of water invariably occurs which finally finds its way into the power means resulting eventually in a defective or burned out motor.

The present invention contemplates an arrangement in which the electric motor is located at the side of the disposal unit housing with its shaft in a substantially horizontal plane, thereby greatly reducing the possibility of water entering the interior thereof.

Moreover, the cutter blade arrangement is of such nature that an inexpensive type electric motor may be used which may substantially reach its running speed before the blades reach their full cutting performance.

The invention furthermore contemplates the use of sufficient quantities of water in the comminution of the material being treated, and the automatic control of the operation of the device in accordance with the water level, thereby facilitating the comminution of the material and also avoiding drain stoppage.

Moreover, the cutter blades, which are centrifugally actuated to their operating positions, are held in such positions not only by centrifugal action, but also by the cutting action upon the garbage material and are held during such operation in contact with definite stops carried by the cutter head.

Furthermore, it has been an object to provide a safety switch for the purpose of preventing the operation of the device until the control cover is in place and has been moved to its operative position.

Another object has been to provide an oscillating hopper which assists in feeding the garbage to the cutter head.

These and other objects which will be apparent to those skilled in the art have been accomplished by the device shown in the accompanying drawings, of which:

Fig. 1 is a vertical sectional elevation of my complete device;

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Fig. 2 is a similar view with portions thereof shown in section;

Fig. 3 is a transverse sectional view of the device taken on line III—III of Fig. 1;

Fig. 4 is a fragmentary top plan view showing the control element;

Fig. 5 is a transverse sectional elevation taken on line V—V of Fig. 1; and

Fig. 6 is an electrical diagram showing the various parts of the device connected in suitable electrical control circuits.

Referring now to the drawings, my device comprises a casing 10 adapted to be suitably supported beneath a kitchen sink or other place suitable for the disposal of waste materials and where there is a suitable source of running water. This casing is preferably cylindrical in cross section at its upper end and is flared outwardly at its lower end where it is formed with a recess 11 of polygonal cross section for the reception of the cutter block 12 of the cutting mechanism. This block is formed with circular recesses 13 in its upper face for the reception of the cutter head 14 of the device. This cutter head which is disposed in a substantially horizontal plane is formed with shaft portions 15 and 16 rotatably mounted in suitable bearings formed in the end walls 20 and 21, respectively, of the cutter block. The shaft portion 15 is preferably surrounded by a bearing hub 22 which passes into an enlarged opening in the end wall 20 of the cutter block and through an opening 24 in the side wall 25 of the lower recessed portion of the casing 10, whereby the cutter block and casing are maintained in aligned positions and assembly of the cutter head is facilitated. The shaft 15 has a reduced portion 26 which is connected to the shaft 30 of an electric motor 31 by suitable coupling means. This motor is preferably arranged in a horizontal plane and is secured to the lower recessed portion of the casing 10, having the flange 23 of the bearing hub disposed therebetween. The reduced portion 26 of the shaft 15 extends inwardly beyond the face of the flange 23, whereby a recess is provided for the reception of a suitable packing ring 32, whereby the lubricant will be retained within the bearing of the shaft and water from the disposal unit prevented from leaking into the interior of the motor.

The cutter head, as shown in the drawings, is provided with a plurality of oppositely arranged blade slots 33 each formed with a substantially flat portion 34 lying in planes substantially parallel to each other and offset in relation to the axis of the head. A cutter blade 35 is disposed in each of the slots 33 and is mounted for limited pivotal movement upon a pivot pin 36. Each of the blades is provided with a base portion 40 which is designed to bear against the flat portion 34 of the slot when the blade is in its cutting posi-

tion, as shown in Fig. 2. The blade is also formed with a cutting portion 41 having a radially arranged cutting face 42 preferably inclined slightly so as to have suitable top rake when in cutting position.

As hereinbefore pointed out, it is one of the objects of my invention to be able to employ an inexpensive electric motor for operating the cutter head of my device. As is well known, such motors cannot have the load applied until they have substantially reached their maximum operating speed. Provision is therefore made in my cutting head for permitting the motor and the head to assume substantially normal speed before the cutting blades are put into action. This is accomplished by causing the blades to lie within the slots with their cutting portions 41 flush with or below the outer periphery of the cutter head during periods of rest and during the time that the motor is picking up speed. This is accomplished by providing a retarding spring 43 of helical form and arranged within a circular groove 44 formed in the straight portion 34 of each of the blade slots. One end of each of these springs bears against the end of the groove 44, the other end bearing against a cutter arm 45 extending from the base portion 40 of each blade and into the groove 44. These springs serve normally to rotate the cutter blades upon their pivots 36 and to move them to their inoperative positions. When the cutter head has substantially reached its normal operating speed, the blades are rotated in the opposite direction by means of centrifugal force whereby their cutting portions 41 will be projected beyond the periphery of the cutter head.

Formed in the circular recesses 13 of the cutter block is a plurality of grooves 46 registering with the blades 35 and of such proportion to provide suitable coacting cutting teeth or abutments 50 for the blades. A centrally arranged downwardly flaring outlet passage 51 is provided in the cutter block between the two circular recesses 13 which serves to conduct the comminuted product to a disposal flange 52 suitably connected to the usual trap 53, whereby the waste materials are conveyed to the sewer. The disposal flange is secured to the bottom of the recessed portion of the casing by suitable means and interposed therebetween is the flange 54 of the cutter block 12.

Feeding of the garbage to the cutter head is facilitated by the provision of an oscillating hopper 55 which is pivotally mounted at its upper end in the upper end of the casing upon pivot pins 56 diametrically arranged with respect to each other. The lower end of this hopper is in close proximity to the top surface 60 of the cutter block and is formed with a circular recess 61 for passage over the cutter head. The hopper is considerably smaller in its dimension at right angles to its pivot pins than the casing 10, thereby permitting it to oscillate back and forth a limited amount. The recess 61 is therefore elongated so as to permit such oscillatory movement.

Arranged on the top of the casing 10 is the housing 63 of the control unit 67 of my device which is also provided with a suitable fastening device 64 having a sleeve portion 65 screw-threaded on its exterior for the reception of a lock nut 66. The sleeve is formed with a flange portion 70 for engagement with a suitable countersunk opening 71 formed in the bottom 72 of the sink. By means of the flange and lock nut the sleeve portion 65 is seated in the countersunk opening 71 of the sink and provides means for fastening the control housing thereto. The control housing is formed with a wall 73 of a diameter substantially equal to the interior diameter of the sleeve portion 65 whereby a cylindrical recess 74 is provided. Within the recess 74 is mounted the control member 75 of my device which comprises an outer casing 76 and a bottom 80. A rotatable control element 81 is mounted within the outer casing and is provided with a bottom 83 pivotally united to the bottom 80 by suitable pivot means whereby the parts may be handled as a unit. The control element is provided with a top 82 joined to the bottom 83 by means of a side wall 84. The bottom 83 of the element is formed with suitable openings 85 which are registrable with similar openings 86 which are formed in the bottom 80 of the outer casing when the control member is in place and the control element is in its operative position. The top wall 82 of the casing is cut away from opposite sides to provide openings 90 between which is formed a handle 91. A stiffening rib 92 extends across the control element in line with the end edges of the openings 90 at one side of the element, and a partition 93 extends across the casing of the element preferably in line with the opposite end edges of the openings 90. The partition 93 thus provides the element with a separate compartment 94 having a series of openings 95 near its lower edge and a series of openings 96 near its upper end for the passage of water accumulated in the device during its operation and to be more fully hereinafter described.

It is desirable in devices of this type to prevent the starting of the motor before the control member has been put into position or the element thereof moved to its operative position after the device has been charged with waste materials. This is accomplished in my device by the provision of a safety switch 100. This switch is suitably carried by a flange 101 formed on the control housing and is designed to have its control button 102 extended through the outer casing 76 of the control member by being passed through a slot 103 formed therein. The control button is mounted within a recess 104 formed in the side wall 84 of the control element. A cam shaped surface 105 is formed in the wall of the control element for engagement with the switch control button 102 when the control element is rotated so as to bring the arrow carried by the top wall 82 in registration with the word "Operate," as indicated in the plan view of Fig. 4, which serves to close the motor circuit, as hereinafter more fully described.

My device also incorporates an additional safety feature which prevents the operation of the motor until such time as sufficient water has been supplied to the waste materials to make disposal thereof effective. This feature comprises an electrode 106 mounted within an insulated bushing 110 carried by the wall 73 of the control housing. The electrode bears against an insulating member 111 carried by the rotatable control element 81 so that it is insulated from mechanical contact with any of the metal parts of the device. The insulating member is flush with the outer surface of the outer casing 84 of the control member and extends therearound a distance sufficient to insure contact with the electrode throughout the limit of its movement. The insulating member may be held in place by one or many integral studs 112 passed through the supporting member 113 of the control element. The

electrode 106 is pressed into contact with the insulating member 111 by means of a spring 114 carried by an insulating block 115 and suitably connected to an electrical conductor 116. In order that the water flowing into the control element has communication with the electrode, an opening 140 is formed through the insulating member 111 and the supporting member 113. Even though there is no mechanical contact between the electrode 106 and the casing, electrical communication between the parts will be established when water rises within the separate chamber 94 of the control element to the level of the opening 140 whence it will flow therethrough and contact the electrode 106, thereby closing the circuit.

In Fig. 6 where I show a diagram of the electrical wiring of my device, I show an electrical control device 120 which is preferably mounted within the junction box 121 secured to the side of the casing 10. In the circuit the power lines supplying electricity to the various parts of the invention are indicated by the numerals 123 and 124. These lines are controlled by a double throw switch 125 of usual type. The electric control device 120 comprises a transformer 126 having a primary winding 130 and a secondary winding 131, and a relay 132 having normally open contacts 133 and 134. The power line 123 is connected to one terminal of the safety switch 100 and the other terminal of said switch is connected to the contact 133 of the relay. The power line 124 is connected to one side of the primary winding of the transformer and also to the motor 31. The other terminal of the motor is connected to the contact 134 of the relay, and the other side of the primary winding is connected to the relay contact 133. The secondary winding 131 is connected to the relay, and the other side of the relay is connected to the water-level responsive electrode 106. One end of the secondary winding is grounded as indicated at 135, the circuit being completed through the ground 136 and lead 117. From the foregoing, it will be obvious that the safety switch 100 serves to close the primary winding of the transformer; the electrode and ground connections serve to close the relay circuit through the secondary of the transformer; and the relay serves to close the circuit to the motor through the safety switch.

When the device is to be put into use, the control member is removed from the control casing and the garbage and other waste materials to be treated are placed within the casing 10 of the device. When filled, the control member is replaced within the control casing and is turned to the position where the arrow on the member points to the word "Operate." This will serve through the camming action of the surface 105 to close the safety switch 100 where it will remain until it is operated to another position. The closing of this switch will cause the transformer to be energized. Water from the faucet 122 or other source of supply is now allowed to pass into the control member and through the registering openings 85 and 86 thereof to the interior of the casing. If the supply of water to the control element 67 exceeds the flow through the registering openings 85 and 86, water will rise within the control element as it rises within the casing 10, the water which rises within the element will flow through the opening 140 and down over the electrode 106, thus serving to complete the circuit through the electrode and the ground connections, thereby energizing the relay and closing its contacts whereby the motor circuit will be closed and the cutter head operated. If the casing 10 fills with water before the compartment 94 is filled, the water will rise within the casing and flow through the openings 85 and 86 and up through the slot 103, thereby submerging the electrode 106 and closing the circuit. Since the cutting blades are held in their inoperative positions by spring tension, the motor will be permitted to start under no load and when its normal speed has been reached, the blades will be forced outwardly to their working positions to cause the waste material contained within the device to be properly comminuted and passed downwardly into the trap and thence into the sewer with the aid of the constant flow of water. During such period of operation, should the water level fall below the electrode, the relay will be de-energized and the circuit to the motor will be broken until such time as sufficient water is again supplied. Furthermore, when the control element is moved to "Seal" or "Remove" or if it should be removed while the motor is running, the safety switch 100 will break the circuit through the primary winding of the transformer and cause the motor to be stopped.



Obviously, some modifications of the details herein shown and described may be made without departing from the spirit of the invention or the scope of the appended claim, the form shown being merely a preferred embodiment thereof.

What is claimed is:

A garbage disposal unit, comprising a casing adapted to receive material to be comminuted, a cutter block disposed within said casing and having a discharge opening, said block having a plurality of cutting teeth extending into the discharge opening, a cutter head carried by said casing and in coactive relation with said block, said head having its axis in a substantially horizontal plane, a plurality of cutter blades carried by said head and cooperating with said teeth, an electric motor for driving said cutter head, an electric circuit for energizing said motor, a control element carried by said casing, means for supplying running water to said control element and said casing, a normally open safety switch connected in said circuit and adapted to be closed under normal operating conditions of said disposal unit, a water-actuated safety means connected in said circuit and responsive to the level of the water in said disposal and said control units to maintain said circuit closed under proper operating conditions.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

| Number | Name | Date |
|---|---|---|
| 1,215,055 | Osius | Feb. 6, 1917 |
| 1,968,515 | Coble et al. | July 31, 1934 |
| 2,044,564 | Carter | June 16, 1936 |
| 2,059,106 | Hess | Oct. 27, 1936 |
| 2,065,634 | Warrick | Dec. 29, 1936 |
| 2,073,268 | Ray | Mar. 9, 1937 |
| 2,185,037 | Powers | Dec. 26, 1939 |
| 2,220,729 | Powers | Nov. 5, 1940 |
| 2,244,402 | Powers | June 3, 1941 |
| 2,469,205 | Powers | May 3, 1949 |