June 16, 1936. C. F. SCHWENNKER 2,044,548

CUTTING MACHINE

Filed June 18, 1932 5 Sheets-Sheet 1

Fig. 1

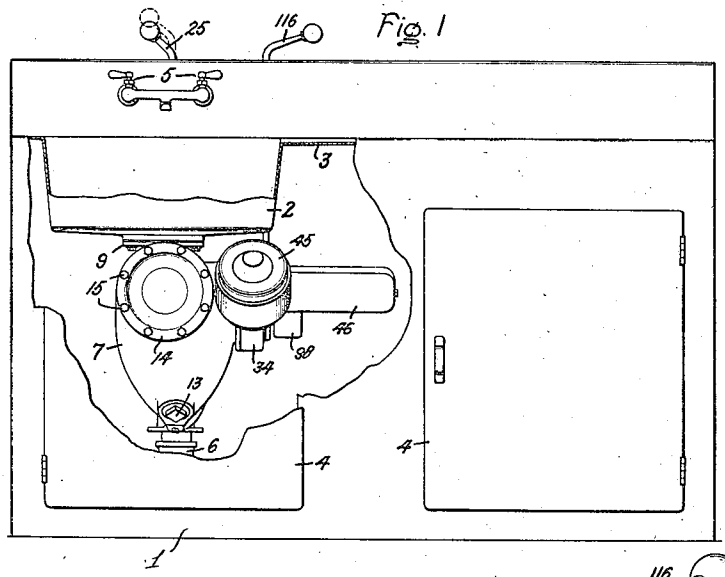


Fig. 2

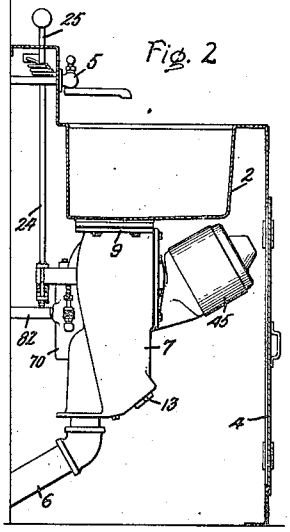


Fig. 3

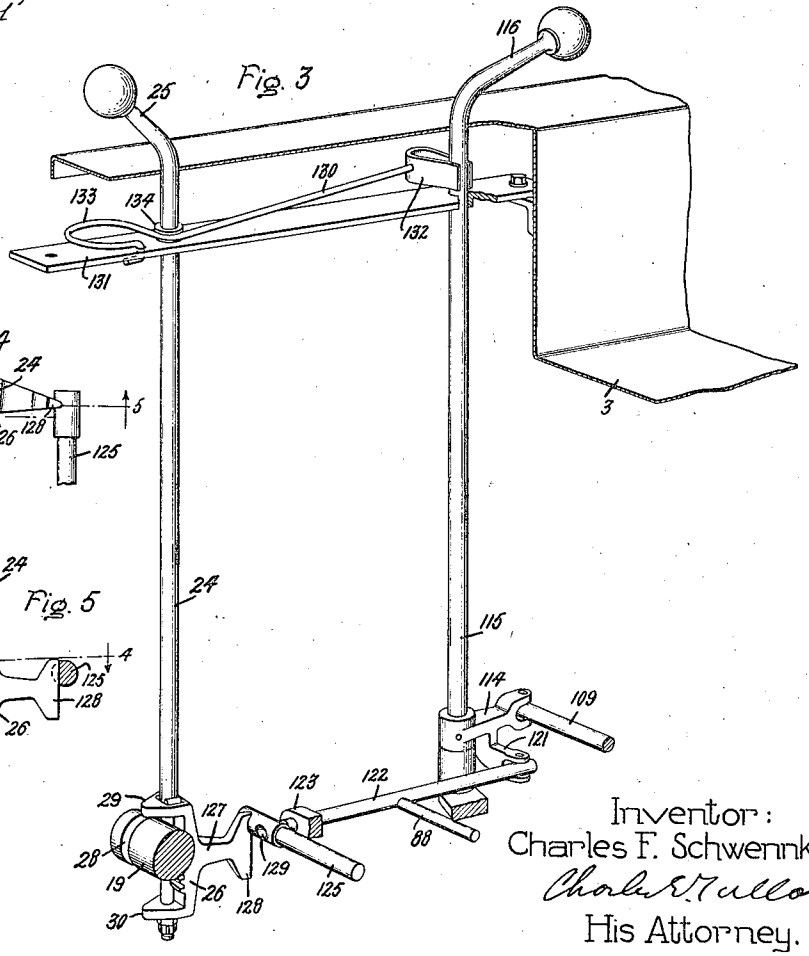


Fig. 4

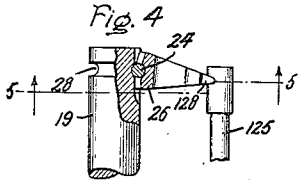
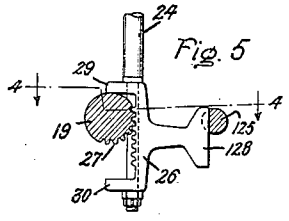


Fig. 5



Inventor:
Charles F. Schwennker,
Charles F. Mullen
His Attorney.

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CUTTING MACHINE

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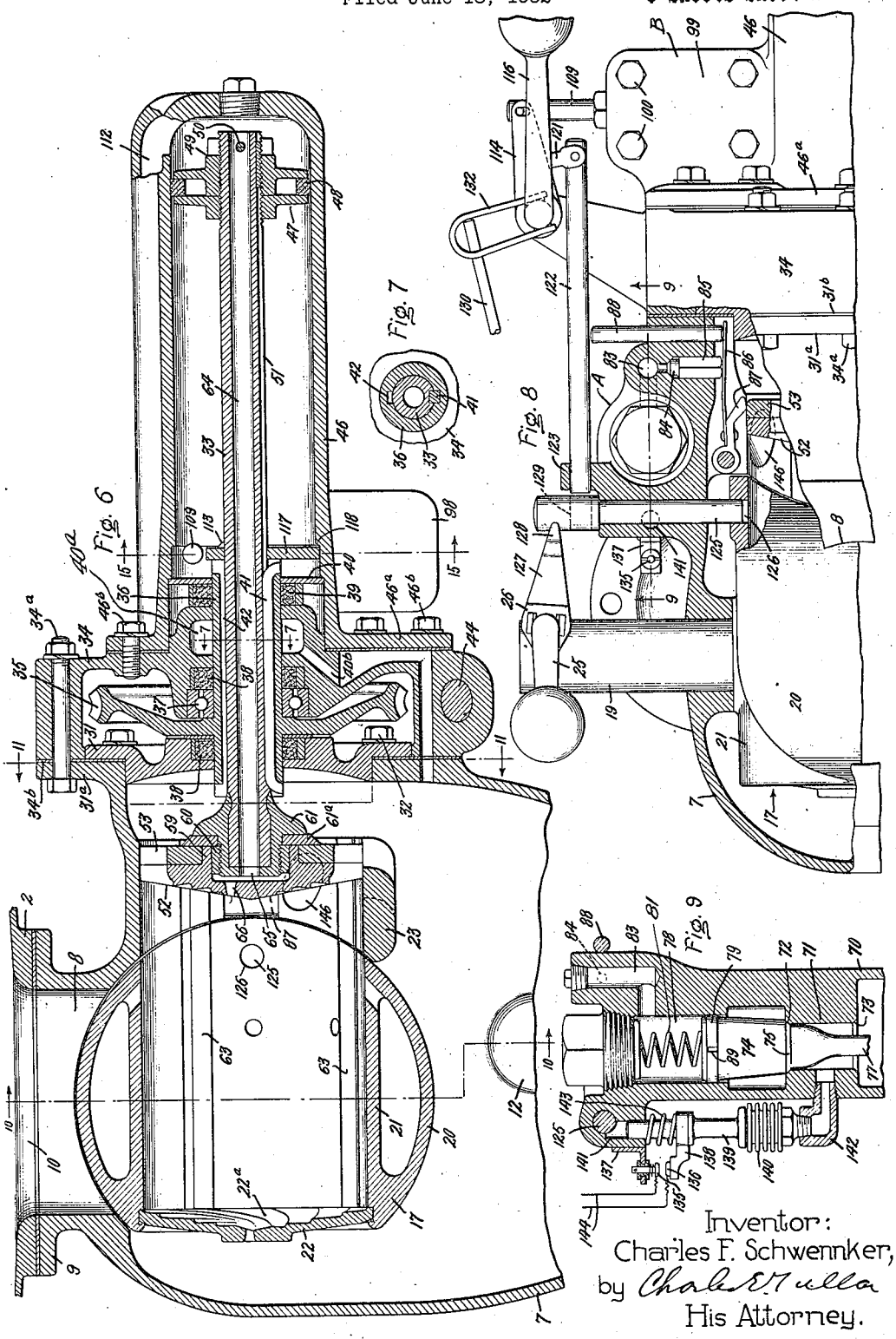


Fig. 6

Fig. 8

Fig. 9

Inventor:
Charles F. Schwennker,
by Charles E. Mulla
His Attorney.

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CUTTING MACHINE

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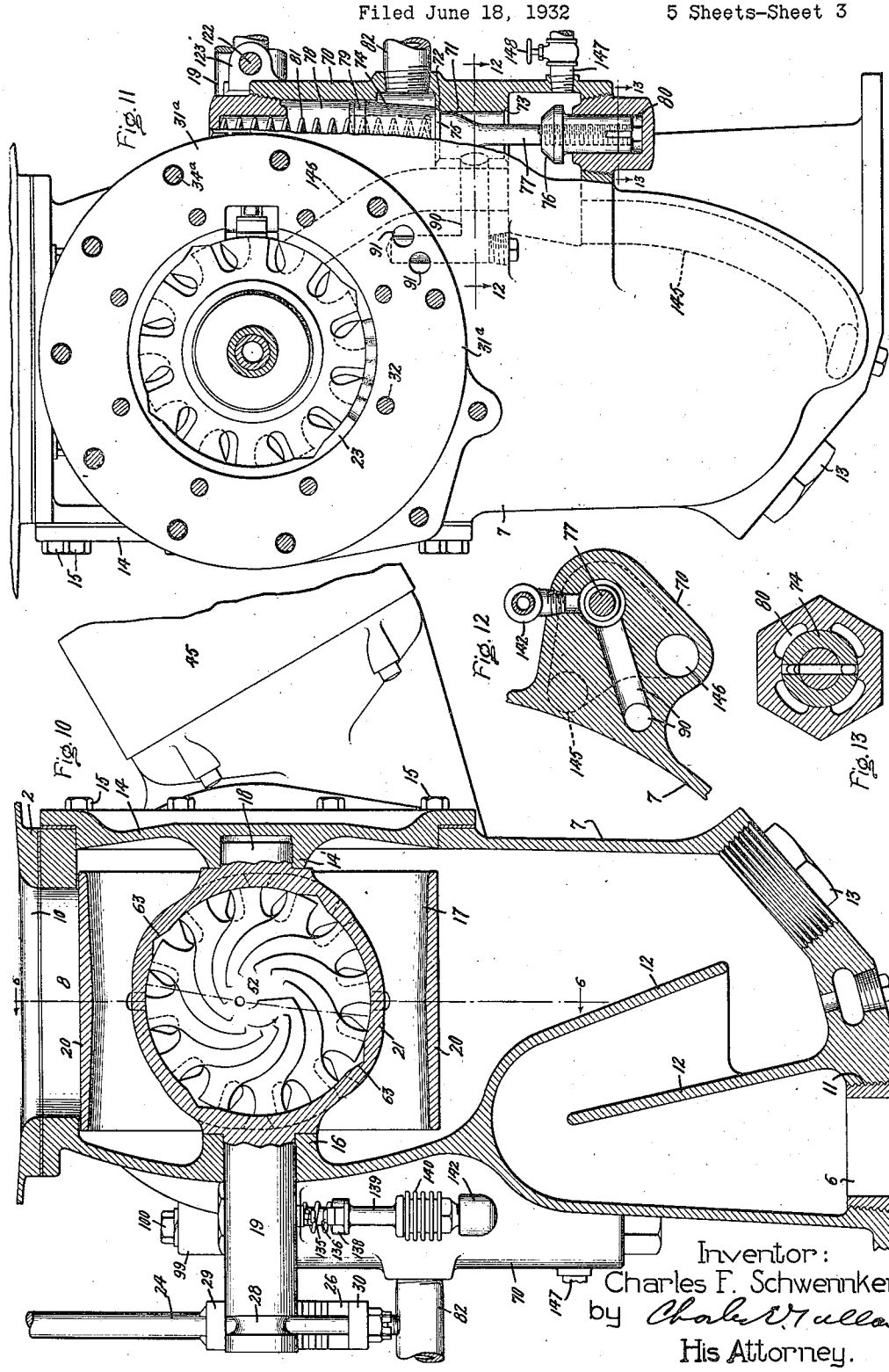


Fig. 11

Fig. 12

Fig. 13

Fig. 10

Inventor:
Charles F. Schwennker,
by Charles F. Mullen
His Attorney.

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CUTTING MACHINE

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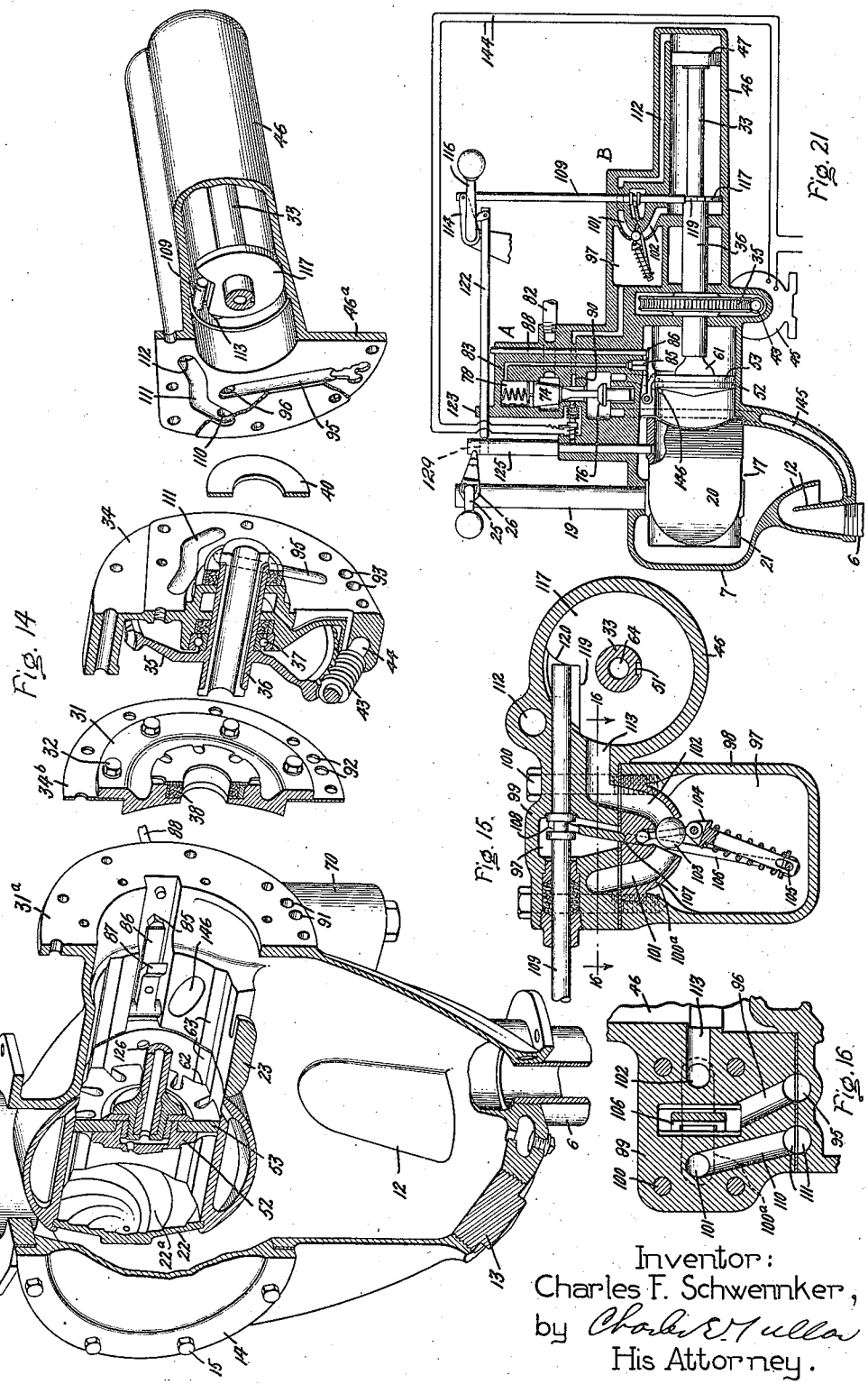


Fig. 14

Fig. 15.

Fig. 16

Fig. 21

Inventor:
Charles F. Schwennker,
by Charles E. Mullen
His Attorney.

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CUTTING MACHINE

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Fig. 17

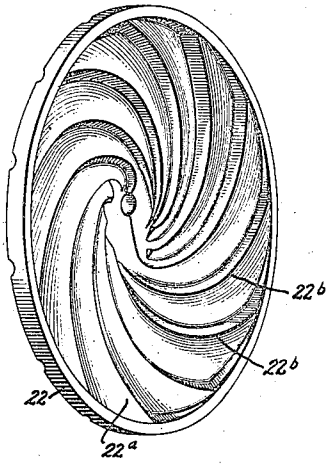


Fig. 18

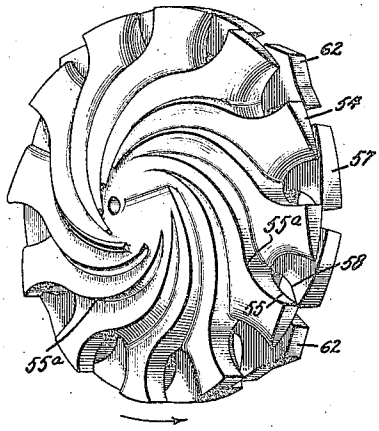


Fig. 19

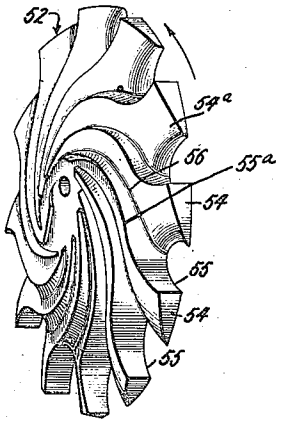
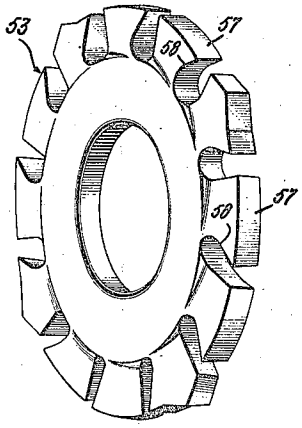


Fig. 20



Inventor:
Charles F. Schwennker,
by Charles F. Mullen
His Attorney.

Patented June 16, 1936 2,044,548

UNITED STATES PATENT OFFICE

2,044,548

CUTTING MACHINE

Charles F. Schwennker, Schenectady, N. Y., assignor to General Electric Company, a corporation of New York

Application June 18, 1932, Serial No. 618,006

27 Claims. (Cl. 146—182)

The present invention relates to cutting machines for cutting material into fairly small pieces and especially to cutting machines for cutting garbage, although it is not limited thereto necessarily.

The object of the invention is to provide an improved construction and arrangement in a cutting machine of this type, and for a consideration of what I believe to be novel and my invention, attention is directed to the accompanying description and the claims appended thereto.

In the drawings wherein the invention is specifically illustrated as embodied in a garbage cutting machine, Fig. 1 is a front view, partly broken away, of a sink provided with a garbage cutter embodying the invention; Fig. 2 is a side view showing the sink in section with the garbage cutter attached thereto; Fig. 3 is a perspective view of the control levers; Fig. 4 is a detail sectional view taken on line 4—4, Fig. 5; Fig. 5 is a detail sectional view taken on line 5—5, Fig. 4; Fig. 6 is a longitudinal sectional view through the garbage cutter; Fig. 7 is a detail sectional view taken on line 7—7, Fig. 6; Fig. 8 is a top view of a part of the construction shown in Fig. 6, the view being partly in section; Fig. 9 is a detail sectional view taken on line 9—9, Fig. 8; Fig. 10 is a transverse sectional view taken on line 10—10, Fig. 6; Fig. 11 is a transverse sectional view taken on line 11—11, Fig. 6; Fig. 12 is a detail sectional view taken on line 12—12, Fig. 11; Fig. 13 is a detail sectional view taken on line 13—13, Fig. 11; Fig. 14 is an exploded perspective view, partly in section, of the cutter shown in section in Fig. 6; Fig. 15 is a detail sectional view taken on line 15—15, Fig. 6; Fig. 16 is a detail sectional view taken on line 16—16, Fig. 15; Fig. 17 is a perspective view of the bottom plate of the receptacle for the material to be cut; and Figs. 18, 19, and 20 are perspective views of the knives or cutters; and Fig. 21 is an explanatory diagrammatic view of the cutting machine illustrating the operation, the parts being shown in their functional relations but not in their true mechanical relations.

Referring to Figs. 1 and 2 of the drawings, 1 indicates a cabinet comprising a sink 2 and a drain board 3, the cabinet being provided with doors 4 to give access to the space beneath it. The usual faucets for hot and cold water are indicated at 5. Connected to the underside of the sink is a drain pipe 6.

The garbage cutting machine is located beneath the sink with its admission opening connected to an opening in the bottom of the sink and its discharge opening connected to drain pipe 6. With this arrangement, the garbage may be placed directly through the bottom of the sink into the garbage cutter and after being cut up, discharged directly to the drain pipe 6.

The garbage cutter comprises a casing 7 having an admission opening 8 surrounded by a flange 9 by which it is bolted directly to the bottom wall of the sink 2 with admission opening 8 in line with an opening 10 in the bottom wall of the sink. The discharge opening 11 in the casing is connected to drain pipe 6. Inside the casing are walls 12 which form a trap in the casing through which material must flow to reach the drain pipe 6. At 13 is a clean-out plug for the trap.

In the upper portion of casing 7 is a circular opening (Fig. 10) closed by a cover plate 14 fastened in place by a ring of studs 15. Located on the inner side of cover plate 14 is a bearing 14' which stands in line with a bearing 16 in the opposite casing wall. Mounted in bearings 14' and 16 is a receptacle 17, it being provided with stub shafts 18 and 19 located in bearings 14' and 16. Receptacle 17 comprises an outer cylindrical wall 20 formed integral with which is an inner cylindrical wall 21 which forms the receptacle proper. The top of the receptacle is open while the bottom is closed by a plate 22. The receptacle is adapted to be turned on its trunnions from the position shown in Figs. 6 and 14 where it is substantially horizontal to a position wherein the open end stands in line with opening 8. Referring to Fig. 6, the receptacle is adapted to be turned from the horizontal position there shown counter-clockwise through an angle of 90 degrees. Inside the casing is a circular wall 23 (Figs. 6 and 14) which defines a passage of the same diameter as the inside of the receptacle. This wall forms a guide for the cutters or cutting knives, the mouth of the receptacle being in line with the opening defined by wall 23 when the receptacle occupies the position shown in Figs. 6 and 14.

The receptacle is arranged to be turned on its trunnions from the position shown in Fig. 6, which may be termed the cutting position, to a position wherein its open end is in line with opening 8, which may be termed the loading position, by means of a rod 24 having a handle 25 at its upper end. The turning of the receptacle is effected by a vertical movement of rod 24. The lower end of rod 24 is connected to a toothed rack 26 (Fig. 5), the teeth of which mesh with teeth 27 on the outer end of trunnion 19. The lower end of the rod slides in a groove 28 in the trunnion end.

Formed integral with rack 26 are stops 29 and 30 which strike against trunnion 19 to limit its turning movement. Referring particularly to Fig. 3, if rod 24 is moved upward trunnion 19 will be turned to move the receptacle from the position shown in Fig. 6 to a position wherein its open end is in line with opening 8, stop 30 striking the underside of the trunnion to limit the upward movement. When rod 24 is moved down again the receptacle will be returned to the Fig. 6 position, stop 29 limiting the downward movement. Wall 20 makes a loose fit at opening 8 so that water from the sink may flow past it freely to the drain. Thus, the garbage cutter when in place does not interfere with the normal functioning of the sink and drain.

In casing 7 in line with wall 23 is an opening which is closed by a cover plate 31 fastened to a flange 31a which surrounds the opening by studs 32. Cover plate 31 has a central opening through which extends a shaft 33. Bolted to casing 7 over cover plate 31 is a gear casing 34 in which is located a worm wheel 35 carried by a sleeve 36 fixed to shaft 33. The peripheral wall of casing 34 surrounds cover plate 31 and is fastened to the flange 31a of the casing 7 by bolts 34a, a suitable packing disk 34b being arranged between flange 31a and the cover plate 31 and the gear casing 34 to provide a tight joint. In the wall of gear casing 34 is a ball bearing 37 for sleeve 36. On opposite sides of the ball bearing and worm wheel are suitable packings 38 and on the outside of the wall is another packing 39 held in place by a disk 40. These packings serve to prevent the leakage of water to bearing 37. Between the right hand packing 38 and packing 39 (Fig. 6) is a space 40a connected to casing 7 by a channel 40b. With this arrangement, any leakage of water past packing 39 is carried to casing 7. Sleeve 36 is fastened to shaft 33 by a key 41. At 42 is a channel between sleeve 36 and shaft 33 for the flow of water.

Meshing with worm wheel 35 is a worm 43 (Fig. 14) carried by a shaft 44 mounted in suitable bearings in the wall of the gear casing. The end of shaft 44 is shown in the section, Fig. 6, at the lower side of the casing. Shaft 44 is connected to the shaft of an electric motor 45, (Figs. 1 and 2) the casing of which is bolted to an extension of gear casing 34. Motor 45 drives worm 43 to turn worm wheel 35, thus turning shaft 33.

Bolted directly to gear casing 34 is a cylinder 46, being provided with a flange 46a which is attached to the gear casing by studs 46b. Shaft 33 extends into cylinder 46 and is provided at its outer end with a piston 47 comprising two disks threaded onto the shaft and holding between them a piston ring 48. The piston is locked on the shaft by means of a nut 49 fastened in place by a pin 50. In the outer surface of shaft 33 is a longitudinally extending keyway 51 in which key 41 is located. With this arrangement shaft 33 is adapted to slide longitudinally through sleeve 36, key 41 sliding in keyway 51 and forming a guide for the shaft at the same time that it serves as a driving connection between worm wheel 35 and the shaft.

Mounted on the end of shaft 33 opposite piston 47 are the cutting knives 52 and 53. They are shown in perspective in Figs. 19 and 20 and assembled relatively to each other in Fig. 18. Both cutters or knives move longitudinally with shaft 33. Knife 52 is fixed to the shaft so that it turns therewith. Knife 53 is loose on the shaft and is held from turning with the shaft. When shaft 33 turns therefore knife 52 turns with it relatively to knife 53.

Knife 52 comprises a disk having slots in its peripheral edge which form cutting fingers 54, the forward inner edges 55 being what may be termed rear cutting edges. Knife 52 is slightly conical on its outer side and is provided with curved grooves 56 which extend from the apex of the cone to the slots between fingers 54, thereby forming curved funnel shaped passages through which material to be cut is fed to the cutting edges 55. The outer walls of fingers 54 taper rearwardly as indicated at 54a in Fig. 19, thus making the fingers triangular in section. The tapered walls 54a function to permit material to be cut to pass down to the cutting edges 55 of the knives. The front edges 55a of the walls formed by grooves 56 form what may be termed front cutting edges. The front cutting edges function to slice relatively long strips off the material to be cut, such strips entering the funnel shaped passages through which they are fed and washed down to the rear cutting edges 55 as explained more fully hereinafter.

Knife 53 comprises a disk having slots in its edge which form cutting fingers 57. The cutting edges of the fingers are indicated at 58. The adjacent surfaces of the cutting knives 52 and 53 are flat so that the two members engage each other evenly. Cutting knife 52 turns relatively to cutting knife 53 in the direction indicated by the arrow in Fig. 18, and it will be seen that the cutting edges 55 and 58 move across each other after the manner of a pair of shears to effect cutting up of the material. The cutting knives are formed from a hard material such as hard steel, a hard stainless steel being preferred.

Referring to Fig. 6, cutting knife 52 is provided on its rear side with a flange 59 which forms a bearing on which cutting knife 53 is mounted, flange 59 being capable of turning readily in the opening through the center of cutting knife 53. Rigidly fixed inside flange 59 is a threaded bushing 60 which screws onto a threaded flanged thimble 61 rigidly mounted on the end of shaft 33. Between the flange on thimble 61 and the cutting knives is located a hardened disk 61a which forms a wearing plate for the relatively turning parts. The two cutting knives are held assembled relatively to each other and attached to shaft 33 by means of a threaded connection between bushing 60 and thimble 61.

To hold cutting knife 53 from turning, certain of its fingers are provided with triangular projections 62 (Figs. 14 and 18) which slide in longitudinally extending grooves 63 in the inner surface of the walls 21 and 23.

Shaft 33 is provided with an axially extending passage 64 which communicates through an opening 65 in thimble 61 with an opening 66 through cutting knife 52, the opening 66 being to one side of the center of the cutting knife.

In a device for cutting up garbage, it is important that the material to be cut be prevented from turning in the receptacle. The V shaped grooves 63 in addition to their function of forming a guide means for preventing knife 53 from turning, function also to prevent the material to be cut from turning in the receptacle. This result is obtained because the cutting knife 52, when rotated against the material to be cut, causes material to be wiped out into the grooves which function to anchor and hold it from turning. Also, for preventing turning of the material, end plate 22 is provided with curved ribs

22[a] which define grooves into which material being cut up is pressed. As shown in Fig. 6, end plate 22 is cone shaped to conform to the contour of cutting knife 52 and is provided with special grooves which define cutting edges 22[b] which face oppositely to cutting edges 55[a] of rotating cutter 52. At the end of a cutting operation, cutter 52 comes close to plate 22 so that the last remnants of the material are cut by the cooperation of cutting edges 55[a] and 22[b] which move across each other with a scissor-like action.

The construction so far described is the cutting portion of the machine. Its operation is as follows.

The receptacle 17 is turned by pulling rod 24 upward to bring its opening in line with opening 8 in casing 7, after which the garbage to be cut up is inserted through the opening 10 in the sink into the receptacle. Rod 24 is then pushed down to turn the receptacle to bring it into the position shown in Fig. 6 wherein the opening to the receptacle is in line with the cutting knives. Motor 45 is now started to rotate shaft 33 and cutting knife 52 and fluid pressure is admitted to the end of cylinder 46 to supply pressure to the piston in a direction to move the cutting knives into the receptacle. The cutting knife 52 is thus revolved on knife 53 and at the same time both knives are fed forward by the fluid pressure. Fluid pressure of a sufficient value is utilized to force the cutting knives against the garbage with the pressure required to effect the cutting operation and to feed the cutting knives forward as the garbage is cut up, the garbage being compressed against the end of the receptacle. Cutting knife 52 rotates in the direction indicated by the arrow in Fig. 18 and as it rotates the cutting edges 55[a] slice strips off the garbage which are forced down through the funnel shaped grooves 56 to the cutting edges 55, 58 where it enters the openings between fingers 57 and is sheared off by the cutting edges 55 and 58. After being sheared off, the material drops down to the bottom of the casing. The rate at which the garbage is cut up depends upon its character. The fluid pressure applied to piston 47 is of substantially constant value and it will feed the cutting knives forward faster or slower depending upon the resistance met with. In the case of relatively soft garbage the feed forward will be relatively fast while in the case of harder material the feed forward will be relatively slower. Since fluid pressure is being used to feed the cutting knives forward (as opposed to a positive feed), the rate of feed will be adapted automatically to the character of the material to be cut up, and in no event will the feed be such as to damage the machine. While the cutting operation is taking place, water flows through the passages 64 and 65 and out of the opening 66 to the face of the cutting knives whereby water is provided continuously to lubricate the cutting knives and force cut-off strips of garbage down funnel shaped passages 56 toward the openings through the cutting knives and finally carry it down the drain pipe 6. At the end of the forward movement of the cutters, the last of the garbage is sheared by cutting edges 22[b] and 55[a], the water forcing the last of the garbage down the funnel shaped grooves to cutting edges 55 and 58. When the cutting knives reach the end of the inward movement, the fluid pressure supplied to the end of cylinder 46 for feeding the cutting knives forward is cut off and fluid pressure is then applied to the opposite side of the piston to return the cutting knives to the original position. At this time, water flows through passage 62 for flushing the backs of the cutting knives and at the same time the water trapped in cylinder 46 is forced through passage 64 as the piston moves rearwardly thereby forcing water through opening 66 to flush the front of the cutting knives and the receptacle. At the same time, additional flushing water is provided for flushing the trap and the receptacle as hereinafter explained.

It will thus be seen that I provide a special form of cutting knives wherein the revolving knife has both front and rear cutting edges, the edges cooperating to effect a slicing and chopping up of the garbage in a most effective manner. I have found that with cutting knives of this type I am enabled to cut up satisfactorily fibrous garbage such as celery stalks and corn husks and hard garbage such as bones. Also the knives will cut successfully, and without damage to them, materials such as pieces of tin and glass which sometimes find their way into garbage.

In connection with the construction hereinbefore described there is provided automatic means for controlling the admission of water to actuate the piston in each direction of movement and for starting and stopping the motor, the arrangement being such that the operator is required merely to move the operating handles in order to effect complete operation of the device. Also means are provided for interlocking the operating handles to prevent operating the grinder in a way that might damage it. This mechanism will now be described.

The controlling means comprises two valve structures, a water control valve structure A and a reversing valve structure B. The position of these valve structures relatively to each other is shown in Figs. 8 and 21, valve structure A being at one side of gear casing 34, and valve structure B being at the opposite side thereof. The valve structure A is shown in detail in Figs. 9, 11, 12 and 13. It comprises a valve casing 70 which may be formed integral with the casing 7 as shown in Fig. 8. In casing 70 is an inwardly projecting wall 71 having upper and lower valve seats 72 and 73. In the valve casing is a valve body 74 having a seat 75 for engagement with seat 72 and a seat 76 (Fig. 11) for engagement with seat 73. The valve seats 75 and 76 are connected by a narrow stem 77 which forms a part of the valve body. Valve body 74 is adapted to move vertically in casing 70. The upper end of casing 70 forms a cylinder 78 with which the upper end of valve body 74 makes a nice fit, being provided with a piston ring 79 which slides on the casing wall. This forms a cylinder and piston construction. The lower end of valve body 74 slides in a pocket 80 which forms a guide for it. The valve body is biased to a position wherein valve seat 75 is in engagement with valve seat 72 by a spring 81. Connected to valve casing 70 above seat 72 is a water supply pipe 82 (Fig. 11). When valve body 74 is in the position shown in Fig. 11 of the drawings, the water supply is cut off and the valve body is held seated by the combined action of spring 81 and the water pressure in cylinder 78, the water pressure being established by the water which leaks past the upper end of the valve body into cylinder 78 and is trapped therein. The portion of valve body 74 above seat 75 is tapered somewhat so that there exists an un-

balanced area upon which the water pressure acts, tending to reverse the position of the valve from that shown in Fig. 11 against the action of spring 81. This tapered shape also permits piston ring 79 to be slipped into position easily. Connected to the upper end of cylinder 78 is a passage 83, Figs. 8, 9, and 21, in one side of which is an opening closed by a valve 84, the stem 85 of which projects through the casing wall to the inside of casing 7. Valve 84 is normally held seated by a spring strip 86 carried by a pivoted finger 87, the out-turned end of which is adapted to be engaged by the peripheral edge of cutting knife 53 when piston 47 is in its extreme outer position as shown in Fig. 6, the knife serving to hold the spring strip against stem 85 with tension sufficient to maintain valve 84 closed. Spring strip 86 may be moved away from valve stem 85 to permit the valve to open by a pin 88 which projects through the casing wall and engages the end of the spring strip. When pin 88 is moved inward to release valve 84, the valve opens, thus relieving the water pressure in cylinder 78 above valve body 74. The water pressure acting on the tapered portion of the valve body above valve seat 72 then quickly moves the valve body against spring 81 to bring valve seat 76 into engagement with valve seat 73. When valve 84 is closed again, pressure will build up gradually in cylinder 78 due to leakage past ring 79, a small vent passage 89 (Fig. 9) being provided in ring 79 if found necessary, and after a predetermined time restore valve body 74 to its initial position.

Connected to valve casing 71 between seats 72 and 73 is a discharge passage 90 (Figs. 11 and 12) which leads to two openings 91 through flange 31ª. Openings 91 communicate (see Fig. 14) through openings 92 in packing disk 34ᵇ and openings 93 in gear casing 34 with a passage 95 in flange 46ª on cylinder 46 and the adjacent surface of the gear casing. Passage 95 communicates by means of a passage 96 with an open space or admission chamber 97 of reversing valve B. Thus it will be seen that valve A controls the flow of water to chamber 97 of valve B. This is shown diagrammatically in Fig. 21.

Reversing valve B (Figs. 15 and 16) comprises a casing 98 fastened to a head 99 by means of studs 100, the head being integral with cylinder 46. In head 99 and in a web cross piece 100ª which extends across the upper end of casing 98 are two passages 101 and 102. Passage 101 communicates with the outer end of cylinder 46 and passage 102 communicates with the inner end of cylinder 46. (See the diagrammatic representation in Fig. 21.) Passages 101 and 102 are controlled by a ball reversing valve 103, the ball valve being adapted to close either one or the other of the two passages. Ball valve 103 is carried by a spring pressed toggle 104 which is supported at its lower end on a pin 105 carried by a U shaped frame 106, supported on a seat 107 on web 100ª. The upper end of frame 106 is provided with a yoke 108 which is located between flanges on an actuating rod 109. When actuating rod 109 is moved back and forth, frame 106 is moved from one side of the center line to the other thereby putting the spring of the toggle under compression and effecting a movement of valve 103 from its one seat to its other seat with a snap action. The arrangement shown is a known type of toggle actuating means. means. Its operation is believed to be clear from an inspection of Fig. 15.

As shown in Fig. 16, passage 96 communicates with the upper portion of chamber 97; i. e., the space in which yoke 108 is located. This upper portion of chamber 97 connects with the lower portion by passages on opposite sides of web 100ª. Passage 101 is connected to the outer end of cylinder 46 through passages 110 and 111 in head 99 and flange 46ª, respectively, and a passage 112 which extends longitudinally of cylinder 46 and at its outer end communicates with outer end of the cylinder.

Passage 102 is connected to the inner end of cylinder 46 by a passage 113.

When ball valve 103 is in the position shown in Fig. 15, chamber 97, which may be termed the water supply chamber, is in communication with the outer end of cylinder 46 through passage 101. When the position of ball valve 103 is reversed from that shown in Fig. 15, passage 101 is closed and water supply chamber 97 is in communication with the inner end of cylinder 46 through passage 102.

The arrangement of valves A and B and the water supply passages is shown diagrammatically in Fig. 21. In this figure the valves A and B are shown diagrammatically as being located in the plane of the paper and the several passages are shown in simplified form. Reference numerals corresponding to those applied to corresponding parts in the figures already described are applied to Fig. 21 and it is believed that this figure will be clear from an inspection of it.

The toggle mechanism for ball valve 103 is arranged to be actuated automatically to move ball valve 103 from the position shown in Fig. 15 to the position wherein it closes passage 101 and to be operated manually to move it from the position where it closes passage 101 back to the Fig. 15 position. For manually operating the toggle mechanism, rod 109 is connected at its outer end to a crank arm 114 at the lower end of a vertically extending rod 115 (Fig. 3) having an operating handle 116 at its upper end. The connection comprises a pin in rod 109 which engages in an elongated slot in arm 114 (see Fig. 8) thus providing a lost motion connection. When operating rod 115 is turned in a direction to move rod 109 inward, it will be seen that the toggle mechanism is actuated to move ball valve 103 to the Fig. 15 position. For moving the toggle to its other position, a friction clutch mechanism is provided comprising a disk 117 (Figs. 6, 14, 15, and 21) which loosely surrounds shaft 33 and is held against longitudinal movement between a shoulder 118 in cylinder 46 and the end of sleeve 36. In disk 117 is a notch 119 which provides a cam surface 120 with which the end of rod 109 engages when in its innermost position as shown in Fig. 15. When piston 47 reaches the end of its inward movement, it engages friction disk 117 turning it due to frictional contact in an anticlockwise direction as shown in Fig. 15, thereby moving rod 109 toward the left to reverse the position of ball valve 103.

In addition to operating ball valve 103, rod 115 and operating handle 116 effect operation also of release valve 84. For this purpose a second crank arm 121 (Fig. 3) is connected to rod 115 and is pivotally conected at its outer end to rod 122, the free end of which slides in a guide opening formed in a projecting ear 123 on casing 7. The side of rod 122 engages the end of rod 88 (Fig. 8) and when handle 116 is turned to move rod 109 inwardly to bring ball valve 103 to the Fig. 15 position, it swings rod 122 on an arc to effect inward

movement of rod 88 sufficient to move spring strip 86 away from the end of valve stem 85, thus permitting valve 84 to open.

Thus it will be seen that operating handle 116 controls the operation of valve A to turn on the water supply and the operation of valve B to reverse the position of ball valve 103.

The apparatus comprises two operating handles, the operating handle 25 which turns receptacle 17 from its vertical position to its horizontal position and vice versa, and the operating handle 116 which turns on the water pressure to effect operation of the cutting knives. In this connection, it is desirable that the arrangement be such that operating handle 116 cannot be moved to turn on the water pressure until receptacle 17 has been moved to its horizontal position and locked in such position, and that while the water pressure is on, operating handle 25 be locked against movement. To accomplish this, an interlocking arrangement is provided between the operating rods 24 and 115. Referring particularly to Figs. 3, 8 and 21, 125 is a locking pin for receptacle 17, it being adapted to enter an opening 126 in the side of the receptacle to lock it in its horizontal position. Locking pin 125 is adapted to be moved into and out of locking position by operating handle 25. To this end, rack 26 is provided with a short arm 127 having an elongated nose 128 adapted to slide vertically in a notch in the end of locking pin 125, the nose being sufficiently long to permit of the vertical movement of rod 24 utilized in turning shaft 19 without passing out of engagement with the notch. In the outer end of locking pin 125 is a hole 129 and when locking pin 125 is moved inward to engage opening 126 in receptacle 17, as shown in Figs. 8 and 21, hole 129 stands in line with the end of rod 122 so that operating handle 116 may be turned. Unless locking pin 125 is in this position, operating handle 116 cannot be turned because locking pin 125 prevents movement of rod 122.

Operating handles 25 and 116 are interlocked also by a spring 130. Spring 130 is connected at one end to a guide strip 131 through which rods 24 and 115 pass and its other end projects through an opening in a U shaped loop 132 rigidly attached to operating rod 115. Spring 130 has a reversely bent loop 133 which engages the edge of a collar 134 through which rod 24 passes freely. When operating handle 116 is in the position shown in Fig. 8, the end of spring 130 is in engagement with the wall of loop 132 (see Fig. 8) but is not compressed by it. At this time spring loop 133 serves to hold collar 134 against rod 24 to frictionally hold it from movement. When rod 24 is to be moved vertically in either direction, handle 116 must be moved first in a direction to force loop 132 against the end of spring 130 (the lost motion connection between rod 109 and arm 114 permitting such movement), moving the spring 130 toward the left (Fig. 3) to compress loop 133 and release rod 24, and held in such position. This arrangement serves to prevent accidental movement of rod 24. It prevents movement of rod 24 to turn the receptacle except when the operator has one hand on handle 116 to release spring 130 and hold it released, and the other hand on handle 25 to turn the receptacle. Thus the receptacle can not be turned while the operator is placing garbage in it, a thing which might result in injury to the operator.

The arrangement is such that when the water pressure is turned on, the circuit for motor 45 is closed automatically and handle 24 is locked against movement. To this end, there is provided a pair of contacts 135 and 136 in the motor circuit. Contact 135 is yieldingly supported by a bracket 137 on valve casing A (see Fig. 9). Contact 136 is carried by an arm 138 connected to a rod 139 which in turn is carried by a corrugated bellows 140. The upper end of rod 139 slides in a guide opening 141 formed in a projection on the casing of valve A. The interior of corrugated bellows 140 is connected by a nipple 142 with the space below valve seat 72 in valve casing 70. 143 is a spring which opposes movement of stem 139 and tends to hold the stem in a position wherein contact 136 is separated from contact 135. When the water pressure is turned on, the pressure of the water in the interior of corrugated bellows 140 serves to expand it against the action of spring 43 to effect movement of contact 136 into engagement with contact 135, thus closing the motor circuit. The wiring of the contacts and the motor is illustrated diagrammatically in Fig. 21 at 144. When rod 139 is moved upward by the water pressure, its upper end engages locking pin 125 (see Figs. 9 and 21) thus holding the pin and hence operating handle 25 against movement as long as the water pressure is on.

Means are provided for flushing or syphoning out the trap after the cutting operation is completed; also for providing water for flushing the cutting knives and the receptacle. For this purpose the lower end of valve casing 71, that is, the chamber below valve seat 73, is connected by a passage 145 (see Figs. 11 and 21) to the bottom of the trap so that when the chamber at the lower end of casing 70 is connected to the water supply, water will be fed through passage 145. The chamber in the lower part of valve casing 70 is connected also by a passage 146 to casing 7 at a point adjacent to cutting knives 52 and 53 when in their outermost position. This passage is shown in dotted lines in Fig. 11 and the point at which it opens into casing 7 is shown in Figs. 6 and 14.

It may be desirable sometimes to flush the machine with hot water. For this purpose a hot water pipe 147 is connected to valve casing 70 below valve seat 73. In pipe 147 is a suitable hand valve 148. Pipe 147 may be connected to any suitable source of hot water. When valve 147 is opened, hot water is supplied through passages 145 and 146, thereby flushing with hot water the trap formed by walls 12 and also the cutting knives, the receptacle, and the surrounding walls of the casing.

The operation is as follows:

When garbage is to be cut up, operating rod 24 is first released by turning the handle 116 counter-clockwise (Fig. 3) after which receptacle 17 is moved by means of operating rod 24 and handle 25 to a position wherein its open end stands in line with the opening 8 in the bottom of the sink. At this time operating handle 116 occupies the positions shown in Figs. 3, 8 and 21; ball valve 103 is in the position shown in Fig. 21, wherein it closes passage 101 (this being the reverse of the position at which it is shown in Fig. 15); valve body 74 is in the position shown in Figs. 9, 11 and 21, and control valve 84 is held closed by spring strip 86 as shown in Figs. 8 and 21.

After the operator has placed the garbage to be cut up in receptacle 17, operating handle 25 is again released by the turning of operating handle 116 in a counter-clockwise direction and

is pushed downward to turn receptacle 17 from its vertical position to its horizontal position, as shown in Figs. 8 and 21, after which the operating handle 25 is turned in a clockwise direction, as viewed in Figs. 8 and 21, to move the end of locking pin 125 into opening 126, thus locking receptacle 17 in its horizontal position, at the same time bringing hole 129 in line with the end of rod 122. Receptacle 17 is now locked in the garbage cutting position, its open end standing in line with the cutting knives 52 and 53. The operator now turns operating handle 116 in a clockwise direction, as viewed in Figs. 8 and 21. This turning movement does three things; first, it moves the end of rod 122 into hole 129 to lock pin 125 in its innermost position; second, it moves rod 88 inward to effect movement of spring strip 86 away from valve stem 85; and third, it moves rod 109 inward to reverse the position of ball valve 103, moving it from the position wherein it covers passage 101, as shown in Fig. 21, to the position wherein it covers passage 102, as shown in Fig. 15, and, at the same time, bringing the end of rod 109 against cam surface 120, turning disk 117 in a clockwise direction and to the position shown in Fig. 15.

When spring strip 86 is moved away from valve stem 85, the water pressure in chamber 78 above valve body 74 opens valve 84 relieving the pressure above it. This is best shown in the diagrammatic view of Fig. 21. The water pressure in valve casing 70 above valve seat 72, acting on the tapered portion of valve body 74, forces the valve body upward, reversing its position so as to bring valve seat 76 in engagement with valve seat 73. Water pressure is now supplied from pipe 82 past valve seat 72, first to the corrugated bellows 140 to effect locking of pin 125 and closing of the motor circuit, thus starting turning movement of the cutting knives, and second through passage 90 and the connecting passages (indicated collectively as 90 in Fig. 21) to chamber 97 of valve structure B. From chamber 97 water flows through passage 101 and the connecting passages (indicated collectively as 112 in Fig. 21) to the outer end of cylinder 46, thus applying water pressure against the outer end of piston 47 to feed the cutting knives forward into receptacle 17. The cutting knife 52 is turned relatively to cutting knife 53 by motor 45 and the worm gearing 43 and 35, and is fed forward by the water pressure at a rate depending upon the resistance met with due to the material being cut. As the cutting operation continues, water is fed through the longitudinal passage 64 in rod 33 and out through passage 66 in cutting knife 52, thus continuously supplying water to the surface of the cutting knives to lubricate the knives and flush away the material being cut after the manner already described. This water is discharged at considerable pressure so as to perform its function in an effective manner.

When piston 47 reaches the end of its inward movement at the completion of the cutting operation, it engages friction disk 117, this disk serving as a stop to limit the inward movement, and turns the friction disk in a direction such that cam surface 120 engages the end of rod 109, thus moving it outwardly and reversing the position of ball valve 103, moving the ball valve from the position shown in Fig. 15 to the position shown in Fig. 21. Reversal of position of ball valve 103 shuts off the supply of water pressure through passage 101 to the outer end of cylinder 46 and connects the water pressure to the inner end of cylinder 46 through passage 102. Water pressure is thus supplied to the inner end of cylinder 46 to move piston 47 outwardly to its original position. This movement takes place slowly, the water in the outer end of the cylinder being forced through passage 64 as the piston moves rearwardly to flush the cutting surfaces of the knives and the interior of receptacle 17 and adjacent parts. When piston 47 reaches the end of its outward movement, cutting knife 53 engages the end of finger 87 (see Figs. 8 and 21) thus forcing spring strip 86 upward to close valve 84 (rod 88 having been released by rod 122 when rod 109 was moved outwardly to reverse the position of valve 103). Valve 84 having now been closed, water pressure gradually builds up in chamber 78 due to leakage of water past the upper end of valve body 74 and this pressure slowly moves valve body 74 downward to bring valve seat 75 in engagement with valve seat 72. When the downward movement begins, valve seat 76 is moved away from valve seat 73 thus connecting the chamber in the lower end of valve casing 70 with the water supply pipe 82. Water is thus supplied from pipe 82 past valve seats 72 and 73 to the flushing passages 145 and 146, thus supplying flushing water through these passages for the period during which valve body 70 is moved downward. Upon the completion of the downward movement, valve seat 75 engages valve seat 72, thus shutting off the supply of flushing water. After valve seat 75 engages valve seat 72, the water pressure to corrugated bellows 140 is released, thus permitting the motor circuit to open. This completes the operation of the mechanism, the parts being restored to their initial position.

In accordance with the provision of the patent statute, I have described the principle of operation of my invention, together with the apparatus which I now consider to represent the best embodiment thereof; but I desire to have it understood that the apparatus shown is only illustrative and that the invention may be carried out by other means.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. The combination with a sink having an opening in its bottom, of a garbage cutting machine comprising a casing, a receptacle in the casing having an open end, cutting means adapted to move into and out of the receptacle through said open end, a drain pipe connected to the casing, and means for moving the receptacle to bring its open end into alignment with said opening and with said cutting means, there being clearance between the walls of the casing and the adjacent walls of the receptacle for the flow of water.

2. In a cutting machine, the combination of a cylindrical receptacle for the material to be cut, and rotating cutting means adapted to move forward and back in the receptacle, said cutting means comprising a rotating cutter and a non-rotating cutter cooperating therewith, walls of the receptacle being provided with grooves for holding material being cut from rotating with the rotating cutter, and projecting means on the non-rotating cutter which slide in said grooves to hold the non-rotating cutter from rotating.

3. In a cutting machine, the combination of a cylindrical receptacle for holding material to be cut, cutting means comprising two cutters movable axially of said receptacle to effect the cut-

ting of the material, means for holding one of said cutters from turning, means for rotating the other cutter and means for holding the material being cut from rotating with the said rotating cutter.

4. In a cutting machine, the combination of a cylindrical receptacle for holding material to be cut, said receptacle having a groove in its inner wall surface, relatively rotating cutters adapted to move axially of said receptacle, and projecting means on certain of said cutters which extends into the groove to hold such certain cutters from turning.

5. In a cutting machine, front and rear relatively rotating cutters comprising disks having grooves in their edges which define fingers having cooperating cutting edges, and grooves in the forward face of the front cutter which provide cutting edges and cone shaped channels running from the center of the front cutter toward its periphery.

6. In a cutting machine, the combination of a receptacle for material to be cut, cutting means comprising a front rotating cutter and a rear non-rotating cutter having adjacent cutting edges, fluid actuated means for moving said cutters axially of the receptacle, and means for turning the rotating cutter as the cutters are moved axially of the receptacle.

7. In a cutting machine, the combination of a receptacle for material to be cut, cutting means comprising a front rotating cutter and a rear non-rotating cutter comprising disks having notches in their peripheries which define fingers having adjacent cutting edges, fluid actuated means for moving the cutters axially of the receptacle, means for turning the rotating cutter, and means for supplying liquid to the face of the cutters.

8. In a cutting machine, the combination of a receptacle for material to be cut, a cutter, fluid actuated means for moving the cutter forward and back in the receptacle, manually actuated means for admitting fluid to the fluid actuated means to effect forward movement of the cutter, means actuated automatically when the cutter reaches the end of its forward movement for admitting fluid to effect rearward movement of the cutter, means for automatically cutting off the fluid supply when the cutter reaches the end of its rearward movement, an electric motor for turning the cutter, an electric circuit for the motor, and means controlled by the fluid pressure supplied to the fluid actuated means for closing the motor circuit.

9. In a cutting machine, a receptacle having a loading position and a cutting position, means for moving it from one position to the other, a cutter, fluid actuated means for moving the cutter into and out of the receptacle, and means actuated by the fluid pressure supplied to the fluid actuated means for locking the receptacle in cutting position.

10. In a cutting machine, a receptacle having a loading position and a cutting position, an operating handle for moving it from one position to the other, a cutter, fluid actuated means for moving the cutter into and out of the receptacle, an operating handle for controlling the supply of fluid to the fluid actuated means, and means interlocking said handles which prevents actuating the second named handle until the first named handle has been operated to move the receptacle to loading position.

11. In a cutting machine, a receptacle having a loading position and a cutting position, an operating handle for moving it from one position to the other, a cutter, fluid actuated means for moving the cutter into and out of the receptacle, an operating handle for controlling the supply of fluid to the fluid actuated means, means interlocking said handles which prevents actuating the second named handle until the first named handle has been operated to move the receptacle to cutting position, and means actuated by the fluid pressure supplied to the fluid actuated means for locking the first named handle against movement while fluid pressure is being supplied to the fluid actuated means.

12. In a cutting machine, a receptacle, a cutter, fluid actuated means for moving the cutter forward and back in the receptacle, valve means controlled by movement of the cutter for effecting automatically the back movement of the cutter, and automatic means controlled by movement of the cutter for supplying flushing fluid to the receptacle.

13. In a cutting machine, a receptacle, a cutting means comprising a front rotating cutter and a rear non-rotating cutter adapted to move longitudinally of the receptacle, said rotating cutter having cutting edges on its forward surface, a piston rod to which the cutters are connected, a piston on the rod, a cylinder for the piston, means for supplying fluid pressure to the cylinder for moving the piston, and means for supplying liquid to the forward surface of the rotating cutter.

14. In a cutting machine, a receptacle, a cutting means comprising a front rotating cutter and a rear non-rotating cutted adapted to move longitudinally of the receptacle, said rotating cutter having cutting edges on its forward surface, a piston rod to which the cutters are connected, a piston on the rod, a cylinder for the piston, and means for supplying water pressure to the cylinder for moving the piston, said piston rod having a longitudinal passage through which water is supplied from the cylinder to the forward surface of the rotating cutter.

15. In a cutting machine, a receptacle, a cutter, a piston and cylinder for effecting movement of the cutter longitudinally of the receptacle, valve means for controlling the supply of fluid pressure to the cylinder to effect movement of the piston therein in each direction, means for rotating the piston and cutter, and means controlled by the rotative movement of the piston for actuating said valve means.

16. In a cutting machine, a receptacle, a cutting means, fluid pressure means for moving the cutting means longitudinally of the receptacle, a motor for turning the cutting means, and means actuated by the fluid pressure supplied to said fluid pressure means for controlling the motor.

17. The combination with a sink having an opening, of a casing connected to the sink having an opening in line with the sink opening and a second opening at one side thereof, a receptacle pivoted in said casing having an open end, means for turning the receptacle to bring its open end into line with either of the openings in said casing, a cutting means, and means for feeding the cutting means through said second opening into the receptacle.

18. The combination with a sink having an opening, of a casing connected to the sink having an opening in line with the sink opening and a second opening at one side thereof, a receptacle pivoted in said casing having an open end, means

for turning the receptacle to bring its open end into line with either of the openings in said casing, a cutting means, fluid actuated means for feeding the cutting means through said second opening into the receptacle, and means for simultaneously supplying fluid to the face of the cutting means.

19. In a cutting machine, the combination of a sink having a drain opening, a drain conduit connected to said opening, a casing interposed in said conduit beneath said drain opening, said casing having a side opening, a receptacle having an open end pivotally mounted in said casing, means for turning the receptacle to bring its open end into line either with the drain opening or the side opening, cutting means carried by the casing in alignment with said side opening, means for actuating the cutting means to effect grinding of material in the receptacle, and means for supplying water to the casing for flushing ground material down the drain conduit.

20. In a cutting machine, the combination of a sink having a drain opening, a drain conduit connected to said opening, a casing interposed in said conduit beneath said drain opening, cutting means carried by said casing, a receptacle pivoted in said casing having an open end, means for turning said receptacle to bring its open end into line with said drain opening and into line with said cutting means, means for actuating the cutting means, and means for supplying water to the casing for flushing cut material down the drain conduit.

21. In a cutting machine, the combination of a sink having a drain opening, a drain conduit connected to said opening, a casing interposed in said conduit beneath said drain opening, cutting means carried by said casing, a receptacle pivoted in said casing having an open end, means for turning said receptacle to bring its open end into line with said drain opening and into line with said cutting means, a motor for actuating the cutting means, control means for the motor, and means actuating the control means to effect actuation of the motor when the receptacle is turned with its open end in line with the cutting means.

22. In a cutting machine, the combination of a sink having a drain opening, a drain conduit connected to said opening, a casing interposed in said conduit beneath said drain opening, cutting means carried by said casing, a receptacle pivoted in said casing having an open end, means for turning said receptacle to bring its open end into line with said drain opening and into line with said cutting means, a motor for actuating the cutting means, control means for the motor, means actuating the control means to effect actuation of the motor when the receptacle is turned with its open end in line with the cutting means, and means for supplying water to the casing for flushing cut material down the drain conduit when the receptacle is in line with said cutting means.

23. A unitary structure to be attached to the drain opening of a sink comprising a casing having a top opening for alignment with a sink drain opening and an opening for connection to a drain pipe, cutting means carried by said casing, a receptacle having an open end pivotally mounted in the casing, means for turning the receptacle to bring its open end into alignment with said top opening or into alignment with said cutting means, an electric motor mounted on said casing and carried thereby, and means connecting said motor to said cutting means for actuating the cutting means.

24. A unitary structure to be attached to the drain opening of a sink comprising a casing having a top opening for alignment with a sink drain opening and an opening for connection to a drain pipe, cutting means carried by said casing, a receptacle having an open end pivotally mounted in the casing, means for turning the receptacle to bring its open end into alignment with said top opening or into alignment with said cutting means, an electric motor mounted on said casing and carried thereby, means connecting said motor to said cutting means for actuating the cutting means, and means providing passages for carrying water to the cutting means and casing for flushing cut material through the drain opening.

25. A unitary structure to be attached to the drain opening of a sink comprising a casing having a top opening for alignment with a sink drain opening, an opening for connection to a drain pipe and a side opening, a receptacle having an open end pivoted in the casing, means for turning the receptacle to bring its open end into alignment with the top opening or into alignment with the side opening, cutting means carried by the casing in line with the side opening, and means carried by the casing for actuating said cutting means.

26. A unitary structure to be attached to the drain opening of a sink comprising a casing having a top opening for alignment with a sink drain opening, an opening for connection to a drain pipe and a side opening, a receptacle having an open end pivoted in the casing, means for turning the receptacle to bring its open end into alignment with the top opening or into alignment with the side opening, cutting means carried by the casing in line with the side opening, a piston and cylinder carried by the casing and connected to the cutting means for moving the cutting means into the receptacle, and an electric motor carried by the casing for turning the cutting means.

27. In a cutting machine, a receptacle, a cutter, a piston and cylinder for effecting movement of the cutter longitudinally of the receptacle, valve means for controlling the supply of fluid pressure to the cylinder to effect movement of the piston therein in each direction, means for rotating the piston and cutter, and a cam which when turned actuates the valve means, said piston engaging and turning said cam when the cutter reaches the end of its travel.

CHARLES F. SCHWENNKER.