May 7, 1940. M. J. GREEN 2,200,061

WASTE DISPOSAL UNIT

Original Filed July 9, 1938 2 Sheets-Sheet 1

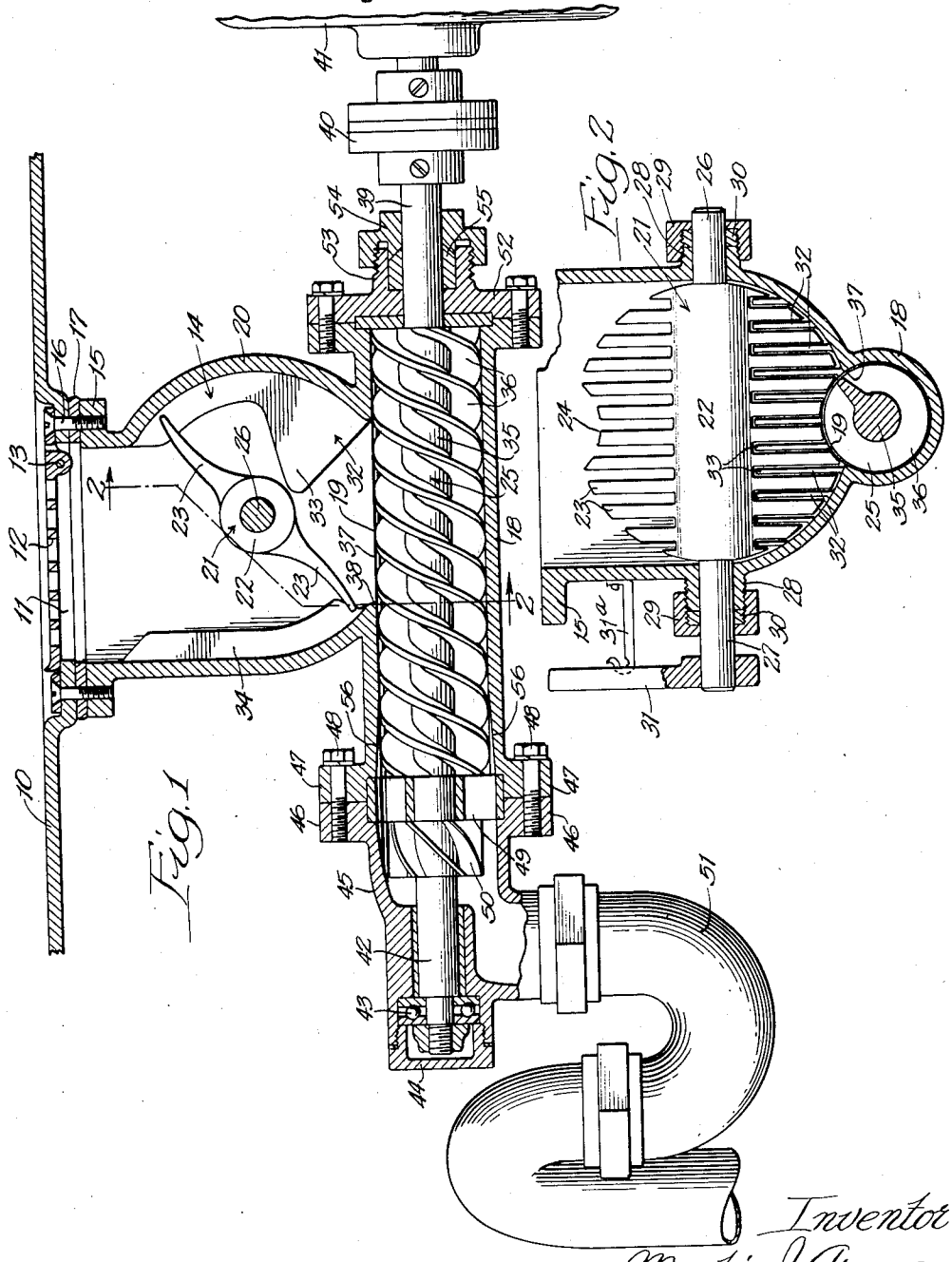


Fig. 1

Fig. 2

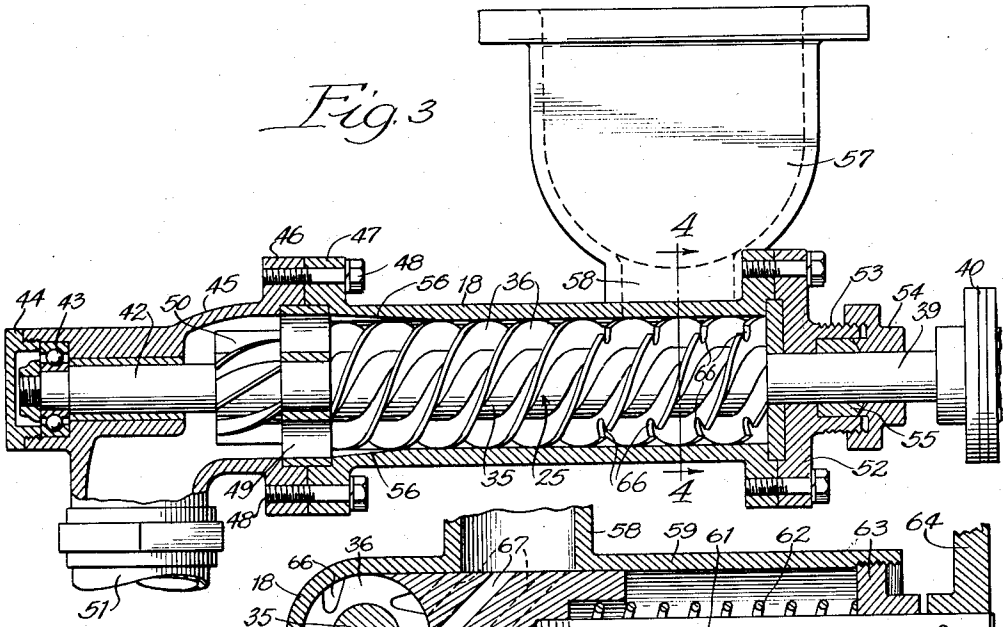
Inventor:
Martin J. Green,
By Banning & Banning
Attorneys.

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Fig. 3



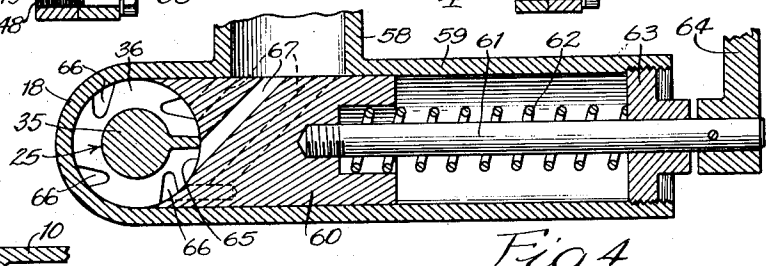
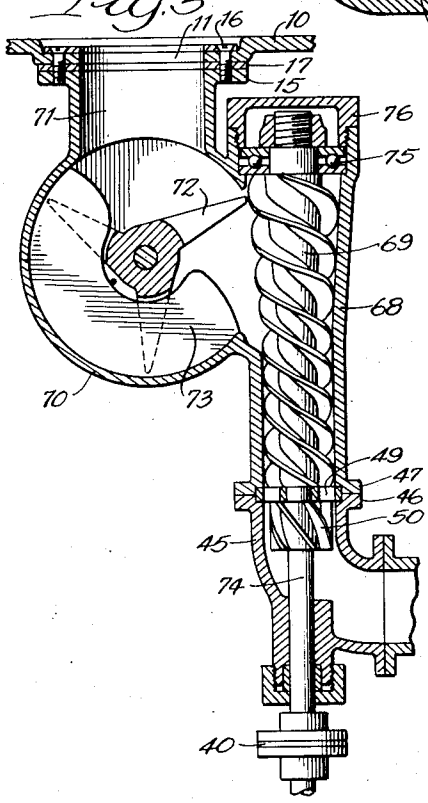


Fig. 4

Fig. 5



Inventor:
Martin J. Green,
By Banning & Banning
Attorneys.

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UNITED STATES PATENT OFFICE

2,200,061

WASTE DISPOSAL UNIT

Martin J. Green, Chicago, Ill., assignor of one-fourth to Julius C. Suess, Chicago, Ill.

Application July 9, 1938, Serial No. 218,411
Renewed October 9, 1939

4 Claims. (Cl. 146—181)

The waste disposal unit of the present invention is designed as a self-contained fitting to be attached to the drain outlet of a sink or the like for household use in the disposal of waste and garbage, which is fed directly into the unit and there shredded into comparatively fine particles and discharged into the waste outlet to the sewer, thereby eliminating the necessity for otherwise disposing of the garbage.

In particular, the invention is directed to the form and arrangement of the shredder and to the feeder employed in conjunction therewith. The unit also makes provision for the maintenance of a partial vacuum in the shredder casing which supplements the mechanical feeding action which is incidental to and concurrent with the shredding operation, and also assists in drawing down the waste particles which are delivered to the shredder by the mechanical feeding devices hereinafter to be described.

The unit is so arranged and constructed that it may be interposed directly between the base or floor of the sink and the usual drain pipe, and so that it may employ water delivered directly through the drain opening in the sink without the necessity for the employment of separate jets or columns of water for the purpose of maintaining an adequate current flow, thereby greatly simplifying the construction and the ease and expense of installation or the provision of additional piping and connections.

Further objects and details will appear from the description of the invention in conjunction with the accompanying drawings, wherein,

Figure 1 is a longitudinal sectional elevation through one of the units embodying the features of the present invention;

Fig. 2 is a cross sectional elevation taken on line 2—2 of Fig. 1;

Fig. 3 is a longitudinal sectional elevation of a modified form of construction;

Fig. 4 is a cross sectional elevation taken on line 4—4 of Fig. 3; and

Fig. 5 is a sectional elevation of another modified form of construction.

Referring to Figs. 1 and 2, the unit of the present invention is attached to the base of a sink 10 provided with the usual drain outlet 11, which may, if desired, be protected by a swinging grille or grating 12 hinged at the point 13. The waste disposal unit is attached directly below the drain outlet, and comprises a hopper 14 having a flanged neck 15 secured by screws 16 entered through the margin of the drain outlet and protected by an interposed packing ring 17.

The hopper 14 is integrally formed with a tubular housing 18 which communicates with the base of the hopper through a mouth 19. The hopper is rounded on its bottom as shown in Fig. 2, and is provided on one side with a rounded protuberant wall 20 so configured as to provide for the movements of a rotatable feeder 21 which comprises a hub 22 and outstanding prongs 23 which are of progressively greater length from the ends and up toward the center to give to the prongs collectively the circular marginal configuration shown in Fig. 2, with the exception of a reduction in height in the center prongs to afford a dip 24 which is provided to afford a clearance for the operation of the convolute shredder 25 presently to be described.

The hub of the feeder is provided at its ends with trunnions 26 and 27 which are entered through the threaded bosses 28 on the sides of the hopper, threaded caps 29 being provided which in each case comprise a packing ring 30 to afford packed journal mountings for the support of the feeder. The trunnion 27 is provided at its outer end with a handle 31 which permits the housewife to rotate the feeder as occasion may require. A spring stop 31a engaging the handle normally centers the feeder in the position shown in Fig. 1.

The bulged wall 20 of the hopper casing is provided on its inner face with a plurality of spaced fins 32 which are integrally formed with the wall of the hopper and extend inwardly therefrom in position to register with the slots between the prongs 23 so that the feeder can be rotated through the fins without interference.

The fins 32 spring from the curved bottom of the hopper wall and hence are of varying length, although terminating at their inner ends 33 at the same level and in a line closely adjacent to the hub of the feeder.

The ends 33 are of triangular formation and constitute extensions projecting inwardly from the lower body portions of the fins, and giving to the fins the general configuration shown in Fig. 1, it being understood that the extent of the inward projection noted will vary conformably to the curvature of the base wall of the hopper from which the fins extend. The opposite side of the hopper is also provided with a series of inwardly extending fins 34 of lower altitude, which, however, merely enter between the tip ends of the prongs 23.

The arrangement as a whole is that of movable and fixed combs which are arranged to sweep

through one another, and the action is such that as the feeder is rotated it will carry around a charge of waste material deposited in the hopper above the feeder, until the progress of such waste is arrested by the forward edges of the fins **32** which stand in overhanging relation to the mouth **19**, through which the material is delivered to the shredder **25**.

The shredder rotates on an axis at right angles to the axis of the feeder and comprises a center hub **35** from which spring a series of convolute shredder blades **36** each of which extends spirally and uninterruptedly from end to end of the cylindrical casing **18**, the fitting of the parts being such as to bring the edges of the convolute blades into practical contact with the inner surface of the casing **18** to afford a fairly close fit, without, however, subjecting the shredder blades to any material degree of friction.

The discharge mouth from the hopper is so configured that the side walls at the point of juncture between the base walls of the hopper and the cylindrical walls of the housing **18** will afford a longitudinally extending sharp angle or ridge **37** on each side, which coacts with the edges of the shredder blades on each side and a similar sharp cross ridge **38**, which ridges present knife edges which coact with the shredder blades in shearing and shredding the waste material delivered by the feeder.

The shredder hub at its outer end terminates in a shaft **39** connected by a coupling **40** with a motor **41** for driving the shredder at a high rate of speed, as for instance 1800 R. P. M. The shredder hub at its inner end terminates in a shaft or spindle **42** which is mounted within ball bearings **43** and closed by a cap **44** threaded onto the drain casing **45**, which drain casing is provided with flanges **46** which abut against the flanged inner end **47** of the shredder casing, the parts being connected by bolts **48**.

The drain casing is of elbow shape, as shown, and between the drain casing and the shredder casing is interposed an apertured plate **49** through which the waste material is discharged by the operation of the convolute shredder. Beyond the apertured plate is located a supplemental shredder **50** which assists in beating up and discharging material immediately prior to its passage through the drain casing and into the goose neck coupling **51** of standard formation, which provides the usual water seal common in the art. The shaft **39** passes through a cap plate **52** provided with a threaded neck **53** which receives a gland **54** bearing against a packing **55** for sealing the parts at this point.

It is important to make provision for the development of a partial vacuum to afford suction for assisting the progress of the waste material, and to secure this effect it is desirable that the shredder blades leading toward the discharge end of the unit maintain a close and uninterrupted contact with the walls of the housing **18**, and it will be noted from Fig. 1 that such contact is maintained throughout a considerable distance, although at the terminus of the housing the walls are provided with grooves **56** which afford a serrated or corrugated surface which coacts with the shredder blades in tearing apart and shredding the particles of waste material passing through the device.

The unit of Fig. 3, in so far as concerns the shredder housing and the formation and mounting of the shredder, substantially duplicates the construction heretofore described, so that it is not deemed necessary to again refer to these portions of the device. However, in the device of Figs. 3 and 4, a plunger type of feeder is provided, and the hopper stands in offset relation to the shredder housing. In this instance, the hopper **57** is of empty bowl-shaped formation and terminates in a throated neck **58** which extends upwardly from a tubular feeder casing **59** extending at right angles to the wall of the shredder housing, as best shown in Fig. 4.

Within the tubular feeder casing is located a plunger **60** mounted at the inner end of a rod **61** which is surrounded by a spring **62** bearing against a threaded head plate **63** through which the rod is entered. The rod is provided with a handle **64** at its outer end, which permits the plunger to be retracted against spring tension to expose the terminus of the throated neck **58** and permit a charge of waste material to fall down into position in advance of the plunger.

The inner face **65** of the plunger is of circular concave formation to closely embrace the blades of the shredder, which at this point are provided in their edges with notches **66** which assist in dragging down the waste material into the bite of the shredder when such material is driven inwardly by the release of the plunger.

In order to provide the necessary water flow while the plunger is in its innermost position, the plunger is provided with a plurality of obliquely disposed water passages **67**, which serve to educt the water from the throated neck **58** to the interior of the shredder housing.

The construction shown in Fig. 5 is in all respects like the construction of Figs. 1 and 2, with the exception that the shredder housing **68** with the shredder **69** is arranged vertically instead of horizontally, which in some situations may be found to be a more desirable or convenient arrangement than the horizontal arrangement first described. In this case, the feeder casing **70** is located laterally adjacent to the vertically disposed shredder housing and is provided with a throated neck **71** which is connected with the drain aperture from the sink in the manner first described.

The feeder is provided with prongs **72** which coact with fixed fins **73** in the manner heretofore described and the discharge aperture into the shredder housing is substantially similar. In this instance I have shown a shredder housing which converges slightly at its outer end and merges into a cylindrical portion in conjunction with a correspondingly configured shredder, and have located the motor (not shown) at the lower end of the shredder shaft **74**, the upper end of the shredder being journalled within ball bearings **75** housed over by a closing cap **76**.

It will of course be understood that the shredder of Fig. 1 or Fig. 5 may, if desired be notched in the manner shown in Fig. 3, and it will be further understood that the plunger feed device, in lieu of the rotating feed device, may likewise be employed in conjunction with a vertically disposed shredder. It is believed that such variations need not be further described in detail, since the same are obvious from the description of the three forms heretofore more particularly described.

Operation

In operation, the waste from the sink will be delivered into the hopper and the feed device operated to mechanically feed the material to the shredder and exert sufficient pressure

thereon to compact the same whether the rotating device or the plunger feed be employed.

The rotating feed device is of particular advantage, in that, when standing in the position shown in Fig. 1, it will serve as a grille to arrest any article of silverware or the like which may accidentally have been discharged with the waste material. Furthermore, even if the feed device be rotated, solid objects will be arrested by the combing action as the prongs of the feeder sweep through the stationary fins, so that in most cases opportunity will be afforded for the recovery of small objects accidentally becoming commingled with the waste material.

Where the rotating type of feeder is employed, the waste material will be swept downwardly and backwardly in opposed relation to the feeding direction of the shredder and tightly compacted and held in immediate proximity to the blades of the rapidly rotating shredder, so that the material will be sheared off and shredded and disintegrated as it passes into the shredder housing and will thereafter be fed downwardly and additionally shredded as it encounters the grooved walls of the shredder housing. In its progress into and through the shredder housing the waste material will be assisted in considerable degree by the suction developed as a result of the rapid rotation of the shredder, which sucks the waste material and water inwardly and forcibly ejects the same into the drain outlet. It will be understood that it is desirable in the operation of the device to provide a sufficient water flow through the sink to maintain the effect of a rotary pump so that the downflow and discharge of the waste material will be assisted not only by the suction maintained but by the force of the water current.

Where the plunger form of feed is employed, charges of material will be compressed by the plunger and held forcibly against the blades of the shredder, and a water flow will be maintained through the head of the plunger so that in this case also sufficient suction will be developed to materially assist the feeding action of the convolute shredder in carrying forward and discharging the waste material.

The device in any of the forms here shown is one which is extremely compact and which may be easily fitted beneath a sink of standard construction and operated with the expenditure of a very small amount of power, and when so installed and operated will provide for the easy disposition of large amounts of garbage and waste which have heretofore required disposal in the conventional manner, and the nature of the shredder itself is such that it will serve as a grinder for the disintegrating of solid materials such as pieces of bone, fruit stones, or the like, which are readily reduced in size so that they may be discharged through the waste drain without clogging.

Although I have shown a rotary shredder having convolute blades arranged in intervening relation to one another, it may be possible to employ a single continuous spiral blade, so that it will be understood that in the claims where I refer to blades I intend to cover and include any convolute formation of equivalent character, whether the same involve one or more convolute blades in the arrangement.

Although the invention has been described with particularity as to detail, it is not the intention unless otherwise indicated to limit the invention to the particular forms of construction shown, since modifications therein may be made without departing from the spirit of the invention.

I claim:

1. In a waste disposal unit, the combination of a hopper provided with a discharge mouth and a shredder housing communicating therewith, a rotary shredder within the housing provided with elongated blades adapted to engage and disintegrate the material delivered from the hopper and feed the same toward the point of discharge, a feeder located within the hopper and rotatable on an axis extending transversely to the axis of the shredder and provided with spaced prongs certain of which are of varying length to closely embrace the contiguous portions of the shredder blades when the prongs are rotated into adjacent relation thereto, and cooperating fixed fins projecting inwardly from the hopper wall and spaced to permit the prongs to sweep therethrough, the edges of certain of the fins terminating in varying positions to closely embrace the contiguous portions of the shredder and the feeder being so disposed that when rotated it will sweep down the waste material and compact the same against the edges of the fins and in close relationship to the rotary shredder.

2. In a waste disposal unit, the combination of a hopper provided with a discharge mouth and a shredder housing communicating therewith, a rotary shredder within the housing provided with elongated blades adapted to engage and disintegrate the material delivered from the hopper and feed the same toward the point of discharge, a feeder located within the hopper and rotatable on an axis extending transversely to the axis of the shredder and provided with spaced prongs certain of which are of varying length to closely embrace the contiguous portions of the shredder blades when the prongs are rotated into adjacent relation thereto, and cooperating fixed fins projecting inwardly from the hopper wall and spaced to permit the prongs to sweep therethrough, the edges of certain of the fins terminating in varying positions to closely embrace the contiguous portions of the shredder and the feeder being so disposed that when rotated it will sweep down the waste material and compact the same against the edges of the fins and in close relationship to the rotary shredder, and the blades of the shredder and the shredder housing wall being in such close relationship as to develop a partial vacuum through the rotation of the shredder for assisting the inflow of waste material.

3. In a waste disposal unit, the combination of a hopper provided with a discharge mouth and a shredder housing communicating therewith, rotary shredder within the housing provided with elongated blades adapted to engage and disintegrate the material delivered from the hopper and feed the same toward the point of discharge, a feeder located within the hopper and rotatable on an axis extending transversely to the axis of the shredder and provided with spaced prongs certain of which are of varying length to closely embrace the contiguous portions of the shredder blades when the prongs are rotated into adjacent relation thereto, and cooperating fixed fins projecting inwardly from the hopper wall and spaced to permit the prongs to sweep therethrough, the edges of certain of the fins terminating in varying positions to closely embrace the contiguous portions of the shredder and the feeder being so disposed that when rotated it will sweep down the waste material and compact the

same against the edges of the fins and in close relationship to the rotary shredder, and the blades of the shredder and the shredder housing wall being in such close relationship as to develop a partial vacuum through the rotation of the shredder for assisting the inflow of waste material, and the marginal walls around the hopper at the point of juncture with the shredder housing affording knife edges in contiguous relation to the shredder blades to coact therewith in shredding the material.

4. In a waste disposal unit, the combination of a hopper provided with a discharge mouth and a shredder housing communicating therewith, a rotary shredder within the housing provided with convolute blades adapted to engage and disintegrate the material delivered from the hopper and feed the same toward the point of discharge, a feeder located within the hopper and rotatable upon an axis extending transversely to the axis of the shredder, and having a downward and backward feeding movement in opposed relation to the forward feeding movement of the shredder, the feeder being provided with spaced prongs, and cooperating fixed fins projecting inwardly from the hopper wall in position to permit the prongs to sweep therethrough, the feeder being so disposed that when rotated it will sweep down the waste material and compact the same against the edges of the fins and in close relationship to the rotary shredder.

MARTIN J. GREEN.