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3,340,915

HOLE CUTTER AND DEBRIS RECEIVER

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FIG. 1

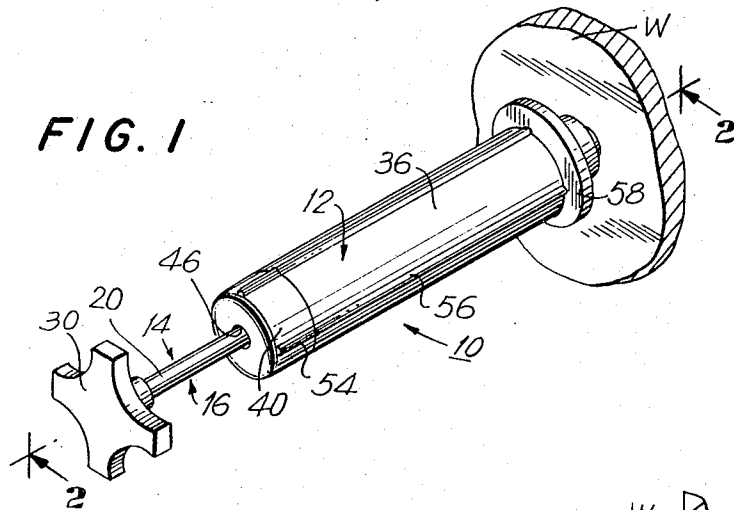


FIG. 2

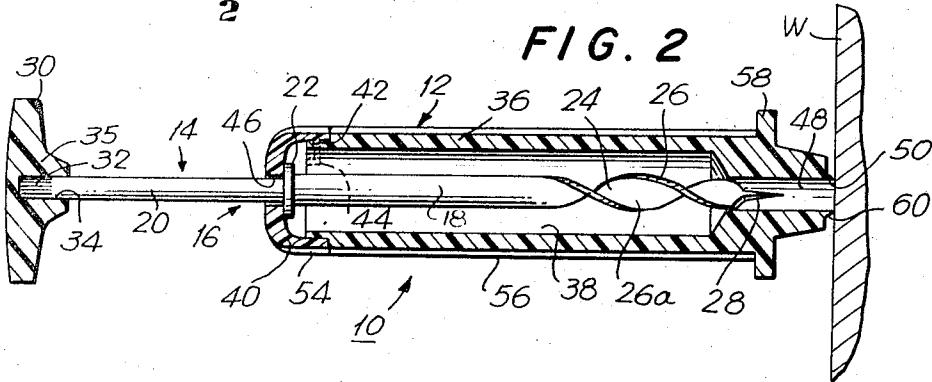


FIG. 3

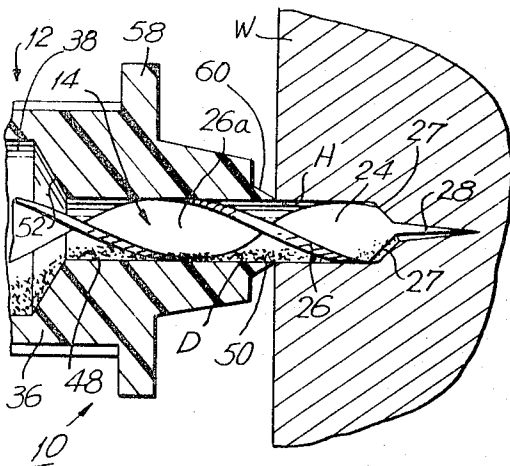
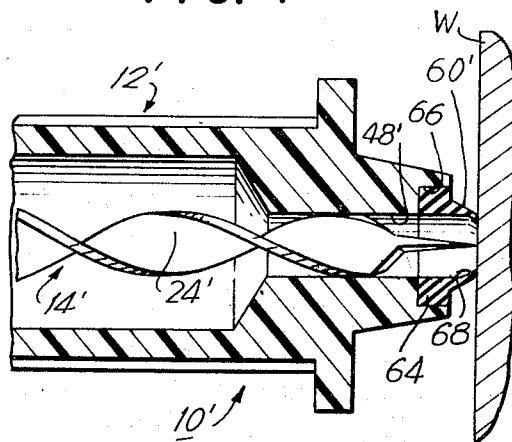


FIG. 4



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## HOLE CUTTER AND DEBRIS RECEIVER

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10 Claims. (Cl. 145—116)

This invention relates to an auger assembly for forming a hole in a vertical wall and for receiving and containing the debris from the resulting formation of said hole.

It is the primary object of my invention to provide an auger assembly of the character described which will enable a do-it-yourself apartment dweller or a home owner to manually bore a hole in a wall and which will receive and contain the debris formed during the boring operation, so that such debris does not spill onto and soil nearby areas such as rugs, curtains, drapes and furniture.

It is yet another object of my invention to provide an auger assembly of the character described which is hand operable so that the apartment dweller or home owner may form a hole in a wall in a quick and easy manner without the necessity for unpacking and setting up power equipment, without the noise usually connected with the use of such equipment and without the dangers of electrical shock and accidents often attendant upon the use of power equipment.

It is still a further object of my invention to provide an auger assembly of the character described which is especially suited for forming holes in walls made of the more penetrable wall structural materials such for example as plaster, plasterboard, sheet rock and the softer woods, and which cuts a hole in a wall made of such material in an efficient manner without the usual scattering of debris from the formation of the hole.

It is still another object of my invention to provide an auger assembly of the character described which includes a hollow container formed to receive the hole-formation debris, the assembly being especially well adapted to receive and hold debris from holes bored in vertical walls.

It is still another object of my invention to provide an auger assembly of the character described including both an auger and a container and wherein the container functions as a bearing for rotatively mounting the auger, as an anchor for locating the auger against a vertical wall surface, and as a temporary storer of debris from the formation of a hole in the wall.

It is still a further object of my invention to provide an auger assembly of the character described wherein the auger has spiral flutes which function as a traveling conveyor to carry debris formed during the boring operation from the hole through the mouth of the container and into the interior cavity of the container.

It is still another object of my invention to provide an auger assembly of the character described which is rugged in construction, few in number of parts, simple in operation, suitable to mass production techniques and which, therefore, can be marketed at a relatively low per unit cost.

Other objects of my invention in part will be obvious and in part will be pointed out hereinafter.

My invention accordingly consists in the features of construction, combinations of elements and arrangements of parts which will be exemplified in the auger assemblies hereinafter described and of which the scope of application will be indicated in the appended claims.

In the accompanying drawings in which are shown various possible embodiments of my invention,

FIG. 1 is a front perspective view of my auger assembly with the mouth of its container pressed against a vertical

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wall surface and the auger assembly properly positioned for use;

FIG. 2 is an enlarged axial cross sectional view of my auger assembly taken substantially along the line 2—2 of

5 FIG. 1;

FIG. 3 is a greatly enlarged fragmentary axial cross-sectional view of the front of the container of my assembly with the auger bit partially penetrated into the interior of the wall; and

10 FIG. 4 is an enlarged cross-sectional view of the front of an auger assembly embodying a modified form of my invention.

In general, and in accordance with the teaching of my invention, I provide an auger assembly especially intended for use by persons who live in apartments and who own homes, and who often desire to form a small hole, e.g.  $\frac{1}{4}$ ",  $\frac{3}{8}$ " or  $\frac{1}{2}$ ", for one reason or another in a vertical wall in their dwellings. Such persons have heretofore found such a project to be quite a nuisance because the debris from the formation of such a hole tended to scatter and fall onto the floor and adjacent areas where it would soil rugs, furniture and drapes. Further, such apartment dwellers or home owners, especially women, quite often hesitated to use heavy power equipment for such a small task because of the noise involved, because of the difficulty of precisely locating the hole due to walking of the drill point, because of the effort of unpacking, using and repacking such power equipment, and because of the dangers of accident and electrical shock.

The auger assembly which is the subject of the present application is small, lightweight and portable, is hand operable, is easily and accurately positionable, and is constructed and arranged so that the debris formed during the boring of a hole is received into and contained and temporarily stored within the auger assembly until such time as it is convenient to transfer such debris into a larger waste receptacle.

My auger assembly includes an auger having an elongated shank with one end portion thereof formed into a spirally fluted auger bit, and the other end having fixed thereto a handle by which the auger may be manually rotated by one hand of a user.

The auger assembly further includes a container having an interior hollow cavity in which the debris is received. The container has at its rear an aperture through which the shank of the auger passes and is journaled, and has at its front a passageway through which the auger bit passes and advances, and in which the bit is journaled during the course of the formation of a hole in a wall. The passageway leads into the cavity. The aperture and the passageway in the container are in axial alignment and each makes a close rotatable fit with the auger.

The aperture and the passageway in the container function as bearings for the auger. When my auger assembly is utilized, the mouth of the passageway is pressed against a wall surface, the container at this time being held by one hand of the user. The auger is then rotated by the other hand of the user so that the auger bit, while turning in and advancing through the passageway in the container, drills a hole into the interior of the wall. As the auger bit is rotated to form a hole in the wall the spiral flutes of the bit convey debris from the hole backward along the passageway and into the interior cavity of the container, said spiral flutes co-operating with the passageway to function as a spiral conveyor.

The container also includes a cap which closes the open rear end of the cavity. The cap may be easily removed from the remainder of the container, this being done when the formation of the hole has been completed, so that the debris in the container can be dumped into a

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waste receptacle. The cap has the rear bearing aperture formed therein.

Referring now in detail to the drawings, the reference numeral 10 denotes an auger assembly constructed in accordance with my invention. Said assembly comprises two components, to wit, a container 12 and an auger 14. As will be evident from the following description, the assembly is quite small, lightweight, portable and suitable for easy storage and use in homes.

The auger includes an elongated solid shank 16, the shank including a forward section 18 and a rearward section 20. Both sections 18 and 20 are of circular cross-section, the forward section having a diameter slightly larger than the rearward section. A disc-shaped circular collar 22 rides on the shank 16 at the junction of the forward and rearward sections.

The forward section of the shank 16 at its leading end is fashioned into an auger bit 24 constituting a pair of diametrically opposed large pitch helical lands 26 separated by spiralling flutes 26a. The lands have rearwardly sloped beveled cutting edges 27 at their forward ends. The bit is headed by a pointed piercing gimlet point 28 which is in axial alignment with the shank. The flutes are configured in a manner appropriate for a manual boring operation constituting, for example, a twisted strip of hardened high carbon steel with edges appropriately ground to sharpen the same.

Since the auger assembly 10 is to be utilized primarily with the more easily penetrable wall materials such as plaster, plasterboard, sheet rock and the softer woods, the point of the gimlet 28 can be easily pushed into a wall W so as to initially start and guide the remainder of the auger bit 24 for formation of a hole. The cutting edge 27 bores through the wall material and the lands 26 finish the hole formation while the flutes 26a in conjunction with the forward bearing passageway in the container 12 convey cuttings from the hole formation rearwardly from the hole in a vertical wall. The lands have a rake which facilitates this cutting operation.

The rear terminus of the shank 16 has affixed thereto a handle 30, and to this end, the said terminus is longitudinally milled as at 32 and is force-fitted into a bore 34 in a hub 35 of the handle. An appropriate adhesive may also be utilized to bond the milled end 32 to the handle 30. Desirably, the handle 30 has a simple cross configuration so that the same may be easily gripped and rotated manually by one hand of a user of my assembly 10.

The container 12 includes an elongated shell 36 of substantially cylindrical configuration having an axially elongated cylindrical hollow interior cavity 38. The shell 36 as well as the cavity 38 have a length about as long as the auger from the shoulder at the rear end of the forward section 18 to the point of the gimlet 28.

The rear end of the container 12 comprises a cap 40 which closes the back of the hollow cavity 38. Except for an aperture and a passageway soon to be described, the container 12 composed of the shell and cap is completely closed.

Quick connect-disconnect means is utilized to attach the cap 40 to the shell 36, and to this end, the interior of the cap 40 adjacent its rim carries a pair of inwardly protruding diametrically opposed like lugs 42 which are mateable with a pair of diametrically opposed bayonet grooves 44 in the interior of the rear end of the shell 36 and having entrance mouths at the back of the shell. The lugs 42 fit into and slide axially along the longitudinally oriented legs of the grooves 44 and then rotate radially and lock with the circumferential legs of the grooves 44.

At the rear end of the container 12, the cap 40 has a central aperture in the form of a through bore 46 through which the rearward section of the shank 16 passes. The bore is coaxial with the longitudinal axis of the cavity 38 and the longitudinal axis of the shell 36. The through bore 46 makes a journaling, i.e. bearing fit with the outside diameter of the shank so that it permits

rotation of the auger 14, but prevents bits and particles of debris from passing therethrough between the shank and the bore. It will be noted that the collar 22 on the shank 16 is located on the interior side of the cap 40, and the handle 30 is located on the exterior of the container 12.

The container 12 further includes a passageway 48 located at the front of the container, the passageway being of circular constant cross-section and being in axial alignment with the through bore 46 in the cap 40. The passageway 48 is elongated and runs from the interior cavity 48 out the front end of the container 12, the foremost end of the passageway 48 constituting an open mouth 50 for the container. The passageway 48 is of a diameter such that the auger bit 24 can shift axially therealong and is a rotatable fit therein whereby the auger bit is journaled in the passageway which serves as a bearing therefor. The cavity 38 immediately adjacent to the interior end of the passageway 48 is conical as at 52.

Both the exterior surface of the cap 40 and the exterior surface of the shell 36 carry longitudinally oriented ribs as at, respectively, 54-56, to enable said cap to be readily separated from the shell 36 by the user's hands, as well as enable a user to obtain a good non-sliding grip on the container.

Adjacent its forward end the shell 36 has a radially outwardly protruding circular flange 58 which is in one piece with the remainder of the shell. Said flange 58 serves as a seat against which the hand of the user, when his hand is curled about the container 12, may exert pressure to hold the mouth 50 of the container forcefully against a wall surface. The shell is tapered forwardly of the flange 58 to increase the visibility of the protruding point of the gimlet when locating the auger immediately prior to use.

The mouth 50 of the container has a forwardly protruding tapering annular lip 60 concentric with the passageway 48 and having an inner diameter that is an extension of said passageway. During use of the auger assembly the thin rim of the lip is pressed against the wall surface and, due to its narrow area, forms an excellent seal to insure that no debris will fall from the hole being bored between the container and the wall surface onto the floor or surrounding areas of the apartment or home, the spiral auger conveyor efficiently transporting such debris across said seal.

Turning then to the operation of my auger assembly 10, the assembly is gripped by the hands of the user, usually his left hand encircling the container 12 and his right hand gripping the handle 30 of the auger 14. The gimlet tip is advanced so as to project from the container and is pressed against the usual mark on the wall where the hole is to be bored. Then the container is advanced on the auger until the lip 60 circumscribes the location at which the hole is to be formed. The container is held perpendicularly to the wall so as to permit the lip 60 to form a good seal therewith.

The hole is usually formed in a vertical wall, but my auger assembly can form holes in almost any penetrable surface. With the container pressed against the wall surface and held stationary with respect thereto, the handle 30 is pressed axially of the container toward the wall surface until the gimlet 28 pierces the wall surface as far as is possible by hand pressure. Then, still pressing toward the wall, the handle 30 is rotated in the appropriate direction (clockwise) so that the cutting edges 27 bore into and form a hole H (see FIG. 3) in the wall W.

As the auger is manually rotated by one hand of the user, the container 12 serves both as an anchor to locate the auger with respect to the wall as well as a bearing which mounts the auger for rotation and advancement. As the auger bit 24 continues to travel forwardly into the wall while forming a hole therein, the flutes 26a thereof convey debris loosened from the wall material during the boring operation rearwardly, the debris being conveyed by the flutes co-operating with the passageway 48 from the hole H through the lip 60 to the interior cavity 38.

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The boring operation is continued until a hole of sufficient depth is formed or until the auger breaks into an interior hollow, e.g. in back of the sheet covering for a hollow wall.

When the boring operation is completed, the auger 14 is withdrawn by pulling the handle 30 axially rearwardly. At this time, the container 12 is still kept in its location adjacent the wall, as the withdrawal of the auger bit 24 will carry with it more debris, some jammed in the flutes, which will drop into the interior of the container. Abutment of the collar 22 against the inner surface of the cap limits rearward withdrawal of the auger. Once the auger has been fully withdrawn back into the container 12, my auger assembly 10 may be removed from the wall surface, leaving a properly cut hole H therein, without debris or dirt having fallen to soil adjacent areas. The assembly is next brought to a larger waste receptacle, the cap 40 removed from the shell 36, and the debris and dirt in the cavity 38 dumped into the waste receptacle.

Desirably, the auger 14 is made from a tough rigid metal, such as steel, while the handle 30, the shell 36 and the cap 40 are formed from a conventional tough resin such as polyethylene or a butadiene modified styrene resin.

A second embodiment 10' of my auger assembly is illustrated in FIG. 4 and includes an auger 14' identical with, and a container 12' substantially similar to, the corresponding parts of the assembly 10, shown in FIGS. 1 through 3. The container 12' differs in that the lip 60' thereof, and an immediately adjacent annular base 64 for the lip are formed from a tough and durable flexible elastomeric material such as natural or synthetic rubber having a resiliency about equal to that of the tread of a tire for a passenger automobile. The lip 60' and its base 64 are in one piece. The base 64 is received in a large diameter bore 66 in the front of the passageway 48', the bore 66 being concentric with the passageway 48'. The elastomeric lip material permits said lip to form an especially good seal with the area of the wall surface surrounding the bore H even if the wall surface has small irregularities. Further, the lip 60' tapers radially inwardly toward the front of the assembly and when the container 12' is pressed against the wall surface, the rim 68 is urged even further radially inwardly. The slope formed by the lip tends to facilitate the movement of debris located at said lip rearwardly along the passageway and to prevent pile-up of debris at the junction of the wall and the container. The resiliency of the lip material permits the auger bit 24' to pass therethrough without substantial interference.

Different auger assemblies with augers of different diameters are supplied to drill holes of different diameters.

It thus will be seen that I have provided auger assemblies which achieve the several objects of my invention and which are well adapted to meet the conditions of practical use.

As various possible embodiments might be made of the above invention and as various changes might be made in the embodiments set forth, it is to be understood that all matter herein described or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, I claim as new, useful, and unobvious, and desire to secure by Letters Patent:

1. A portable manually operable auger assembly for boring a hole into a wall and receiving and temporarily containing debris from the formation of said hole, said assembly including

- (A) an auger comprising
  - (i) an elongated shank,

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- (ii) a handle fixed to the rear end of the shank to facilitate manual rotation of the auger and
- (iii) a spirally fluted auger bit at the other end of the shank, and

(B) a container arranged to be gripped by one hand and comprising

- (i) a closed shell
- (ii) having an interior hollow cavity between the front and back of the shell,
- (iii) said shell having a bearing aperture adjacent the back thereof through which the shank passes and is rotatably journaled with the handle located exteriorly of the shell and
- (iv) a linear bearing passageway at the front of the shell in axial alignment with the aperture,
- (v) said passageway having a leading mouth,
- (vi) the passageway running from the exterior front end of the shell into the cavity and engaging the auger bit as a bearing for both axial shifting and rotative journaled movement,

(C) whereby when the container is held by one hand of the user stationary with respect to the wall with its mouth pressed against a vertical wall surface and the auger is rotated and advanced into a wall by the other hand of the user, the auger bit will bore a hole therein and the spiral flutes of the bit will convey debris from the formation of the hole along the passageway in which it is journaled and into the container cavity.

2. An auger assembly as set forth in claim 1 wherein the container further includes a closure cap for the cavity and means detachably connecting the cap to the remainder of the container, whereby when the cap is separated from the container, debris located in the interior cavity can be removed therefrom.

3. An auger assembly as set forth in claim 1 wherein the handle is located at the rearward terminus of the shank.

4. An auger assembly as set forth in claim 1 wherein a circular collar intermediate the ends of the shank is located within the shell and is of a diameter greater than the diameter of the aperture, said collar preventing rearward removal of the auger from the container.

5. An auger assembly as set forth in claim 1 wherein the auger bit has a leading tapered gimlet integral therewith and in axial alignment with the auger shank, said gimlet facilitating penetration of the bit into a wall surface.

6. An auger assembly as set forth in claim 1 wherein the shell includes a forwardly protruding annular lip circumscribing the mouth of the passageway.

7. An auger assembly as set forth in claim 6 wherein the lip is forwardly tapering.

8. An auger assembly as set forth in claim 6 wherein the lip is formed from flexible elastomeric material.

9. An auger assembly as set forth in claim 1 wherein the shell has an exterior annular flange located on a forward portion thereof, said flange constituting a pressure seat for the hand of the user gripping the container.

10. An auger assembly as set forth in claim 1 wherein the interior cavity is cylindrical and wherein the shank passes centrally therethrough along the axis of the cavity.

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