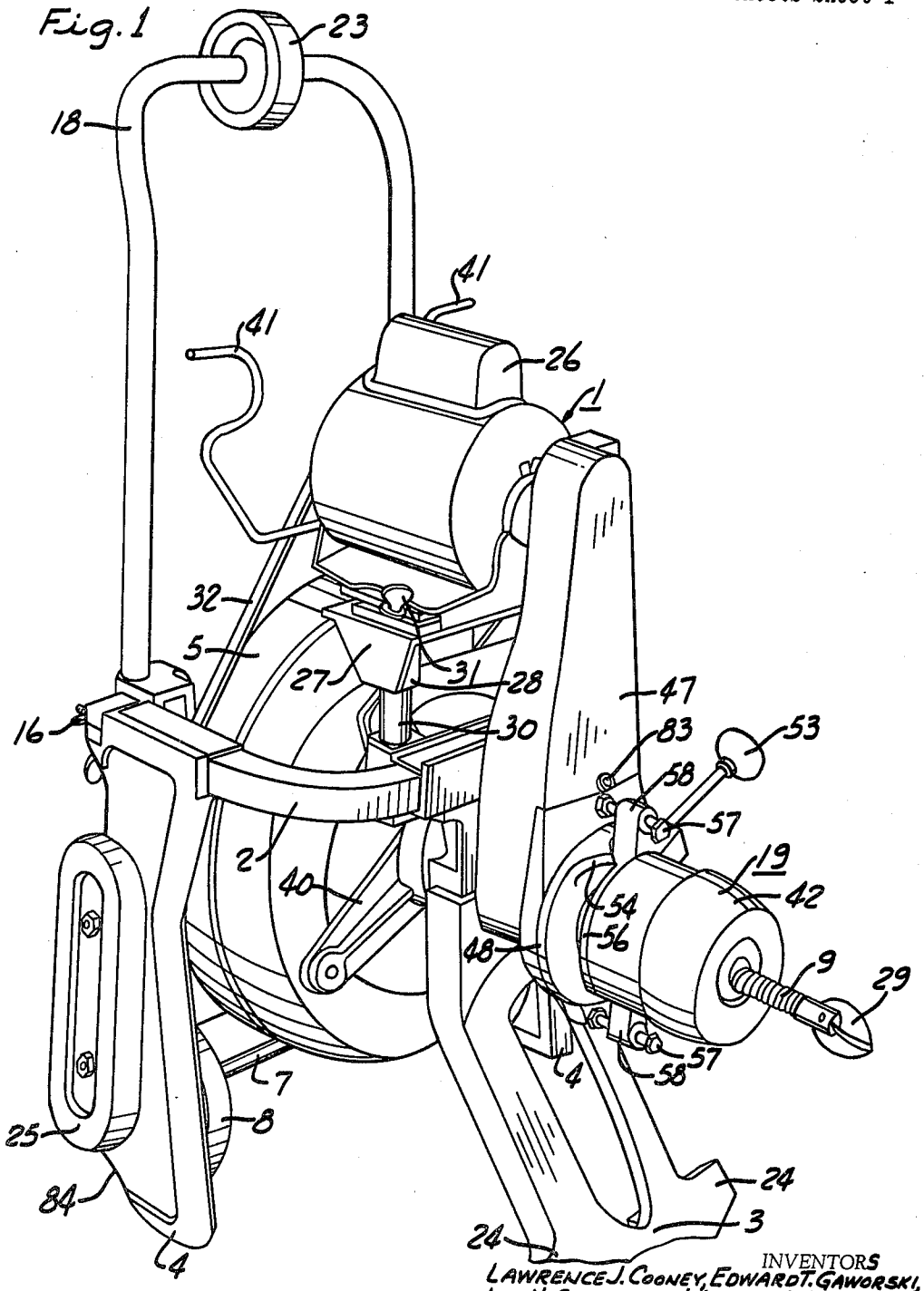
April 19, 1966 L. J. COONEY ETAL 3,246,354

SEWER AUGERING MACHINE WITH AUTOMATIC FEED MECHANISM AND INTERCHANGEABLE DRUM MEANS

Filed July 23, 1964 5 Sheets-Sheet 1

Fig. 1



INVENTORS
LAWRENCE J. COONEY, EDWARD T. GAWORSKI,
LEE H. SILVERMAN & ARTHUR A. SILVERMAN
BY
CAROTHERS AND CAROTHERS
THEIR ATTORNEYS

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Fig. 2

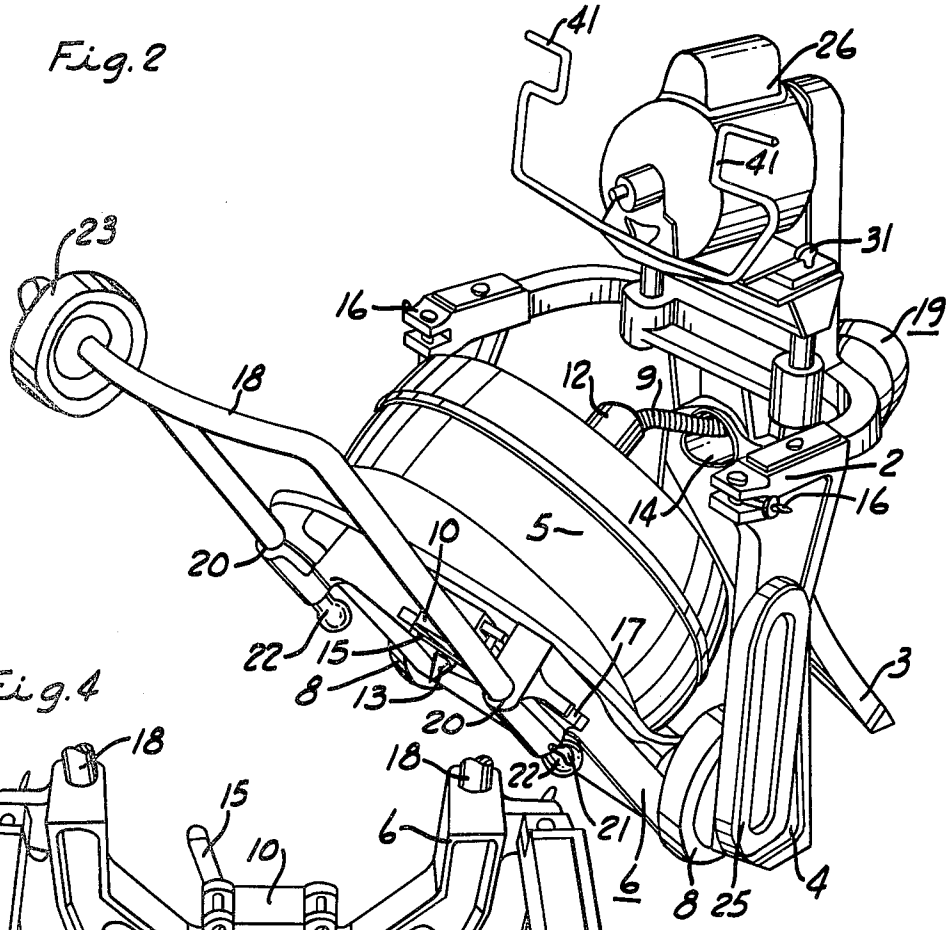

Fig. 4

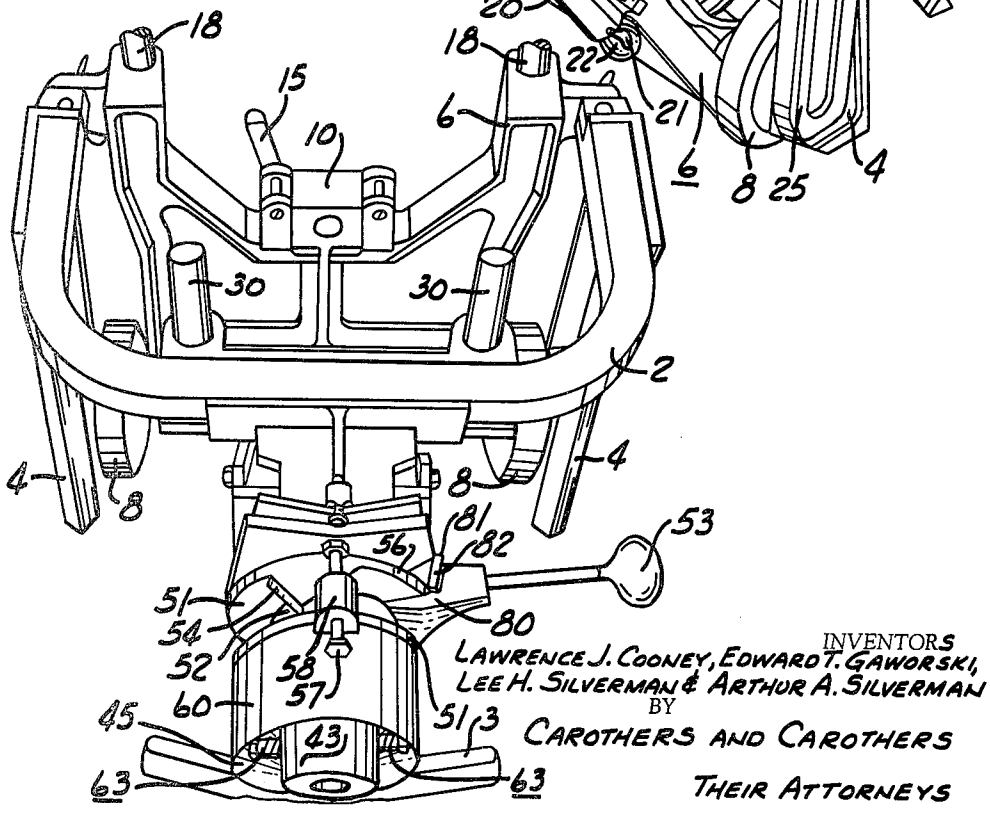

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Fig. 10

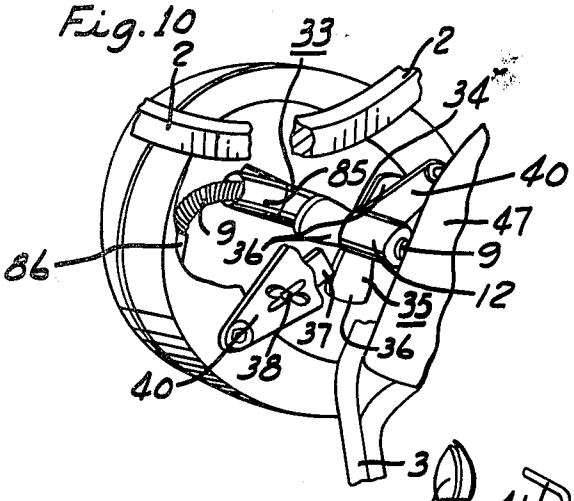
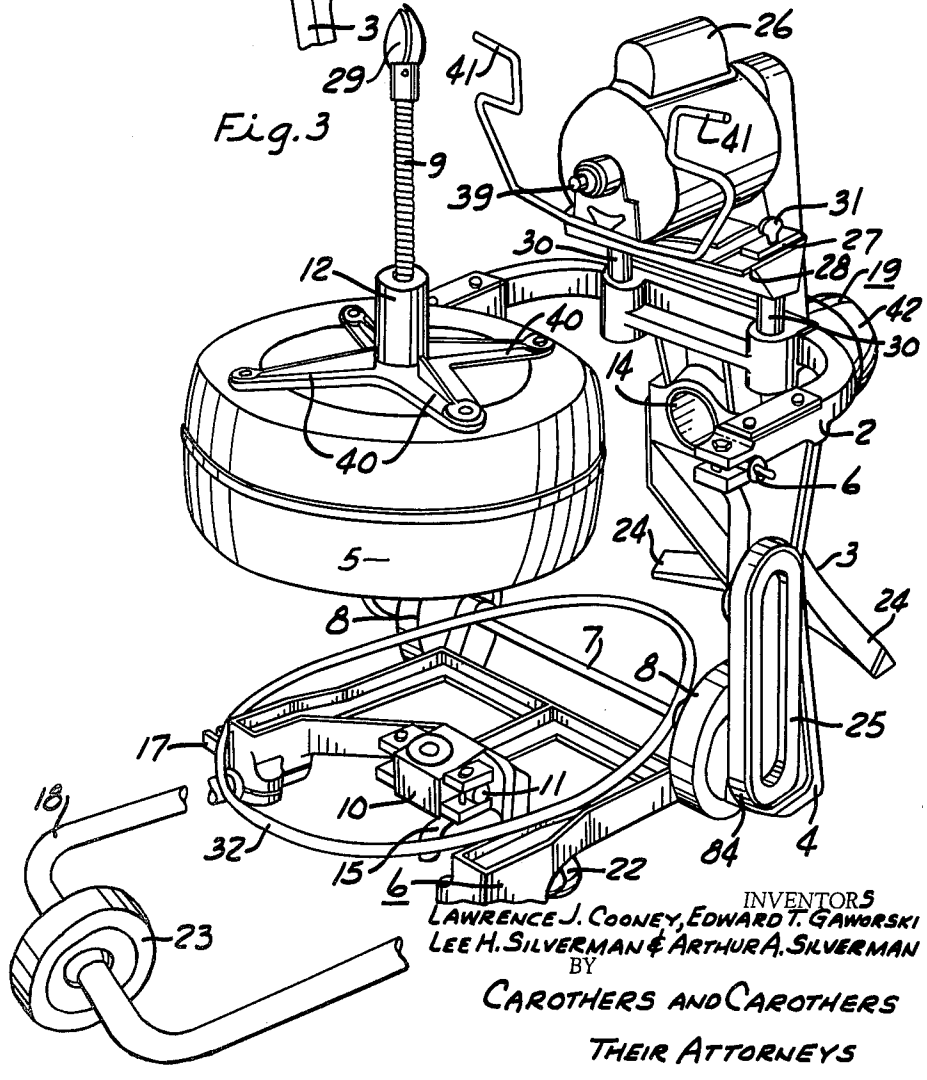


Fig. 3



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LEE H. SILVERMAN & ARTHUR A. SILVERMAN
BY
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Fig. 6

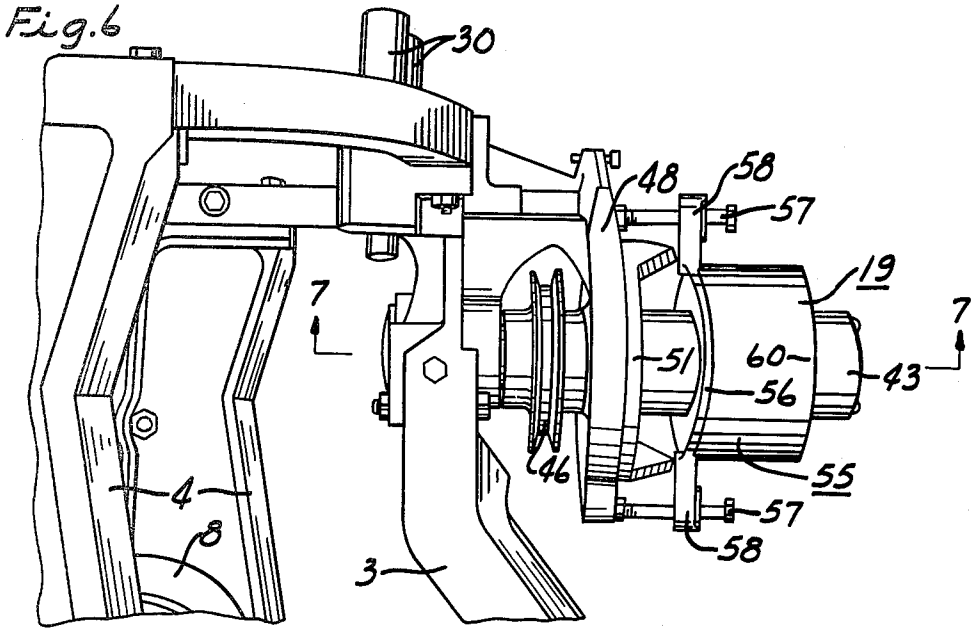
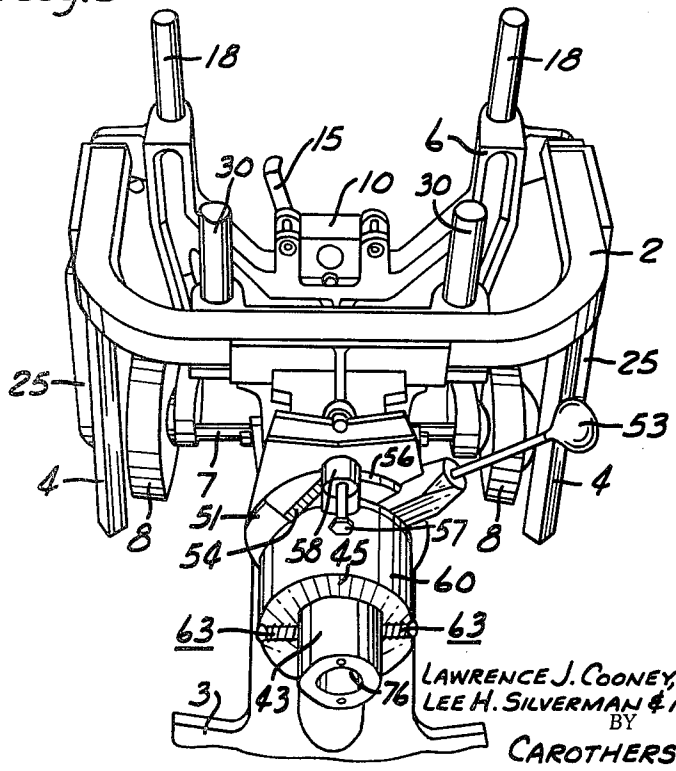


Fig. 5



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LEE H. SILVERMAN & ARTHUR A. SILVERMAN
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THEIR ATTORNEYS

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Fig. 7

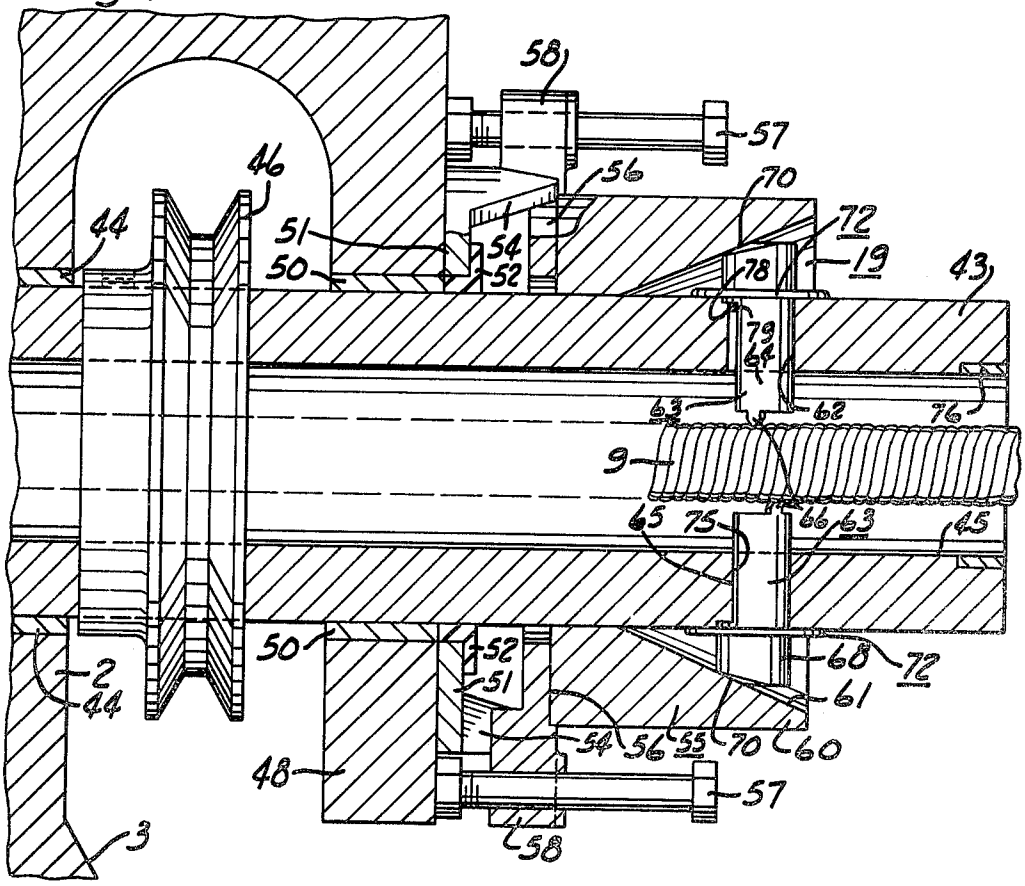


Fig. 8

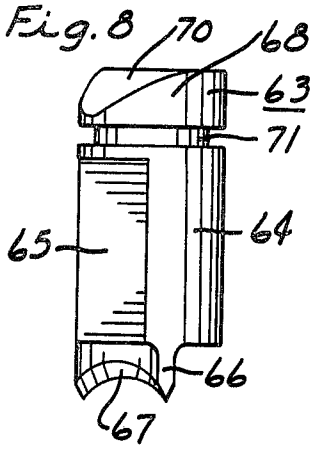
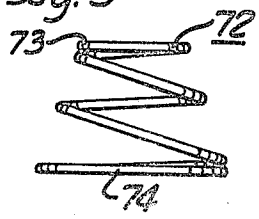


Fig. 9



INVENTORS
LAWRENCE J. COONEY, EDWARD T. GAWORSKI,
LEE H. SILVERMAN & ARTHUR A. SILVERMAN
BY
CAROTHERS AND CAROTHERS
THEIR ATTORNEYS

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Patented Apr. 19, 1966

3,246,354

SEWER AUGERING MACHINE WITH AUTOMATIC FEED MECHANISM AND INTERCHANGEABLE DRUM MEANS

Lawrence J. Cooney, Pittsburgh, Edward T. Gaworski, Ingram, and Lee H. Silverman and Arthur A. Silverman, Churchill, Pa., assignors to General Wire Spring Company, Pittsburgh, Pa., a partnership

Filed July 23, 1964, Ser. No. 384,622
20 Claims. (Cl. 15—104.3)

This invention relates generally to sewer augering machines for cleaning and removing obstructions from pipes and conduits and more particularly to an automatic feeding mechanism and a pivotal frame structure for such sewer augering machines.

The sewer augering machine of the type disclosed in this invention utilizes a so-called plumber's snake which consists of a central wire or cable core with a helically wound armor in the form of a coil spring on the core to produce a very flexible cable or snake. The snake is fed from a storage drum which is rotatably supported on a frame to a snake-engaging drive means which feeds and advances the snake into pipe or conduit to be cleaned.

Heretofore many problems have existed in these types of machines concerning their portability, stability, simplicity of the snake-engaging drive means not only in connection with operative use but also ease of disassembling for repair and cleaning, and need for immediate interchangeability of the rotary storage drum used on such machines. It is the object of this invention to eliminate these problems.

The principal object of this invention is the provision of an automatic feed mechanism for engaging a helically wound sewer auger snake to feed the same into the pipe to be cleaned.

Another principal object of this invention is the provision of a sewer augering machine with a retractable frame assembly to permit readily the removal of the rotary drum in which the helical wound cable or snake is stored. Thus the retractable frame assembly gives the machine interchangeability of drums not only making it simpler to quickly change to a different diameter of cable but also permitting the addition of other lengths of cable to a cable already inserted in a pipe to be cleaned where the job demands a greater length of cable.

Another object of this invention is the provision of a cable feeding mechanism which has an adjustable chuck to permit the feeding of a wide range of different diameter helical wound cable.

Another object of this invention is the provision of a cable feeding mechanism consisting of a cam follower having an inwardly extended conical surface which is moved axially on a feed throat tube, through which the cable is fed by a rotatable cam plate. Spring biased cable guides extend radially through said throat tube and have teeth at one end to engage the helical wound armor on the cable. The other ends of said cable guides are beveled to be received by the conical surface of the follower when the latter is actuated by the cam plate. Thus the follower will force the cable guides inwardly in order that the cable guide teeth will grasp the cable and feed the same through the throat tube.

Another object of this invention is the provision of a snake feeding mechanism which can be disassembled for cleaning and repair without any tools.

Another object of this invention is the combination of a retractable frame assembly to permit drum interchangeability and an automatic adjustable feed mechanism to provide one sewer augering machine capable of feeding helical wound cables of different diameters.

Another object of this invention is the provision of a frame that is tripod shaped having three legs to permit

leveling of the augering machine and give stability to the machine especially during operation.

Another provision of this invention is the provision of a frame with a pair of wheels and axial assembly, which wheels are slightly lifted off the surface of the ground when the three legs of the frame are in contact with the surface of the ground.

Another provision of this invention is the provision of a movable handle which when retracted into its lower position aids in stabilizing and leveling the augering machine and when extended permits handling of the machine from place to place when the frame is caused to be pivoted onto the wheels.

Another object of this invention is the provision of a wheel member on the upper extremity of the handle which permits the three wheels together to suspend and roll the frame and the machine on the ground regardless of the position of the handle. Furthermore, the handle wheel member aids in loading the machine on a truck, loading dock, etc., acting as a fulcrum when the machine is lifted by the forward leg.

Another object of this invention is the provision of slide support means on the lower rearward end of the frame to permit the machine to easily climb and descend stairs.

Another object of this invention is the provision of arms at the bottom of the forward leg of the tripod frame of the machine to aid in leveling and stabilizing the machine as well as act as handle grips when the machine is to be placed on a higher level surface such as a truck bed or loading dock by pivoting on the frame on the handle wheel member.

Another object of this invention is the provision of a rotatable hollow spindle journaled axially within the drum with a side entry therein for passage of the cable from the interior drum through the opening and axially out of the spindle. The drum is also provided with a latch that has indentations which may be engaged by dog members secured to the spindle to prevent the spindle from rotating within the drum.

Another object of this invention is the provision of an outboard pivotal bearing on the retractable frame assembly for suspending the drum and to permit easy removal of the drum from the retractable frame assembly when the latter is in retracted position and at the same time permit easy removal or retraction of the starting cable from the feed throat tube. The pivotal bearing block is provided with a latch which fits into an annular groove in the rotary shaft of the drum when the shaft is protruding through and out of the block. Thus the drum may be locked when positioned on the retractable frame assembly and remain locked thereon until the retractable frame is pivoted, permitting removal of the drum from said frame.

Another object of this invention is the provision of a reversible motor to rotatably drive, in either direction, the feed mechanism and rotate the drum through a belt and pulley arrangement. The motor is secured to a small base and is slidably supported on a pair of pins extending upwardly from the tripod or main frame. The motor base is provided with downwardly extending socket members which slidably engage the pins on the frame. Thumb screws are provided in the ends of the socket members on the motor base so adjustment can be made for tension on the driving belts as well as permit quick and easy removal of the motor from the tripod frame.

Another object of this invention is the provision of a sewer augering machine which may readily be disassembled into three major and distinct parts, for storage or any other purposes, some already mentioned: the motor, the drum and the tripod frame.

It should be noted that an auger cable or snake must be rotated at all times in order that the feeding mechanism can effectively feed the auger cable into the pipe or conduit to be cleaned. In this regard the feeding mechanism must by necessity rotate at a faster speed than that of operating or rotating the whole auger cable. A helical wound cable having left-hand armored helix is used and the feeding mechanism is driven at a faster rate or rotational speed than the speed of rotation of the cable. Thus the feed mechanism and drum although rotating at different speeds are rotated in the same direction.

Other objects and advantages appear hereinafter in the following description and claims.

The accompanying drawings show for the purpose of exemplification without limiting the invention or claims thereto certain practical embodiments illustrating the principles of this invention wherein:

FIG. 1 is a perspective view of the sewer augering machine comprising this invention.

FIG. 2 is a perspective view of the sewer augering machine comprising this invention with the retractable frame assembly partly in its retracted position.

FIG. 3 is a perspective view of the sewer augering machine comprising this invention with the retractable frame assembly in full retracted position to permit removal of the cable drum.

FIG. 4 is a forward perspective view of the tripod frame and feeding mechanism comprising this invention with cam plate handle in the cam retracted position.

FIG. 5 is another perspective view similar to FIG. 4 showing the cam plate handle in its uppermost position permitting feed mechanism to be disassembled.

FIG. 6 is a side view of the feed mechanism showing the cam plate having extended the cam follower in its forward position, i.e., the full cam extended position.

FIG. 7 is a sectional view of the feed mechanism taken along the line 7—7 of FIG. 6.

FIG. 8 is a perspective view of a cable guide.

FIG. 9 is a side view of the spring used in combination with the cable guides in the feed mechanism.

FIG. 10 is a perspective cutaway view showing the rotary storage drum interior.

Referring now to FIG. 1, the sewer augering machine comprising this invention is shown illustrating the various points comprising the complete invention.

The main base or frame **2** of the machine **1** is in the form of a U-shaped member and is supported by the forward leg **3** and two rearward side legs **4**. Thus the base frame **2** in combination with the forward leg **3** and the rearward side legs **4** forms a tripod frame with a front wide leg pointed to readily permit leveling of the machine **1**.

The storage drum **5** is rotatably supported within the frame **2**. The drum **5** is of the circular cylindrical type and is used for storing and carrying a helically wound sewer augering cable or snake which is very flexible due to its helical wound armor and is commonly used by plumbers for cleaning and removing obstructions from waste pipes wherein the snake **9** is advanced through the pipe and rotated at the same time. The helical snake **9** is fed through the central axis of the drum **5**. As shown in FIGS. 1 and 2, the snake **9** is fed axially out of the drum **5** through the auger feed mechanism **19** whereupon it is continually power fed into the pipe or conduit to be cleaned. The forward end of the snake **9** is provided with a cutting tool **29** for the purpose of performing cutting operations in order to cut away the different obstructions that may be found in a sewer. The head **29** is readily removable from the end of the snake **9** so that different heads may be placed on the snake which will perform different cutting operations necessary in the sewer or pipe to be cleaned.

Referring to FIGS. 2 and 3, there is illustrated the retractable frame assembly **6** which is pivotally secured to the axle **7**, which axle also secures the wheels **8** to the legs **4**. The retractable frame assembly **6** permits the storage drum **5** to readily be removed from the frame **2** so that a different storage drum may be placed on the machine. The retractable frame assembly **6** carries an outboard pivotal bearing **10** which is rotatably journaled on the frame **6** as shown at **11**. The drum **5** is provided with supporting shafts **12** and **13**. The shaft **12** is journaled in the bearing support **14** in the frame **2** as shown in FIG. 3 and the shaft **13** is journaled in the pivotal bearing **10**. The end of the shaft **13** is provided with an annular groove so that when the shaft is placed within the bearing **10** the latch **15** is placed within the groove of the shaft **13** in order to maintain the drum **5** secured to the retractable frame assembly **6**.

The retractable frame assembly is secured to the main frame or base **2** by the swivel wing nuts **16** which lock in the notches **17** of the retractable frame assembly **6**. The retractable frame assembly **6** is also provided with a U-shaped handle **18** which is slidably secured in the cylindrical openings **20**. The handle **18** may be fixed in any vertical position by tightening the wing nuts **21** on the frame **6**. When the handle **18** is retracted to its lowest position so that the rubber feet **22** touch the ground the actual effect is the extension of the side legs or feet **4**, which gives the machine **1** a greater length of contact with the ground, preventing the machine from moving forward during operation thereof. Thus by dropping the handle **18** the machine is given greater stability, which is one of the important advantages of the over-all improvement of this type of machine.

The handle **18** is also provided with a wheel member **23** which is located on the upper end of the handle **18**. The wheel member **23** is rotatably journaled within the handle and materially aids in moving the machine about, especially when the machine is to be moved from one elevation to another. In this regard it should be noted that the forward leg **3** is provided with outwardly extending feet **24** which not only aid in stabilizing the machine during operation but also act as handle grips when the machine is being moved to a higher elevation. With the handle shown in an extended position in FIG. 1 the wheel member **23** is placed against the edge of the higher elevation and the operator grasps the feet **24** and thus may roll the machine **1** on to the higher elevation, the wheel member **23** acting as a fulcrum. This is the simple "wheelbarrow" principle which is used to move this machine from one place to another, especially to a higher elevation such as the bed of a truck.

Slide support means **25** are provided on the rearward edge of the legs **4** which materially aid in moving the machine up and down stairs, aiding in the over-all handling of the machine **1**. It should be noted that the U-shaped handle must be extended practically in its uppermost position in order to expose the slide support means **25**.

The motor **26** is reversible and supported on the motor base **27** which is provided with downwardly extending socket members **28** which slidably fit upon the pin members **30** as shown clearly in FIG. 3. As shown in FIG. 1, the motor is adjustable for vertical height by thumb screws **31** which upon being driven inwardly of the base **27** will raise the motor **26** on the pin members **30**. The drum **5** is rotatably driven by the motor **26** through the V-belt **32**. Thus it should be noted in connection with FIGS. 2 and 3 that the tension placed on the belt **32** may be adjusted by the thumb screws **31**.

Referring now to FIG. 10, the drum **5** is provided with a tubular shaft **33** which is rotatably journaled within the drum **5** as indicated at **34**. As shown in FIG. 10 the tubular shaft member **33** is provided with a tubular member **85** which extends transversely out of the tubular shaft **33**. The coiled snake or cable **9** passes through the tubular extension **85** to the tubular shaft **33** where it is directed axially out of the drum **5** through the bearing member **12** into the feed mechanism **19**. The end of the

snake 9 may be fastened to the back of the drum 5 by means of a suitable clamp, such as illustrated at 86.

The tubular shaft 33 is provided with a latch member 35 that has indented portions between extended portions 36 for receiving the sliding dog member 37. The dog member 37 may be slidably secured in position upon tightening of the thumb screw 38. The dog member 37 may be placed on any of the radial arms 40 of the drum 5 as shown in FIG. 10. Thus the tubular shaft 33 may be held in a stationary position relative to the drum 5 by inserting the dog member 37 between any of the extended portions 36.

The machine 1 having been so far generally described reference now is made to the ease of changeability of the drum 5 or the removal thereof from the retractable frame 6 and base frame 2. As shown in FIG. 2 the swing away wing nuts 16 are loosened and removed from the notches 17 in order that the retractable frame assembly 6 may pivot on the axle 7 away from the base frame 2. Before the frame assembly 6 is pivoted away from the base 2 the adjustable thumb screws 31 should be loosened in order that the motor 26 and its base 27 will slide downwardly on the pin members 30. The V-belt 32 then may be removed from the motor pulley 39. The latch member 15 remains secured on the shaft 13 so that the drum 5 will remain with the retractable frame assembly 6 when the latter is pivoted away from the base 2. It should be noted that the bearing support 14 is somewhat larger than the bearing member 12 of the drum 5 especially at its outer end. This enables the bearing member 12 to pass out of its bearing support 14 easily on pivoting of the retractable frame assembly 6 as shown in FIG. 2. The helical wound snake 9 protrudes from the axial center of the drum 5 through the center of the bearing member 12 and may be removed from within the bearing support 14 and the feed mechanism 19 by bending or flexing the same as shown in FIG. 2.

When the retractable frame assembly 6 has been pivoted to its full extent so that it is lowered on the ground as shown in FIG. 3 the latch 15 may be lifted to release the shaft 13 of the drum 5 and the drum 5 may be lifted upwardly as shown in FIG. 3 out of the outboard pivotal bearing 10. At this time another drum 5 may be placed on the machine and the latch 15 closed on its shaft 13 to hold the same securely to the retractable frame assembly and thus the sequence of operation is reversed. As the frame assembly 6 is raised off the ground the protruding end of the snake 9 from the drum 5 is fed into the opening of the support bearing 14. The bearing member 12, upon continuously pivoting the frame assembly 6 towards the base 2, will slidably fit within the bearing support 14. The swing away latch bolts 16 may then be swung in position over the notches 17 to lock the frame assembly 6 to the base 2. The drum 5 is then in its rotatable position on its bearing supports 14 and 10 and may be rotatably driven by the motor 26 through the V-belt 32. Thus the retractable frame assembly 6 readily permits the operator to quickly change the drums 5 not only in order to add additional length of helical wound snake 9 during a sewer cleaning job but also readily permits the operator to switch to a different diameter snake. This novel interchangeability of storage drums for sewer augering machines forms an important portion of the invention in this application.

The motor 26 may be provided with a pair of hook members 41 so that the electrical cord to the motor 26 may be wound around them when the machine is not in operation.

Another important aspect of the machine comprising this invention is the feed mechanism 19 for the snake 9, which mechanism is supported on the forward end of the frame or base 2 above the forward leg 3. As shown in FIG. 1 a cover 42 is provided over part of the feed mechanism 19 in order to protect the parts. FIGS. 4, 5, 6 and 7 clearly illustrate the construction and use of the feed mechanism 19 and reference now is made to FIG. 7 wherein the feed mechanism 19 comprises generally a tubular feed throat 43 which is rotatably journaled by the bearing 44 on the forward end of the base 2. The throat 43 being tubular has an inner passage 45 which connects with, and is in axial alignment with, the bearing support 14. Thus when the bearing member 12 of the drum 5 is in its bearing support 14 the bearing member 12 and the tubular throat 43 are in axial alignment and thus permit the auger snake 9 to freely pass therethrough.

The V-belt pulley 46 is secured to the throat 43 and is rotatably driven by the motor 26 through the use of a V-belt (not shown). The V-belt for rotatably driving the throat 43 is protected by the cover plate 47 as shown in FIG. 1 so as not to endanger the operator while the machinery is in operation.

As noted in FIGS. 6 and 7 a part of the base 2 consists of an overhang portion 48. The tubular throat 43 extends through the overhang portion 48 and is journaled therein on the bearing member 50. Thus the tubular throat 43 is rotatably supported on the frame 2 at two different places and is rotatably driven through the pulley 46 between the places where the throat 43 is journaled on the base 2.

Journaled on the forward side of the overhang portion 48 of the frame 2 is the cam plate 51 which is independently journaled and radially adjustable on the throat 43 on the independent bearing means 52. The cam plate 51 is provided with an outward radial extending handle 53 so that the operator of the machine 1 may make adjustments to the feed mechanism 19. The cam plate 51 is provided with forwardly extending cam surfaces indicated at 54, which cams upon rotation of the cam plate 51 will slide forwardly the cam follower 55. The cam follower 55 consists of two different parts. The annular plate 56 of the cam follower 55 is in coaxial alignment with the throat 43 but does not engage the throat as shown in FIG. 7. The plate 56 is slidably secured to the overhang portion 48 of the frame 2 by the slide members 57. The slide members 57 may be in the form of bolts which are fastened to the overhang portion 48 and the annular plate 56 is provided with arm portions 58 which have openings therein to permit their slidable engagement with the slide members 57. It should be noted that the arms 58 of the annular plate 56 are thicker and larger in proportion to the annular plate 56 per se due to the fact that they also act as camming surfaces on rotation of the cams 54 by the handle control 53. The other portion of the follower 55 is coaxial and slidable on the throat 43 and is in the form of a cylindrical housing as indicated at 60.

The housing 60 is provided on its forward end with an inward extending surface of conical configuration as indicated at 61. The other end of the housing 60 is provided with a bearing surface so that it may be permitted to rotate freely on the throat 43 independently of the annular plate 56 which is fixed to the overhang portion 48 of the frame 2 and therefore not permitted to rotate. Transverse openings 62 are provided in the throat 43 for receiving the snake or cable guides 63. As noted in FIG. 8 the cable guides 63 are provided with a stem portion 64 which is generally cylindrical in shape except for the flat face 65. The bottom of each snake guide is provided with a tooth member 66 which is tapered and concave in shape as indicated at 67 in order to mate with the shape between turns of the helical wound snake 9 as illustrated in FIG. 7. The snake guide 63 is also provided at its other end with a head member 68 which has a beveled surface 70 so that it may slidably fit against the conical surface 61 of the cam follower 55. The head member 68 is also provided with an annular groove 71 for receiving the biasing spring 72 which is illustrated in FIG. 9.

The upper circular loop 73 of the spring 72 may be snapped firmly in the groove 71 and at all times bias

the snake guide 63 in an outwardly direction away from the axial center of the throat 43 as indicated in FIG. 7. As noted in FIG. 9 wherein the spring 72 is shown the spring is made increasingly larger toward its bottom so that the bottom loop 74 is practically twice as large as the upper loop 73. This aids the snake guide 63 in not catching in the opening 62, which is important, since the camming action against the beveled head 70 is always at an angle with respect to the direction of sliding motion of the snake guide 63. Thus the spring 72 helps maintain the guides 63 in straight line position with respect to the openings 62 so that the guide 63 will not get caught in the opening 62.

It should be noted that the tooth member 66 on the end of the guide 63 is not only tapered at 67 in order to fit the shape between adjacent turns of the helical wound armor on each snake 9 but also is of helical configuration with respect to the flat face 65 of the stem 64 when the tooth member 66 is secured to the bottom of the stem. This brings to mind the purpose of the face 65 which is engaged by the flat wall 75 in the openings 62 which permit the stem to slide inwardly and outwardly away from the axial center of the tubular throat 43 and will maintain the guides 63 from changing the rotary position of the tooth member 66 relative to the axis of the tubular throat 43.

Another form of preventing the guides 63 from rotating within their respective slots 62 would be to drill the openings or slots 62 cylindrical, eliminating the wall 75 in each of the slots. This is illustrated in the upper portion of FIG. 7 wherein an annular groove 78 passes over a portion of each slot. A wire spring 79 may then be inserted into the annular groove and that part of the spring 79 passing the edge of the opening 62 may cooperate with the flat face 65 of the guide 63 in order to prevent the guides from rotating in the respective openings 62.

The outer end of the tubular throat 43 is provided with a wear ring 76 which prevents excessive wear by the snake 9 as it proceeds out of and past the opening 45. As can be imagined the snake 9 does not always proceed out of the opening 45 in axial alignment with a pipe or conduit to be cleaned and thus a large amount of wear may appear at the opening 45 especially due to the fact that the snake 9 is rotating as well as the feed mechanism 19. The wear ring 76 being made of hard material, such as high carbon steel, helps reduce excessive wear at this point.

Having explained the structural features of the feed mechanism 19, FIGS. 4, 5 and 6 help to illustrate the function and operation of the food mechanism. It will be noted in each of these figures that the cover 42 as shown in FIG. 1 has been removed along with other parts such as the drum 5 and motor 26 in order that the feed mechanism 19 might be more clearly illustrated.

As mentioned above, the handle 53 as shown in FIGS. 4 and 5 is mounted on the annular cam plate as indicated at 80 and thus the cam plate 51 may be rotated about the throat 43 on its bearing member 52. The handle 53 is threadably secured in the member 80, and upon threading inwardly the handle 53, the threaded section under the stem will come in contact with the plate member 81. Thus the handle 53 when threaded inwardly against the plate 81 acts as a stop or hold so that the parts making up the feed mechanism 19 are held in fixed position. It should be noted that the plate member 81 has a tab 82 which projects outwardly from the overhanging portion 48 of the frame or base 2. The tab 82 prevents the operator from passing the stem of the handle 53 past the position of the tab. The cam plate 51 may be rotated counterclockwise, the member 80 passing over the tab 82 only when the stem of the handle 53 is withdrawn into the member 80, permitting the member 80 to pass over the end of the tab 82. Thus the tab 82 functions as a stop and when the handle 53 is withdrawn outwardly and the cam plate 51 rotated counterclockwise to the position shown in FIG. 5 the cams 54 will be completely withdrawn from underneath the arms 58 of the annular plate 56. The biasing springs 72 will thus force the follower 55 to slide rearwardly on the throat 43 substantially the full extent of the sliding members 57. Thus the handle 53 in its counterclockwise extreme position past the tabs 82 permits the removal of the snake guide 63 and the withdrawal of the follower 55 off of the throat 43. This is all shown in FIG. 5 wherein the guide members 63 are in a position to be removed from the throat 43.

The handle 53 may be rotated in a clockwise direction past the tab 8 over its plate member 81 to the full extent of its clockwise rotation, which is the position of the cam plate 51 as shown in FIG. 6. It will be noted that the protruding cam members 54 of the cam plate 51 have forced the follower 55 in its forwardmost position. In this position the snake guides 63 have been slid inwardly in a respective slot 62 for their full extent by the surface 61 of the housing 60. Thus there is a wide range of adjustability through the handle 53 and rotation of the cam plate 51 between the tab 82 and the full clockwise position of the cam plate 51 as illustrated in FIG. 6 wherein adjustment can be made of the depth of insertion of the the tooth end of the snake guide 63 transversely into the opening 45 of the tubular throat 43. The cam plate 51 in cooperation with the cam follower 55 and the snake guide 63 give a wide range of versatility to the sewer augering machine of this invention by permitting many different sizes of helically wound augering snakes to be fed by the feed mechanism 19 due to the inwardly and outwardly adjustment of the snake guide 63, which adjustment is made through the use of the conical surface 61 of the cam follower 55.

The ability to change helically wound augering snakes of different diameter without the use of any special tools or the interchanging of parts forms an important advantage of this machine over the prior art. As illustrated above, the retractable frame assembly 6 may be pivotal rearwardly of the frame 2 in order to permit removal of the drum 5 and the insertion of another drum which may contain a coiled helical wound snake of larger diameter which may be fed through the support bearing 14 and the tubular throat 43 of the feed mechanism 19. Adjustment can be made through the handle 53 in order to adjust the snake guides 63 to the new larger diameter augering snake. It is possible then to actually connect different lengths of helical wound augering snakes and feed the same through the feed mechanism 19 even though one snake may be of larger diameter than the other. If the diameter of the snake is larger, adjustment may be made by rotating the cam plate 51 and handle 53 in a counterclockwise direction to permit the follower 55 to slide rearwardly on the throat 43 so that the guides 63 may retract outwardly in their respective slots 62 to permit the larger diameter snake to pass between their respective tooth members 66.

As partially explained heretofore the adjustment of the tension on the V-belts that drive the storage drum 5 and the throat 43 of the feed mechanism 19, respectively, may be adjusted by the thumb screws 31 as shown in FIG. 1. If it is necessary to remove the motor 26 and its base 27 from the frame 2 the thumb screws 31 may be turned clockwise for substantially their full length in order that the V-belts may be lifted over and off of the driving V-belt pulleys secured to the rotary shaft of the motor 26. The motor 26 and its base 27 may then be lifted vertically off the pins 30 after the belt protecting guard 47 has been removed by unloosening the screws shown at 83.

Upon review of FIGS. 1 through 3 it is evident that the V-belt 32 which drives the drum 5 is much longer than the V-belt driving the tubular throat 43 through the V-belt pulley 46. This is because the auger snake 9 must be rotated at all times in order to make the feed mechanism 19 effective in feeding the auger snake and thus it is necessary to rotate the feed mechanism 19 at a different

speed than that of operating or rotating the whole of the augering snake **9**. The helical wound armor on the snake **9** has a left-hand helix similar to a left-hand thread and the rotating of the feed mechanism **19** in the same direction as that of the rotating snake but at a faster rate of feed than that of the rotating snake permits the snake to be fed faster than it is rotated. This is necessary in order to properly clean the sewer pipe. The direction of the helix which is left-hand requires the snake and feed mechanism to be driven in counterclockwise direction. With further reference to FIGS. 1 through 3, it should be noted that the axle **7** is placed high enough on the rearward legs **4** so that when the machine is in its upright position with the forward leg **3** on the ground, the bottom of the wheels **8** will be disengaged from the ground. Thus the wheels **8** will not interfere with the stability of the machine when the machine is in operation. The lower rearward edge of the legs **4** are cut away as illustrated at **84** so that upon tilting the whole machine **1** by the handle **18** the wheels **8** will make immediate contact with the ground, permitting the machine to be readily transported to another place. It is readily seen that the sewer augering machine **1** may generally be separated into three separate parts in order that the machine may be repaired or placed in storage. These separate parts consist of the drum **5**, the motor **26** and its base **27**, and the base frame **2**.

We claim:

1. A sewer augering machine comprising a tripod frame having a forward leg and two rearwardly positioned legs, a rearwardly retractable frame assembly pivotally secured to said rearwardly positioned legs, a rotatable storage drum detachably supported on said retractable frame and on said tripod frame above said forward leg for containing a coiled sewer auger snake to be power rotated and fed along the rotary axis of said drum, said auger snake having a helical wound armor, a feed mechanism rotatably supported on the forward end of said tripod frame having a tubular feed throat substantially axially aligned with the rotary axis of said storage drum, a motor supported on said tripod frame having a drive means to rotatably drive said feed mechanism and said drum at different speeds, and control means on said feed mechanism to engage said helical armor of said snake and feed said snake into a pipe or conduit to be cleaned.

2. In a feed mechanism for feeding a helically wound sewer augering snake in a sewer augering machine supported on a frame comprising a tubular feed throat rotatably supported on the frame of the sewer augering machine for passing the helically wound sewer snake therethrough, a cam plate independently and rotatably journaled on said throat and having camming surfaces thereon, a cam follower secured to said frame and coaxially slidable on said throat and having an inwardly extending camming surface means, transversely movable snake guides carried by said throat, tooth means on the inner end of said guides to mate with the shape between adjacent turns of said helically wound snake, head means on the other end of said guides to be engaged by said surface means to transversely slide inwardly said guides when said cam plate is rotated to cam and slide forward said cam follower.

3. The feed mechanism of claim **2** characterized by reversible power drive means to rotate said throat to helically feed said augering snake forwardly or rearwardly through said tubular throat.

4. The feed mechanism of claim **3** characterized in that said cam follower comprises an annular plate coaxially aligned but not in engagement with said throat and slidably secured to the frame of the sewer augering machine, an annular follower housing coaxially aligned and independently rotatable on said throat with an inwardly extending surface of conical configuration on one end thereof, and bearing surfaces between said annular plate and said annular follower housing to permit the latter to freely rotate with said throat.

5. In a feed mechanism for feeding a helically wound sewer augering snake in a sewer augering machine supported on a frame comprising a tubular feed throat rotatably supported on the frame of the sewer augering machine for passing the helically wound sewer snake therethrough, snake guide means traversely movable in said throat to engage said snake, a follower secured to the frame of the augering machine but slidable on said throat, said follower having an inwardly extending surface for a substantial portion of its length of conical configuration coaxially aligned with said tubular throat, rotatable independently journaled plate means on said throat, cam means on said plate means, and means to rotate said plate means to cam said follower forwardly on said throat to cause said snake guide means to move inwardly of said throat and engage said helically wound snake.

6. The feed mechanism of claim **5** characterized by spring means between said throat and said snake guide means to bias the movement of said guide means outwardly of said throat.

7. The feed mechanism of claim **5** characterized by reversible power drive means to rotate said throat to selectively feed said augering snake forwardly or rearwardly through said tubular throat.

8. The feed mechanism of claim **5** characterized by a bearing ring of hard metal material embedded in the outer opening of said tubular feed throat to prevent excessive wear by said augering snake as it is fed forwardly and rearwardly through said throat.

9. The feed mechanism of claim **5** characterized in that said means to rotate said plate means comprises a radially extending handle secured to said plate means and radially adjustable to rotate and lock said plate means in one of many selective positions, said one selected position depending upon the diameter and size of said augering snake.

10. The feed mechanism of claim **9** characterized in that said handle is placed in its farthest selective position to permit said follower to slide rearwardly on said throat to completely expose said snake guide means to permit their removal from said throat and facilitate the complete disassembly of the feed mechanism.

11. The feed mechanism of claim **5** characterized in that said snake guide means comprises tooth means on one end thereof to mate with the shape between adjacent turns of said helically wound augering snake, head means on the other end thereof to engage said follower surface, and a stem portion between said head means and said tooth means slidably engageable within transverse openings in said throat.

12. The feed mechanism of claim **11** characterized in that said tooth means is an arcuate shaped single tooth tapered to mate with the shape between adjacent turns of said helically wound snake and disposed at an angle relative to the tubular bore of said throat to mate with the helix on said snake.

13. The feed mechanism of claim **11** characterized in that said head means has a beveled surface to mate with said follower surface.

14. The feed mechanism of claim **11** characterized in that said throat has radially disposed cylindrical openings to receive said stem portion of said guide means, said stem portion having a flat face longitudinally disposed for its full length, a flat face in said cylindrical openings to engage the flat face of said stem portion when said guide means enter their mating cylindrical opening to maintain said guide means from changing the rotary position of said tooth means relative to the axis of said tubular throat.

15. In a feed mechanism for feeding a helically wound sewer augering snake in a sewer augering machine supported on a frame comprising a tubular feed throat rotatably supported on the frame of the sewer augering machine for passing the helically wound sewer snake therethrough, snake guide means transversely movable in said throat to engage said snake, a follower secured to the frame of the

augering machine but slidable on said throat, said follower coaxially aligned with said tubular throat and having an opening in one end thereof, the surface of said opening extending transversely inwardly for a substantial length of said follower toward the longitudinal axis of said throat, rotatable independently journaled plate means on said throat, cam means on said plate means, and means to rotate said plate means to cam said follower forwardly on said throat to cause said snake guide means to move inwardly of said throat and engage said helically wound snake.

16. A sewer augering machine comprising a base, rearward leg means on said base, a forwardly extending front leg on said base, rearward frame means pivotally supported from said rearward leg means, axially aligned bearing means on said frame means and said base, a storage drum axially supported in said bearing means for containing a coiled helically wound sewer augering snake to be power rotated and power fed along the rotary axis of said drum, latch means on said rearward frame bearing means to detachably retain said drum within said rearward frame bearing means, a feed mechanism rotatably supported on the forward end of said base having a tubular feed throat substantially axially aligned with said bearing means to engage and feed said helically sewer augering snake therethrough, a motor supported on said base having a drive means to rotatably drive said feed mechanism and said drum at different rotational speeds, said rearward frame means retractable radially away from said base to permit the removal of said drum from said bearing means when said latch means is detached from said drum.

17. The sewer augering machine of claim 16 characterized in that said rearward frame bearing means is a bearing member supported in a block which is pivotal radially relative to the axis of said bearing means to aid in removal of said drum from between said base and said rearward frame means when the latter is retracted rearwardly.

18. The sewer augering machine of claim 16 characterized in that said rearward frame means includes a vertically movable U-shaped handle means, a wheel member rotatably secured to the U-shaped end of said handle means, said handle means when retracted to its lowest position acts as additional legs to aid in stabilizing the machine.

19. The sewer augering machine of claim 16 characterized by axial means between said rearward leg means, said rearward frame means pivotally supported from said axial means, wheels rotatably supported on said axial means, said axial means placed on said rearward leg means sufficiently high enough to permit said wheels to disengage from the ground when the sewer augering machine is supported directly on said rearward leg means and said forward front leg.

20. A sewer augering machine comprising a base frame, rearward leg means on said base frame, a forwardly extending front leg on said base frame, a retractable frame assembly pivotally secured to said rearward leg means, axially aligned bearing means on said retractable frame assembly and said base frame, a storage drum axially supported in said bearing means for containing a coiled helically wound sewer augering snake to be power rotated and power fed along the rotary axis of said drum, a feed mechanism rotatably supported on the forward end of said base frame and having a tubular throat substantially in axial alignment with said bearing means and the rotary axis of said drum for passing the helically wound sewer augering snake therethrough, snake guides transversely movable toward and away from the rotary axis of said throat to engage and feed said augering snake therethrough when said feed mechanism is power rotated, means in said feed mechanism to adjust the transverse movement of said guides with respect to the cross-sectional size of said augering snake, said rearward frame means retractable away from said base frame to permit the removal of said drum from said bearing means, the cooperation between the interchangeability of said drum and the adjustment to said guides permitting the use of helically wound sewer augering snakes of different cross-sectional areas to be used on the same sewer augering machine.

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CHARLES A. WILLMUTH, *Primary Examiner.*