May 4, 1943. H. LONG 2,318,172

UNIVERSAL TOOL

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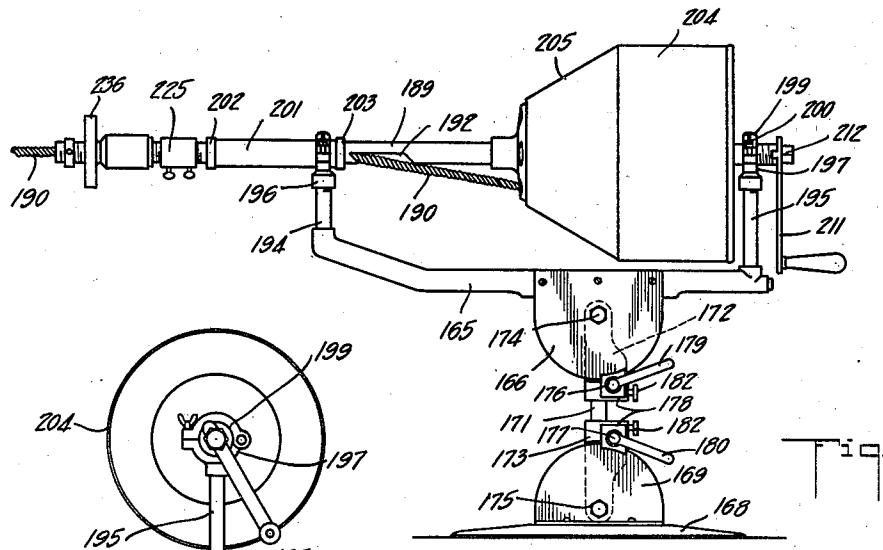


Fig. 1

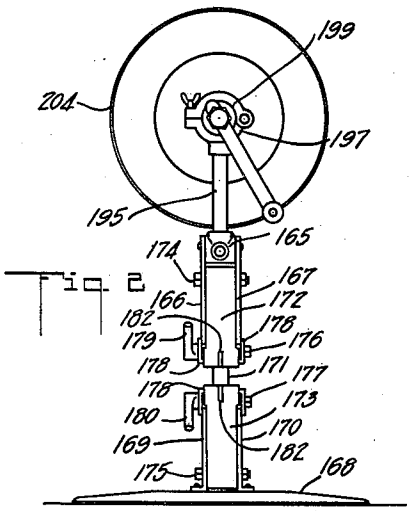


Fig. 2

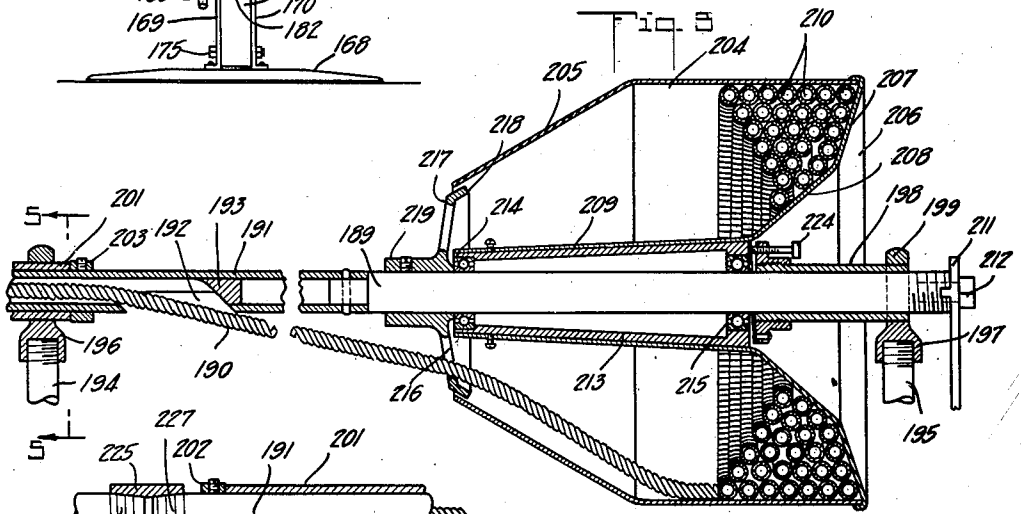


Fig. 3

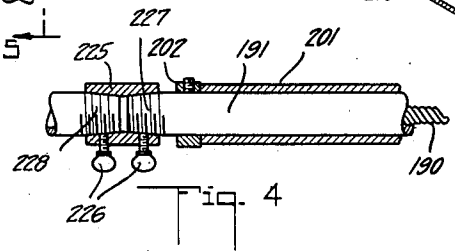


Fig. 4

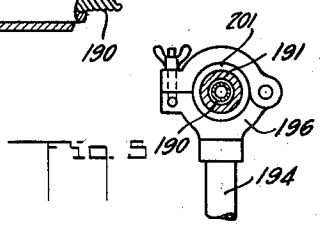


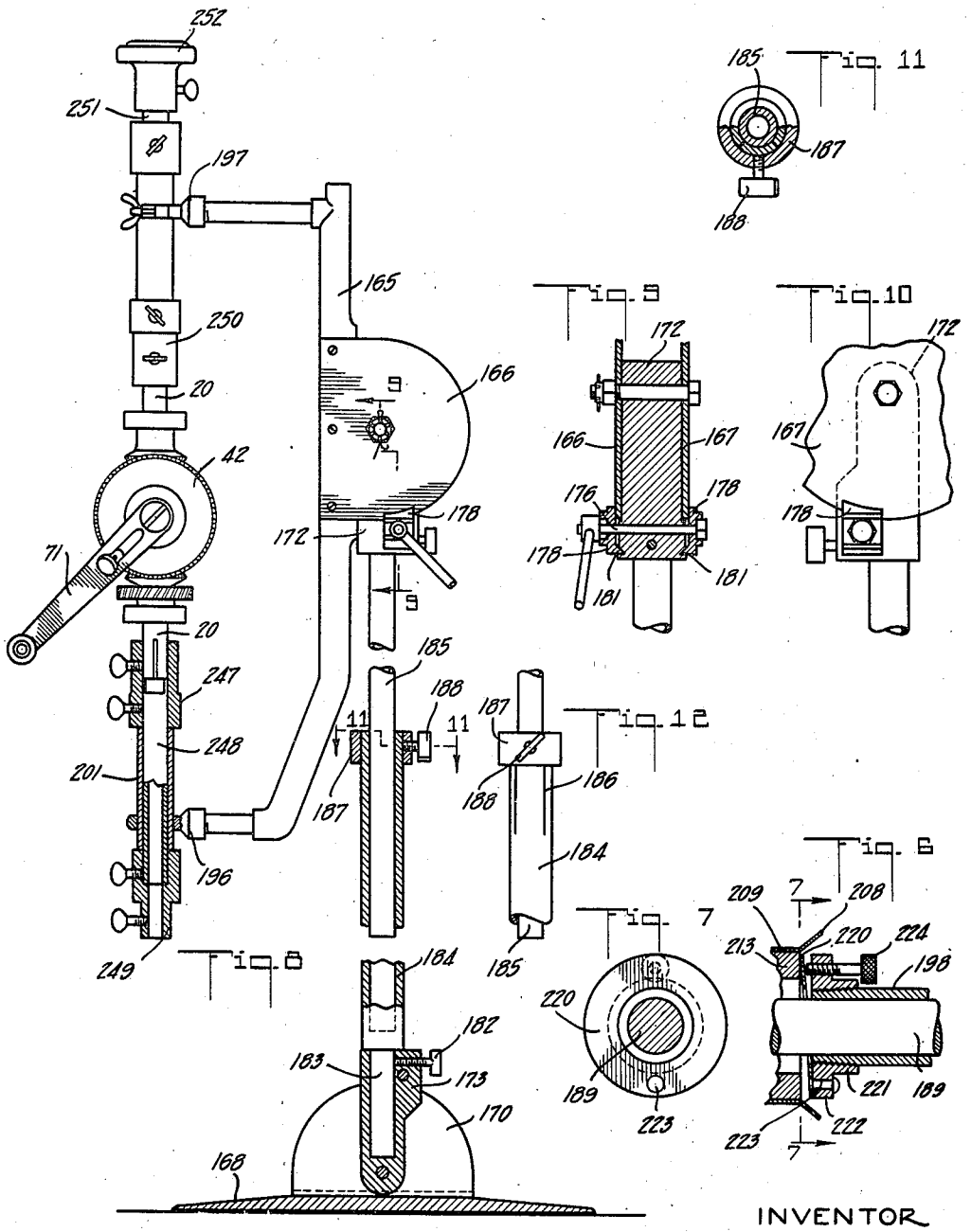
Fig. 5

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Fig. 13

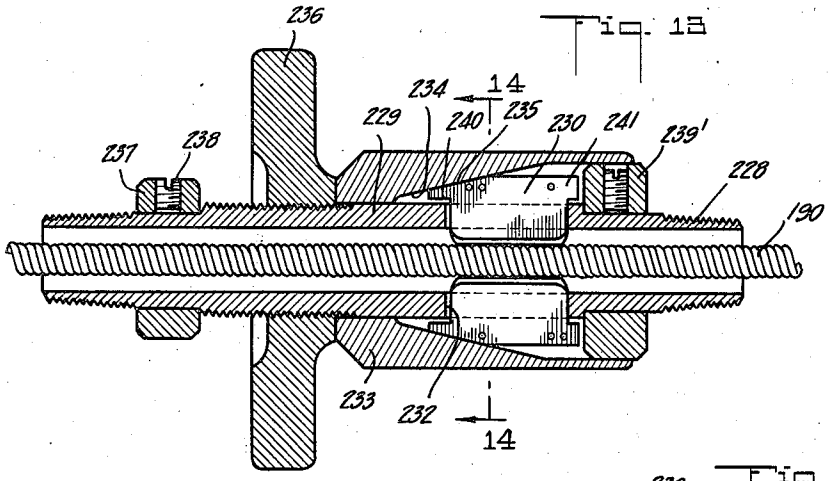
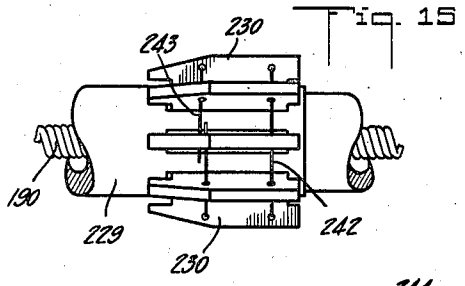
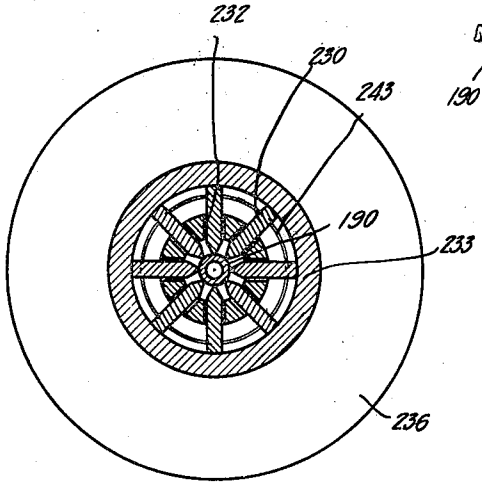


Fig. 15





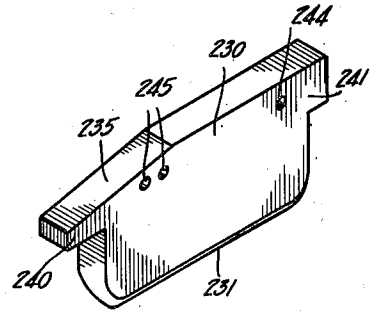


Fig. 14

Fig. 16

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Fig. 17

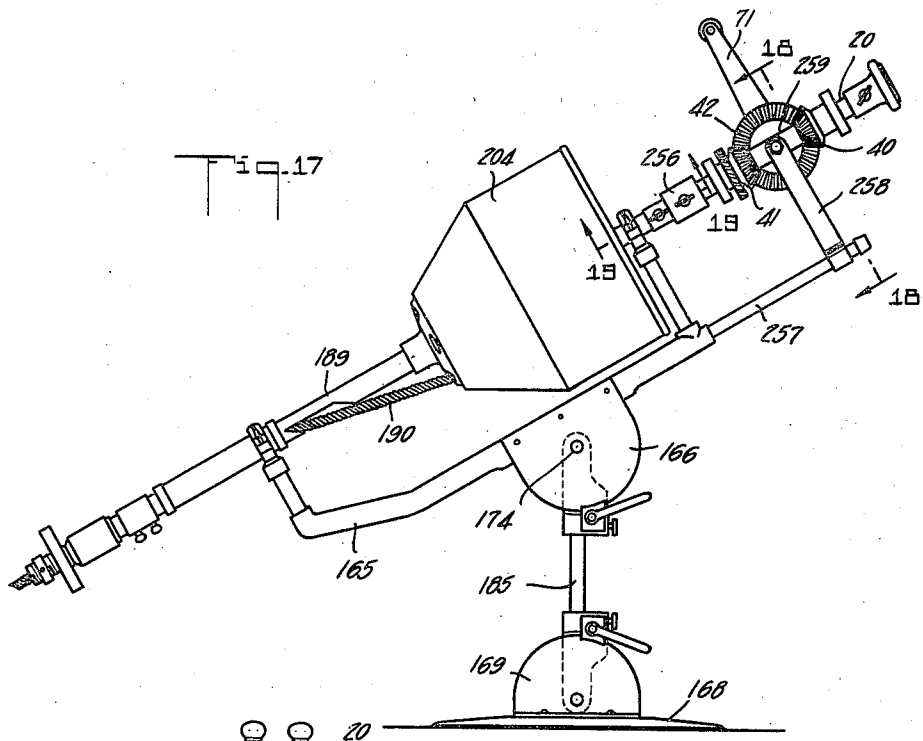
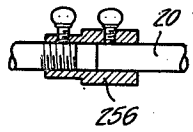


Fig. 19



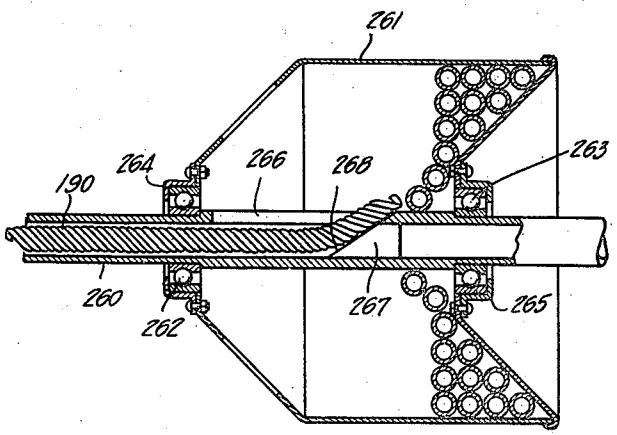


Fig. 20

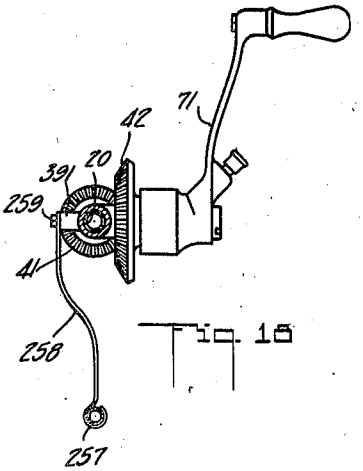


Fig. 18

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UNITED STATES PATENT OFFICE

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UNIVERSAL TOOL

Hugh Long, Los Angeles, Calif.

Application July 22, 1939, Serial No. 285,914

3 Claims. (Cl. 15—104.30)

This invention relates to a universal tool. More particularly, the invention contemplates a compact, light weight portable apparatus that may readily be converted to be used for a number of purposes. For example, the tool may be used as a lathe, drill press and a plumber's snake, root borer, or drain cleaner.

This application discloses matter similar to that disclosed in my application filed September 24, 1938, under the name of Hugh Long, Serial No. 231,558, now Patent No. 2,259,899, for "Universal tool."

It is one of the objects of this invention to improve in the general the structure and operation of devices of this character.

In connection with plumber's equipment, the efficient use of a "snake" is quite important. Such snakes usually are in the form of a flexible shaft, that may be readily coiled about a support or in a cage, and that may carry at its advancing end, an augur or drain cleaner. It is another object of this invention to facilitate the operation of such snakes, and especially by providing a support therefore that can be adjusted to the most convenient position for manipulation of the snake; and to make it possible to exert a large turning moment on the snake while the operator is permitted to assume a comfortable position. This object is attained by the facility of adjustment of the supports, angularly as well as in height.

It is still another object of this invention to improve in general, snake operating devices of this character.

This invention possesses many other advantages, and has other objects which may be made more easily apparent from a consideration of several embodiments of the invention. For this purpose there are shown a few forms in the drawings accompanying and forming part of the present specification. These forms, which illustrate the general principles of my invention, will now be described in detail; but it is to be understood that this detailed description is not to be taken in a limiting sense, since the scope of the invention is best defined by the appended claims.

Referring to the drawings:

Fig. 1 is a side elevation of a form of the invention;

Fig. 2 is an end elevation thereof;

Fig. 3 is an enlarged longitudinal sectional view of a portion of the apparatus illustrated in Fig. 1;

Fig. 4 is a detail sectional view illustrating the manner in which certain of the elements of the apparatus of Fig. 1 may be coupled together;

Fig. 5 is a sectional view taken along the plane 5—5 of Fig. 3;

Fig. 6 is an enlarged fragmentary sectional view of a part of the apparatus illustrated in Fig. 3;

Fig. 7 is a sectional view taken along plane 7—7 of Fig. 6;

Fig. 8 is a view similar to Fig. 1 illustrating another manner of use of the apparatus.

Fig. 9 is a fragmentary sectional view taken along the plane 9—9 of Fig. 8;

Fig. 10 is a fragmentary enlarged elevation taken from the right hand side of Fig. 9;

Fig. 11 is a sectional view taken along the plane 11—11 of Fig. 8;

Fig. 12 is a fragmentary elevation of the apparatus illustrated in Fig. 8;

Fig. 13 is a sectional view of the chucking mechanism adapted to be utilized in connection with the apparatus illustrated in Fig. 1;

Fig. 14 is a sectional view taken along the plane 14—14 of Fig. 13;

Fig. 15 is a top plan view of the chucking mechanism with some of the parts removed in order to illustrate the clamping bars;

Fig. 16 is a pictorial view of one of the clamping bars;

Fig. 17 is a view similar to Fig. 1, of a snake operating mechanism, but including reduction gearing;

Fig. 18 is a sectional view taken along plane 18—18 of Fig. 17;

Fig. 19 is a fragmentary sectional view taken along plane 19—19 of Fig. 17; and

Fig. 20 is a fragmentary sectional view similar to Fig. 3 but illustrating a modified form of cage construction.

An adjustable support is provided that may be effectively used in connection with the operation of a plumber's snake. A single bar support 165 (Figs. 1 and 2) may be provided which carries the clamping semi-circular disks 166 and 167. The base 168 carries corresponding semi-circular clamping disks 169 and 170. A link 171 is pivotally mounted at its opposite end in the axes of the disk structures 166—167 and 169—170, whereby the angle and height of the support 165 may be adjusted. The clamping mechanism to hold the apparatus in adjustment is shown to best advantage in Figs. 1, 2, 8, 9 and 10. Thus the link 171 may be provided at its opposite ends with the clevises 172 and 173 which enter between the spaced clamping disks 166—167 and

169—170. The pivot bolts 174 and 175 pass through these clevises. The clevises also carry the clamping bolts 176 and 177. These clamping bolts also pass through the clamps 178 overlapping the edges of the corresponding disk member and tightened against them by manipulation of the handle nuts 179—180. Any appropriate device may be utilized for preventing rotation of the clamps 178 about the axis of the corresponding clamping bolt; such for example as dowel pins. The head of the bolts 176 and 177 may be accommodated in a groove formed in the corresponding clamping member 178 to prevent the clamping bolt 176 from turning. As shown most clearly in Fig. 9, each of the clamps 178 may be provided with a knife edge 181 cooperating with a groove in the corresponding clevis 172 or 173.

Provisions are made whereby the length of the link structure joining the base 168 to the support 165 may be adjusted. As shown in Fig. 1 the clevises 172 and 173 may be slidably accommodated on the intermediate pipe member 171. The thumb screws 182 may be used to clamp the clevises in any angularly adjusted position on the intermediate member 171.

If a greater height is desired, provisions may be made to form a telescoping joint that may be adjustable for height. Such an arrangement is illustrated in Figs. 8, 11 and 12. In this form the clevis 173 is shown as accommodating a post 183 joined to the hollow tubular member 184 of any desired length. Telescoping within the tube 184 is a rod 185 joined to the upper clevis 172.

In order to hold the two telescoping members 184 and 185 in any adjusted position, the upper end of the tubular member 184 is arranged to be compressed around the rod 185. For this purpose the upper end of the tubular member 184 is shown as slotted as at 186 (Fig. 12). A collar 187 may be joined at one point to the top of the member 184. At a diametrically opposite point a clamping screw 188 may be provided for tightening the member 184 around the rod 185.

The support 165 is shown in Figs. 1 and 2 as providing a rotatable support for a snake spindle 189. This spindle is shown as being made up of a hollow front portion 191 into which the snake 190 may project to pass outwardly in the front of the apparatus as illustrated in Fig. 1. For this purpose the hollow portion 191 is shown as provided with a slot 192. Adjacent the slot opening a tapered plug 193 may be inserted in the hollow member 191 to guide the snake 190 into the slot.

The manner in which the snake 190 may be clamped in the snake spindle 189 will be described hereinafter.

The supporting bearings for the spindle structure 189 include the upright posts 194 and 195 projecting from support 165. These posts are shown as threaded into the half-round seats 196 and 197. Disposed in the half-round seat 197 attached to post 195 there is a journal sleeve 198. This sleeve 198 is clamped firmly in its seat by the aid of a cap 199 pivoted at one side to the seat member 197. A clamping thumb screw 200 serves to hold the cap 199 firmly in place. The spindle 189 is journaled within the sleeve 198.

Similarly, the seat 196 at the left hand end of the apparatus firmly holds a bearing sleeve 201. In order to restrict axial movement of the spindle 189 with respect to the bearings, the hollow portion 191 may carry the spaced collars 202 and 203 adjacent the opposite ends of the bearing sleeve 201.

The snake 190 is arranged as is well understood, to carry appropriate tools at its free ends, such as augurs or drain cleaners or reamers or the like. It is necessary that the unused portion be properly maintained in a reservoir space, as for example a snake cage. Such a cage 204 is illustrated in the present instance as mounted coaxially with the spindle 189. It may be in the form of a sheet metal member having a conical portion 205 and a rear wall 206. This rear wall 206 is so formed as to provide an interior annular space defined by the conical walls 207 and 208. A reentrant sleeve-like portion 209 forms the inner wall of the annular space. As indicated most clearly in Fig. 3, the snake 190 is shown as joining a plurality of convoluted turns 210 within the cage 204.

The manner in which the cage 204 is supported by the aid of the reentrant sleeve 209 upon the spindle 189 will be hereinafter described. The spindle 189 is shown as capable of manual rotation, as by the aid of a handle structure 211 attached to the right hand end of the spindle 189, as by the aid of a screw 212. During the rotation of spindle 189 the snake 190 is also rotated, since the snake may be clamped by the aid of a chucking device. During this rotation, provision should be made to permit the cage 204 to rotate also. For this purpose the reentrant sleeve 209 carries a tapered elongated tubular bearing supporting member 213. This member 213 surrounds the spindle 189 and carries the outer races of a pair of spaced ball bearing structures 214 and 215. The inner races of these ball bearing structures are supported directly upon the spindle 189. The snake is passed into the cage 204 through any one of a number of apertures 216 provided in a flange 217. This flange 217 has a lip 218 extending beneath the open edge of the cage 204. The flange 217 is provided with a hub 219 by the aid of which it may be fastened to the spindle 189.

The manipulation of the snake 190 under various conditions may involve an advancement or retraction of the snake 190 through the hollow member 191. Under such circumstances the snake should be free to coil and uncoil within the cage 204. The provision of the bearing structures 214 and 215 permits the cage 204 to rotate to the proper extent to accomplish this coiling or uncoiling of the snake 190. If desired, however, the free rotation of the cage 204 about the spindle axis may be restrained as by a braking arrangement. Such a braking arrangement is illustrated most clearly in Figs. 3, 6 and 7. It may include a flexible brake disk 220 adapted to be urged against the right hand surface of the bearing support member 213. The disk 220 encompasses the spindle 189 and is supported by the aid of the bearing sleeve 198. For example, this bearing sleeve may support a threaded collar 221 having a flange 222. A rivet or other fastening device 223 passes through the flange 222 and the disk 220. Diametrically opposite the place where the disk 220 is joined to the flange 222, means are provided for flexing the disk 220 against the member 213. For example, a thumb screw 224 may be provided for this purpose. This thumb screw is threaded through the flange 222. It may be adjusted to provide the desired pressure against the brake disk 220.

In some instances it may be desirable to clamp the snake 190 within the spindle 189. A clamping chuck structure is provided for this purpose at the left hand end of the spindle. This chuck

is illustrated to best advantage in Figs. 13 to 16, inclusive.

The chuck structure may be coupled to the hollow portion 191 of the spindle 189 by the aid of a pipe union 225 (Fig. 4). This pipe union may be provided with a pair of thumb screws 226. These thumb screws engage respectively the pipe threads 227 on the end of the extension 191 and the pipe threads 228 formed on the hollow chuck body 229 (Fig. 13). The snake 190 passes through the body 229 and is clamped to the body by the aid of a series of angularly spaced gripping bars 230. Each of these gripping bars has a narrow tapered inner edge 231. The body 229 is provided with a series of radial slots 232 through which the bars may pass.

The gripping action of the bars 230 is effected by the aid of a chuck operating member 233. This member is in the form of a hollow sleeve having an internal tapered surface 234 coacting with correspondingly tapered surfaces 235 on the outer edge of each of the bars 230. As shown most clearly by the aid of Fig. 13, movement of the operating member 233 toward the right will serve to contract the bars 230 against the snake 190. Movement of the operating member 233 toward the left will release the pressure on the bars 230 for releasing the snake 190.

The axial movement of operating member 233 for engaging and releasing the snake 190 is effected by the aid of a hand wheel 236 threaded on the body 229. A collar 237 fastened as by set screw 238 on a cylindrical portion of the body 229 provides a limit for the travel of the hand wheel 236 toward the left. A similar collar 239' is disposed on a cylindrical portion of the body 229, and serves also as a guide for the right hand end of the operating member 233.

As shown most clearly in Figs. 13 and 16, each of the gripping bars 231 is provided with extensions 240 and 241, which serve as stops against the edges of the apertures 232 and to ensure that the bars will not drop too far inwardly into the hollow body 229 when the snake 190 is withdrawn.

In order to hold the bars 230 in assembled relation prior to the assembly of the operating member 233, wire ties 242 and 243 may be provided, passing through appropriate apertures 244, 245 in the bars 230.

The operation of the snake mechanism illustrated in Fig. 1, especially when it is mounted upon the extension stand illustrated in Fig. 8, may be now set forth. When it is desired for example to clean out a drain, the height of the standard may be adjusted for maximum convenience, the spindle being appropriately directed toward the drain. A portion of the snake is then inserted in the drain and a generally axial motion imparted to that portion by swinging the entire mechanism to and fro about bolts 174 and 175 as pivots, the clamp handles 179 and 180 being loose so as to permit such movement readily. At the same time the snake may be rotated by operation of handle 211, it being assumed that the chuck structure is out of gripping relation with the snake. Alternatively, the chuck structure can be operated to clamp the snake 190 while the to and fro motion of the snake mechanism is effected.

The support 165 with the adjustable standard may be utilized as illustrated in Fig. 8, for supporting a bit brace. The angular position of the manually operated bit brace may be adjusted as heretofore described in connection with the snake cage illustrated in Fig. 1. This bit brace is provided with an operating handle and ratchet mechanism 71 for rotating a bevel gear 42. Furthermore, the hollow spindle 20 of the bit brace may be provided with extensions for cooperating with the seats 196 and 197. Thus the lower end of the spindle 20 may carry the coupling 247 for the spindle extension 248. The lower end of this spindle extension may be provided with a supplemental coupling 249 adapted to carry a tool or the like. Similarly at the upper end of the spindle 20 a coupling member 250 is utilized for the spindle extension 251. A hand grip 252 may be coupled to the upper end of the extension.

At times an increased turning moment is needed to be applied to the snake 190. Under such circumstances a supplemental reduction gearing may be effectively employed in connection with the snake mechanism. As illustrated most clearly in Figs. 17 and 18, for this purpose use may be made of the brace bit gearing and the hollow spindle 20. Thus the handle structure 211, Fig. 1, is removed from the end of the spindle 189. This threaded end of the spindle may then be coupled as by coupling member 256 (Fig. 19) to the hollow spindle 20 of the brace bit, including the ratchet handle 71.

In order to provide a firm support for the brace bit structure, a pipe 257 is threaded into the horizontal portion of the support 165 to serve as an extension thereof. Projecting from this member 257 is a brace rod 258 fastened as by the aid of the screw 259 into the stub shaft 391 of the brace bit.

The reduction gearing afforded by the bevel gear 42 and the cooperating bevel gears 40 and 41 of the brace bit makes it possible to exert a much greater turning moment upon the snake 190.

Another form of snake cage and support is illustrated in Fig. 20. The snake 190 in this form passes through a hollow spindle 260 corresponding to the spindle 189 of the form shown in Fig. 1. The cage 261 is shown as rotatably supported upon the spindle 260 by the aid of the ball bearing structures 262 and 263 respectively at the left and right hand portion of the cage structure. The inner races of these ball bearing structures are shown as accommodated on reduced portions of the spindle 260, and as abutting against shoulders formed thereon. The outer races are accommodated in the flanges 264 and 265 carried by the cage 261. The snake 190 passes through an elongated slot 266 of the spindle 260. This slot 266 is located in such manner that the snake 190 passes through the slot 266 directly into the inside of the cage 261. A plug 267 with a sloping face 268 may be located within the spindle 260 adjacent the right hand end of the slot 266 for guiding the snake 190 in a proper direction as it enters the cage 261. The manner of use and the supporting of the spindle 260, however, may be substantially identical with that described in connection with the form illustrated in Fig. 1.

What is claimed is:

1. In a device of the character described, a hollow spindle, a snake cage rotatably supported by the spindle, means for rotatably supporting said spindle, a standard for the spindle support, a base for the standard, said standard having freedom of angular movement with respect to said base, said support having freedom of angular movement about an axis transverse to the spindle axis, with respect to the standard, said movements being in substantially the same plane,

and means for optionally restraining the standard and the support against said angular movement.

2. In a device of the character described, a hollow spindle, means for rotatably supporting said spindle, a snake cage rotatably mounted on the spindle, a collar fastened to the spindle support, a flexible brake ring axially spaced from the cage and joined at one point to the collar, and means acting to urge the ring against the cage, at a place remote from the said point.

3. In a device of the character described, a base, a standard pivotally supported by said base, means for optionally restraining said standard against angular motion about its pivot, a supporting structure pivotally mounted on top of the standard, about an axis parallel to the axis of the standard pivot on the base, said axis being in the same plane, means for optionally restraining said supporting structure against angualr motion about its pivot, a hollow rotary spindle mounted on said structure, having an axis transverse to those of the pivots, and a snake cage rotatably supported on the spindle.

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