This invention relates to a cleaner for cleaning sections of sanitary pipe in a dairy, and has for an object to provide a device of this character which is easily portable so that it may be easily moved about the dairy from place to place to locate it in the most desirable position for use.

It is another object of the invention to provide such a cleaner for cleaning these pipe sections which is driven by power so that the cleaning may be done much more quickly and with less labor on the part of the operator than in the old hand methods.

It is another object of the invention to provide a cleaner, having a power driven brush which may be passed through the pipes together with means for supplying water to the brush during the cleaning operation.

With the foregoing and other objects in view the invention consists with certain novel features of construction, combinations, and arrangement of parts as will be more fully disclosed in connection with the accompanying drawings, it being of course understood that various changes or modifications may be employed without departing from the principles of the invention.

In this drawing

Fig. 1 is a side elevation of my improved cleaner in condition for use.

Fig. 2 is a transverse section thereof substantially on line 2—2 of Fig. 1.

Fig. 3 is a longitudinal detail section of a portion of an operating mechanism at the end adjacent the motor.

Fig. 4 is a similar section of the end of this mechanism adjacent the brush.

Fig. 5 is an end elevation of the support for the operating shaft looking toward the end thereof as indicated by the line 5—5 of Fig. 1.

Fig. 6 is a transverse section substantially on line 6—6 of Fig. 3, and

Fig. 7 is an end and side elevation of a coupling for the flexible shaft.

The construction shown comprises a motor 10 of any suitable type, preferably an electric motor mounted on a suitable support 11, which in turn is mounted on suitable wheels or casters 12, so that it may be easily rolled to different positions about the dairy. The motor may be mounted on a stud 13 seated in support 11 and secured therein by set screws 14 so as to permit the adjustment of the motor on the support, as by raising or lowering or turning it in different directions as is found desirable, and then clamping it in the adjusted positions.

Extending forwardly from the support 11 is a supporting bar 15 having a curved member 16 at its free end providing an open top recess 17 in which the operating shaft and support may normally rest. This rod or support comprises a metal tube 18, preferably of brass, and enclosed by a rubber or fibre covering 19 so that the metal tube will not mar the inner surfaces of the pipes during the cleaning operation. The covering may be woven in position from suitable yarn. Within the tube 18, and spaced therefrom to provide a passage 20 is another tube 21 and enclosing a flexible shaft 22 for driving the brush 23. This shaft is connected to a coupling 24 mounted in a suitable bearing 25 at the end of the pipe 21 and to which the brush is detachably connected, as by threaded connection 26 and the lock nut 27. The other end of the flexible shaft is connected to the rotor of motor 10 by any suitable coupling means. In the present construction the end of the rotor shaft is shown at 28 having a forked end in which is seated one end of the coupling shaft 29 mounted in a bearing sleeve 30. This sleeve has a reduced end 31 extending into the open end 32 of an extension on the motor enclosing the rotor shaft 28. This reduced portion 31 has an annular groove 33 in its outer surface to receive the end of the set screw 34, to retain the sleeve 30 in position, but to permit it to turn in the extension 32. The inner end of the flexible shaft 22 is connected to the shaft section 29 by the coupling 35. The shaft 29 is hollow to receive the end of the coupling 35 and has an inwardly extending lug 36 adjacent its outer end which may be passed into the groove 37 in the coupling 35, and then by cross groove 38 into the relatively long groove 39. This forms a driving connection between the shaft 29 and flexible shaft 22, and which will permit the
flexible shaft to elongate or contract as it twists looser or tighter under variations in the driving torque and prevents the shaft buckling up and breaking.

Connected to the section 30 is a sleeve 40, which is connected by a flexible covering sleeve 41 with a coupling 42 connected to the inner end of the pipe 18, and this flexible section is also covered with a rubber or fibre covering 43. A flexible tube 44 also surrounds the flexible shaft 24 within this flexible section and extends from the coupling 42 to the shaft section 29 so that the section of the entire assembling between the sleeve 40 and the coupling 42 is flexible to permit the remainder of the shaft assembly to move about as indicated in dotted lines of Fig. 1, while the remainder of this shaft assembly between the coupling 42 and the brush is rigid and normally rests on the support 16 as indicated in the full lines of Fig. 1. The sleeve 40 may be provided with an opening closed by a plug 45 for the entrance of oil to the space 46 and which may pass through the opening 47 to the flexible shaft 24 and fill the tubes 44 and 21 so that this flexible shaft runs in oil. The space between the flexible shell 41 and flexible tube 44 is closed by a stop 48 to prevent passing of this oil into the coupling 42. The interior of this coupling communicates with the passage 20 between the tube 21 and the shell or pipe 18 and forms a means for supplying water to this passage which is discharged through the open end 49 to the brush and into the tube being cleaned. For this purpose a pipe 50 is connected to the coupling 42 and is provided with coupling means 51 for attachment of hose 52 leading from any suitable source of supply.

In the sanitary pipes are removed from the dairy apparatus, such as the milk cooler, and is passed over the brush 23 while the brush is rotating, the operator taking the tubes one at a time, passing one end over the brush and then lifting the rigid portion of the shaft assembly from the support 16 and passing the tube down over the brush as indicated in dotted lines Fig. 1, the tube being cleaned being indicated by the reference numeral 53. It is of course understood that the rigid portion of the shaft assembly is of sufficient length to clean the entire length of the longest tubes to operate upon, or for extremely long tubes one-half may be cleaned from one end and the other half from the other end. The water may or may not be supplied through the pipe 20 but if water is supplied it greatly facilitates the cleaning operation and keeps the brush clean.

As the tubes are forced on and off the brush, it is of course desirable that the stand 11 does not shift during this operation. I have therefore, provided auxiliary means for supporting this stand independently of the rollers or wheels 12 during the cleaning operation. For this purpose I mount on the under side of the stand a shaft 54 carrying eccentrics or cams 55 and connect to the shaft a lever 56 which is normally held in the elevated position to lift the cams from engagement with the floor by the spring 57, so that the stand is on the wheels 12 and may be easily shifted. When the device is in position for cleaning tubes the operator merely swings the lever downward with his foot which brings the cams 55 to engagement with the floor and lifts one set of the rollers 12 from the floor, the lever being held in this position by the spring catch 58 which is inclined at its upper surface as shown at 59 so that it is automatically retracted as the lever is depressed, and is moved into position over the lever by the spring 60. When the operator again wishes to shift the device he merely retracts the catch 58 permitting the spring 57 to raise the lever and allow the device to again rest upon the rollers 12.

The supporting bar 15 is braced and supported by braces 61 connected to the base of the motor support 11 and connected to the bar 15 at 62. An upright support 63 is also pivoted to the bar and braces at this point, and may be swung up out of the way when not in use. This may be an angle bar pivoted by one flange to the pivot 62, and the other flange acting as a stop to limit outward movement of the bar.

The device makes a very effective cleaning device for the sanitary pipe section used in a dairy. The sanitary requirements require that these pipes all be carefully cleaned every day, and as there are a large number of these sections used in modern dairies it will be obvious that cleaning by the old hand methods requires a large amount of time and labor, and for that reason there is danger of the workmen shirking their work and not properly cleaning the pipes. With this device however, the workmen are merely required to pass the pipe sections onto and off the brush, so that the brush passes entirely through the pipe, and the pipe is very thoroughly cleaned with little effort on the part of the operator.

Having thus set forth the nature of my invention, what I claim is:

1. In a portable pipe cleaner, a motor, a flexible shaft connected to the motor, an elongated rigid tubular casing, a brush at the free end of said casing, a shaft in the casing for driving the brush and connected to the flexible shaft, a short flexible casing enclosing a portion of the flexible shaft and forming a hinge-like connection between the rigid casing and the motor, and said rigid casing movable on the short flexible section as a hinge to position the long rigid section of the casing for the passage of a tube thereover.

2. In a pipe cleaner, a motor, a rotary...
brush, a flexible driving shaft operatively connected to the motor and the brush, a tubular casing enclosing said shaft including a rigid portion leading from adjacent the brush and a flexible portion between the rigid portion and the motor, a tubular casing enclosing the first casing and spaced therefrom to form a passage open at its outer end adjacent the brush, and means for supplying liquid to said passage.

3. In a pipe cleaner, a motor, a mounting therefor, a rotary brush, a flexible driving shaft, and an enclosure therefor between the motor and the brush having an elongated rigid portion from the brush inwardly and a relatively short flexible portion between the rigid portion and the motor and forming a hinge-like joint, and a laterally extending support from the motor mounting for the said rigid portion, said support including a part from which the rigid portion of the casing is vertically movable on flexing of the flexible portion of the casing whereby to permit a tube being passed over the brush from one of its ends.

In testimony whereof I affix my signature,

SERENO F. KING.