April 14, 1942. W. A. KRANER 2,279,922

CLEANING DEVICE

Original Filed Aug. 2, 1937

FIG_1_

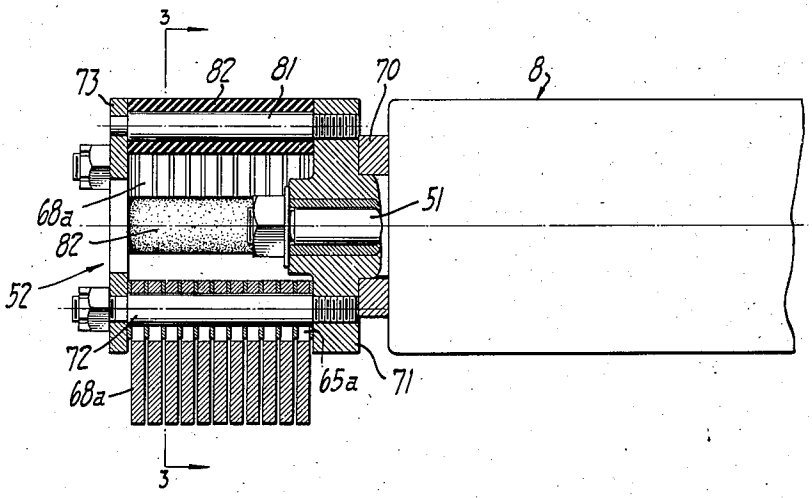


FIG_2_

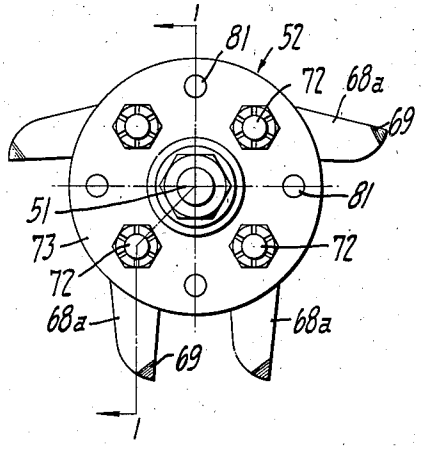
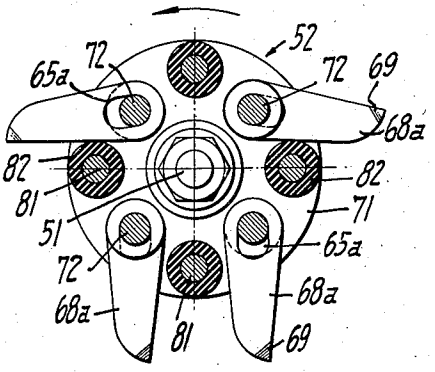


FIG_3_



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UNITED STATES PATENT OFFICE

2,279,922

CLEANING DEVICE

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Original application August 2, 1937, Serial No. 156,859. Divided and this application February 12, 1940, Serial No. 318,534

4 Claims. (Cl. 15—104.04)

This invention relates generally to devices used for the cleaning of various metal surfaces such as metal pipe, tanks, castings and the like, where it is desired to remove scale, rust, or coating materials such as asphalt. This application is a division of my copending application, Serial No. 156,859, filed August 2, 1937 for "Pipe cleaning machines."

Devices of the above character have been available in the past, but have not been entirely satisfactory. To be satisfactory under all conditions such a device must be capable of removing resinous materials like tar, or bituminous compositions, as well as the more readily removable incrustations like dirt and scale. Particularly in connection with the reconditioning of old pipe preparatory to applying a fresh protective coating, such devices have been unsatisfactory in that they have not been capable of a thorough rapid cleaning of the pipe surfaces. If a reconditioning operation upon surfaces such as old pipes is to be properly effective, the cleaning must be thorough at all times in order that no rust or scale may remain beneath the fresh coating.

It is an object of the present invention to provide an improved cleaning device capable of efficient cleaning action, irrespective of the type of material which may be found upon the surface to be cleaned. Thus, my device is effective in removing bitumen coating materials, tar paper, and like materials, as well as the more readily removable incrustations like dirt and rust.

A further object of the invention is to provide a novel type of cleaning device which cleans by repeated hammer-like impacts upon the surface to be cleaned, and which will effectively remove all forms of material therefrom without becoming clogged.

Additional objects of the invention will appear from the following description in which the preferred embodiment of the invention has been set forth in detail in conjunction with the accompanying drawing.

Referring to the drawing:

Figure 1 is a cross-sectional view of a device embodying my invention with the supporting means therefor shown schematically. The plane of the section is indicated by the line 1—1 in Figure 2.

Figure 2 is an end elevational view of the device shown in Figure 1.

Figure 3 is a cross-sectional view, taken in a plane indicated by the line 3—3 of Figure 1.

Referring to Figure 1, the device may include a supporting structure indicated generally at 8 and only shown schematically in the drawing. From the supporting structure a shaft 51 projects to carry the cleaning head indicated generally at 52. In the embodiment shown a disc or hub 71 is journaled to the stud shaft 51 and in turn is journaled within bearing 70 carried by the mounting 8. Upon the hub 71 are mounted the circumferentially spaced studs 72. In order to strengthen the studs, their outer ends are connected by the ring 73. Each stud 72 provides a pivotal attachment for a group or set of hammers 68*a*, which may be spaced apart by suitable washers. Preferably the spacing of adjacent groups of hammers is such as to provide overlapping or staggering of successively acting hammers to insure a complete cleaning action. The staggering may be effected by varying the arrangement of the spacing washers.

Note that the openings 65*a* in the hammers are oval shaped or elongated to enable limited movement of each hammer in a radial direction. Preferably the openings 65*a* have a width in the order of the diameter of the stud 72 and a length in the order of one and one-half times such diameter. The hammers 68*a* are similar to hammers employed upon so-called centrifugal hammer mills, and are shown provided with chiseled shaped edges 69 for impacting the surface being cleaned. If desired, the striking edges 69 of the hammers can be tipped with a hard wear resistance metal like "Stellite." When the rotor 52 is driven at a comparatively high rate of speed, the hammers 68*a* take positions extending substantially radially from the axis of rotation, and they tend to return to such positions after impact with the pipe.

Mounted upon the hub 71, are also the studs 81 which are positioned between studs 72. Each stud 81 is provided with a covering 82 of resilient material, such as soft resilient rubber coating. As illustrated, the covering 82 for adjacent studs 81 forms buffer or buffers which limit swinging movement of the adjacent sets of hammers. It has been found that this arrangement serves to better maintain the hammers extending outwardly substantially radially with respect to the axis of rotation so that the hammers have utmost efficiency in cleaning a surface.

Operation of my device in connection with the cleaning of pipe or other metal surface can be reviewed as follows: The device is applied to a surface to be cleaned, which may be the exterior of a pipe which has been raised from the ground

for cleaning purposes, and which is to be lowered back into the ground after the cleaning operation and after the pipe has been recoated. The device is started in operation by starting the drive to the head **52** to rotate the head at a relatively high rate of speed and it is positioned so that the individual hammers **68***a* repeatedly impact the surface of the pipe. The positioning of the device may be either manual or by virtue of its being mounted upon a machine which in turn is traversed over the surface to be cleaned. This hammering or impacting action serves to break away or dislodge any type of surface incrustation which may be present, including asphaltic residues, residues of previous tar paper coatings, scale, rust and the like.

A feature of the device is that the shock of impact of the hammers with the surface being cleaned is not directly transmitted to the other parts of the cleaning head. This is attributed to the elongated openings **56***a* in the hammers, which in effect enable an impact and rebound of a hammer without directly transmitting shock or impact to its retaining stud. In addition, the device readily accommodates itself to surface irregularities.

It will be apparent that the device can be applied to various kinds of cleaning operations, in addition to the cleaning of pipe, as for example the cleaning of castings, metal tanks, etc.

I claim:

1. In a cleaning device, a shaft, a plurality of circumferentially spaced studs rotatably carried by said shaft, a plurality of hammers carried by said studs for free swinging movement, and buffers formed of resilient material and positioned in alternate spaced relation with respect to said studs and circumferentially spaced from said hammers to limit individual swinging movement of each hammer.

2. In a cleaning device, a shaft, a plurality of circumferentially spaced studs carried by said shaft for rotation about the axis thereof, a plurality of hammers having slots engaging said studs to provide for pivotal movement of said hammers about said studs and for radial movement of said hammers relative to said shaft, and buffers of resilient material spaced alternately with respect to said spaced studs to limit the swinging movement of said hammers.

3. In a cleaning device, a shaft, at least one stud carried by said shaft in parallel but axially displaced position and for rotation about the shaft axis, at least one hammer having an elongated slot engaging said stud to provide for pivotal movement of said hammer about said stud and for radial movement of said hammer relative to said shaft, and buffers of resilient material at either side of said hammer and circumferentially spaced therefrom to limit the swinging movement of said hammer.

4. In a cleaning device, a shaft, a plurality of circumferentially spaced studs carried by said shaft for rotation about the axis thereof, a plurality of hammers having elongated slots engaging said studs to provide for pivotal movement of said hammers about said studs and for radial movement of said hammers relative to said shaft, and buffers of resilient material between said studs and circumferentially spaced from said hammers to limit the swinging movement of said hammers, said buffers comprising a plurality of studs with each stud having a covering of resilient material.

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