

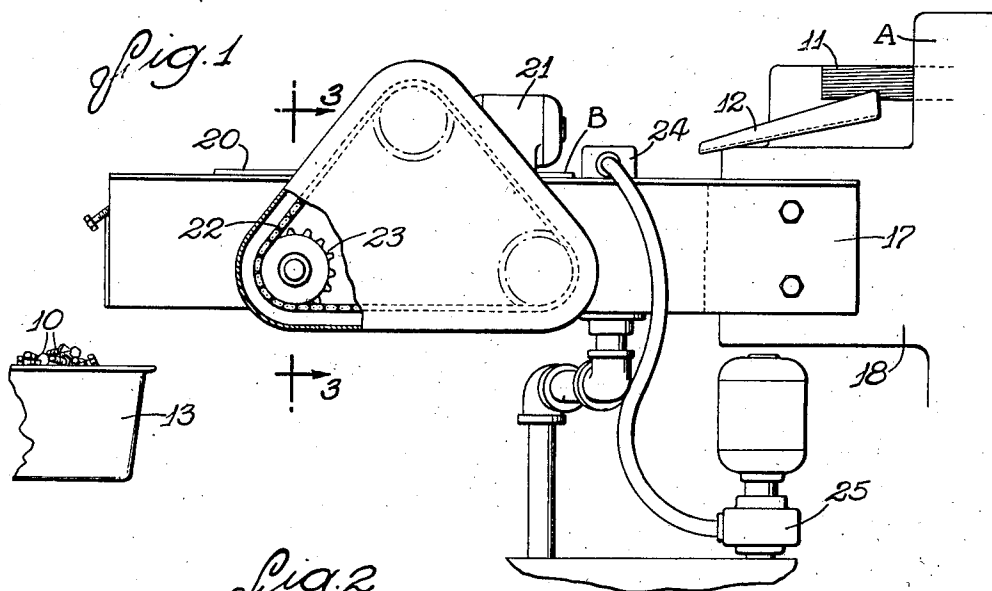
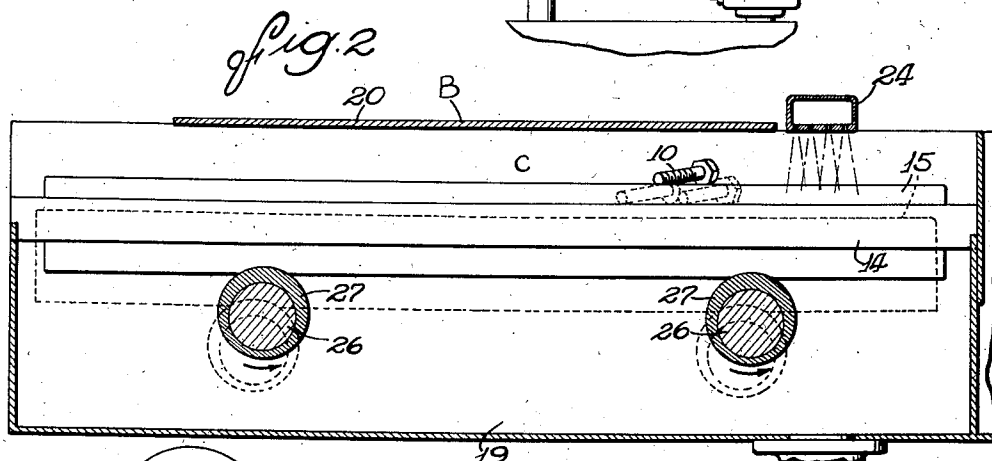
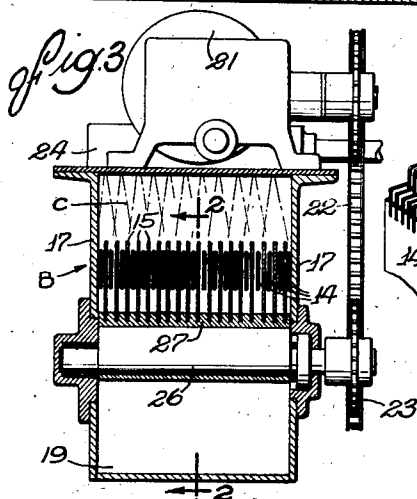
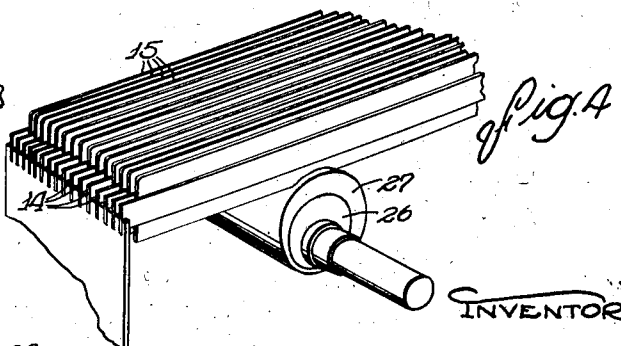
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METHOD AND APPARATUS FOR CLEANING METAL PARTS

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METHOD AND APPARATUS FOR CLEANING
METAL PARTSCarl E. Severin, Rockford, Ill., assignor of one-
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10 Claims. (Cl. 80—1)

The invention relates to a method of cleaning small metal parts such as screws, bolts, nuts and the like as well as an improved apparatus therefor.

5 The general object of the invention is to effect the cleaning of small metal parts in a continuous process as they emerge from a cold working machine in which they have been previously shaped. The handling operations required
10 are minimized by using such a continuous process as distinguished from the prior practice of cleaning successive segregated batches of such small metal parts by centrifuging or the like.

15 A more specific object of the invention is to provide a novel cleaning process utilizing the heat generated in the small metal parts by the cold working of them to assist in the removal of cleaning fluid applied to the parts as they emerge from a set of roll threading dies or other
20 cold working mechanism. In the course of this cleaning operation, the sprayed parts are preferably tossed and turned in a drying chamber to free them from excess liquid leaving only a dried coating of fluid on them.

25 Another object of the invention is to provide a novel form of cleaning device adapted to advance a series of metal parts through a drying zone while simultaneously turning and shaking them to free them from excess cleaning fluid.

30 Still another object of the invention is to provide a cleaning device of the type set forth embodying an arrangement for conserving the cleaning fluid by shaking the excess liquid from the cleaned parts, accumulating the same, and re-circulating it over successive metal parts being
35 cleaned.

Further objects and advantages of the invention will appear as the following description proceeds taken in conjunction with the accompanying
40 drawing, in which

Figure 1 is a side elevation of a cleaning apparatus embodying the present invention and adapted to carry out the novel cleaning process herein contemplated.

45 Fig. 2 is an enlarged longitudinal sectional view along the line 2—2 in Fig. 3.

Fig. 3 is a transverse sectional view along the line 3—3 in Fig. 1.

Fig. 4 is a detailed perspective view of a portion
50 of the conveyor rack for the drying apparatus.

For purposes of illustration of its various novel features, the invention has been described herein as applied to the cleaning of bolts 10 as they emerge from a threading machine A in which they
55 are threaded by rolling between threading dies 11.

It will be understood by those skilled in the art, however, that the present invention is applicable to the cleaning of metal parts of many kinds and shaped by a large variety of different kinds of cold working devices. A detailed description
5 of the threading machine A is not required for an understanding of the present invention. Such a machine is shown and described in Patent No. 2,020,658 issued to Earl R. Frost. In general, threads are rolled on successive bolt blanks by
10 reciprocating threading dies and the threaded blanks are then discharged from the machine along an apron or chute 12.

The heat generated in the metal parts by the cold working process is often sufficient to raise
15 their temperature to as much as 250 degrees Fahrenheit, and this heat is preferably utilized not only to assist in vaporizing a cleaning fluid flowed over the parts to remove any dirt or particles of metal from them but also to aid in the
20 mechanical removal of the excess of cleaning fluid applied to the parts. To this end, the cleaning apparatus B is arranged to receive the parts 10 directly from the cold working mechanism. In general, the metal parts are advanced
25 continuously from their point of entry into the cleaning apparatus B in which they are sprayed with a cleaning fluid and then dried, being finally discharged into a suitable receiving container 13. In the course of the drying operation, the metal
30 parts are not only dried by vaporization of the cleaning liquid but, in addition, shaken and turned during their advancing movement through the drying zone C so as to free them of excess
35 liquid.

In the present instance, the parts 10 are carried through the cleaning apparatus B by a conveyor comprising generally a series of spaced parallel bars disposed substantially horizontally
40 with the alternate bars connected together to form two groups 14 and 15 adapted for vertical as well as endwise movement relative to each other for advancing the parts with a step-by-step motion. While both groups of bars may be movable if desired, it is preferred for the
45 sake of simplicity of construction to mount the bars 14 stationarily. This is accomplished by fastening opposite ends of the bars to a housing 17 mounted on the machine bed. An open trough or tank 19 (Figs. 2 and 3) underlies the
50 conveyor racks and forms a bottom wall for the housing, the top wall being formed by a horizontal plate 20.

To advance the metal parts 10 through a cleaning apparatus, the movable rack bars 15 are
55

reciprocated longitudinally and simultaneously moved above and below the top edges of the fixed bars 14 by means of eccentrics 26 (Figs. 2 and 4). Sleeves 27 secured to the lower edges of the movable rack bars 15 are journaled on the eccentrics 26 and thus vibrate the bars 15 between the extreme upper and lower positions shown respectively in full and dotted lines in Fig. 2 while simultaneously reciprocating them horizontally. The eccentrics 26 are rotated by an electric driving motor 21 mounted on the top of the apparatus and connected thereto through a drive chain 22 and sprockets 23 (Figs. 1 and 3). As the bars 15 rise above the tops of the bars 14, the metal parts 10 are lifted and shifted forward a short distance, again falling on the fixed bars 14. This movement is continued progressively step-by-step with a consequent shaking and turning of the metal parts as they are bumped along the conveyor.

Cleaning liquid is sprayed over the hot metal parts 10 as they enter the cleaning apparatus by a spray head 24 (Fig. 2), thus effectively washing away chips and dirt from the surface of the parts. Any suitable cleaning fluid may be used such, for example, as kerosene. The excess cleaning fluid left on the surface of the metal parts is shaken from them as they are bounced along the surface of the conveyor racks 14-15 in their advancing movement through a drying chamber or zone C (Fig. 2). Also, the alternate transfer of the parts alternately from one set of bars to the other in the course of their intermittent movement along the conveyor also assists in natural drainage of the excess of cleaning fluid down along the surfaces of the parts and the transfer of such draining fluid onto the bars. The liquid thus freed drains into the tank or sump 19 through the interstices between the bars of the conveyor rack where it is accumulated and recirculated to the spray head 24 by means of a motor driven pump 25 (Fig. 1). Also, by virtue of the heat derived from the heated parts by the cleaning fluid, the viscosity of the latter is reduced so that the fluid which is not immediately shaken off drains rapidly to the lower side of the part as it is being elevated and is removed the next time the part, upon being lowered, contacts a bar 14. By repetition of this process as the parts are alternately raised and lowered and simultaneously advanced through the drying zone, most of the excess of the cleaning fluid is removed quickly. This, in combination with the evaporation induced by the heat derived by conduction from the parts, rapidly removes all of the kerosene except a negligible film which it is desirable to retain on the parts for the purpose of preventing rusting. The parts, thus treated, may be packaged for storage as soon as they emerge from the drier and drop into the container 13.

It will thus be seen that an arrangement has been provided for expeditiously and economically cleaning small metal parts in which no intermediate handling steps are required. In addition, the recirculation of the cleaning liquid, as described minimizes the cost of the process while the utilization of the heat generated in the parts by their previous cold working aids in effectually drying the cleaning liquid sprayed over them.

I claim as my invention:

1. The combination with a mechanism for cold working small metal parts, of a cleaning apparatus utilizing the heat generated in the parts by the cold working thereof in removing a cleaning

liquid therefrom, said apparatus including means for flowing a cleaning liquid on the hot parts as they emerge from said mechanism, and means for advancing the hot parts through a drying zone and for simultaneously shaking and turning the parts to aid in freeing them of excess cleaning liquid.

2. The combination with a mechanism for cold working small metal parts, of means for washing the articles by flowing a vaporizable cleaning liquid over the hot parts as they emerge from said mechanism to utilize the heat generated in the parts as an incident to their cold working for evaporating the cleaning liquid from their surfaces to dry the same.

3. The combination with a mechanism for cold working small metal parts, of a cleaning apparatus utilizing the heat generated in the parts by the cold working thereof to aid in the removal of a cleaning liquid therefrom, said apparatus including means for flowing a cleaning liquid over the hot parts as they emerge from said mechanism, a rack embodying two groups of elongated bars disposed in a generally horizontal plane with bars of the two groups alternating with each other, means reciprocating the bars in one of said groups and alternately moving the same above and below the other bars for moving the loose metal parts step-by-step along the surface of the rack with an intermittent motion to free the excess cleaning liquid from the metal parts so that the freed liquid may drain through the interstices between the bars.

4. The method of cleaning small, loose, cold worked metal parts which includes the step of washing the metal parts by flowing over them a vaporizable cleaning liquid immediately upon the termination of a cold working operation to utilize the heat generated in the parts by the cold working to aid in the vaporization of the liquid.

5. The method of cleaning small, loose, cold worked metal parts which includes the steps of washing the metal parts by flowing over them a cleaning liquid immediately upon the termination of a cold working operation to utilize the heat generated in the parts by the cold working to aid in the removal of the cleaning liquid, and tossing and turning the metal parts in a drying zone to free them of excess cleaning liquid.

6. Apparatus for washing and drying small parts having, in combination, a group of spaced parallel bars connected together forming a support, a second similar support composed of bars alternating with said first bars and cooperating therewith to form a substantially horizontal conveyor, means for discharging said parts onto one portion of said conveyor, means for flowing cleaning fluid onto the parts on said portion only whereby to constitute such portion a washing zone and the remainder of the conveyor a drying zone, and means for moving said supports relative to each other to alternately raise one above the other and simultaneously relatively reciprocate the supports generally horizontally whereby the parts are transferred first onto one support and then onto the other while being advanced step by step along the conveyor successively through said washing and drying zones, such transfer of the parts and the turning of the parts incident thereto inducing draining of the excess fluid from the parts through said support during progress of the parts through the drying zone.

7. Apparatus for washing and drying small parts having, in combination, a set of spaced parallel bars connected together and having sub-

stantially flat upper surfaces extending substantially horizontally, a second similar set of bars alternating with said first bars and cooperating therewith to form a substantially horizontal conveyor, means for discharging said parts one by one onto one portion of said conveyor, means for flowing cleaning fluid onto the parts on said portion whereby to constitute such portion a washing zone and the remainder of the conveyor a drying zone, and means for moving said sets of bars relative to each other to alternately raise one above the other and simultaneously relatively reciprocate the sets generally horizontally whereby the parts are transferred first onto the bars of one set and then onto the bars of the other set while being advanced step by step along the conveyor successively through said washing and drying zones.

8. Apparatus for washing and drying small parts having, in combination, two generally horizontal supports having interspersed elements and cooperating therewith to form an elongated conveyor, means for discharging said parts onto one portion of said conveyor, means for flowing cleaning fluid onto the parts on said portion whereby to constitute such portion a washing zone and the remainder of the conveyor a drying zone, and means for moving said supports relative to each other to alternately raise each part above and

then back onto one of the supports while advancing the part step by step along said conveyor successively through said washing and drying zones.

9. The method of cleaning cold worked metal parts which comprises generating heat in the parts by cold working the same, flowing a cleaning fluid onto the parts immediately following such cold working whereby to wash the parts while retaining therein a substantial amount of the heat developed by said cold working, and advancing the washed and heated parts intermittently out of the washing zone through a drying zone while simultaneously transferring each part alternately from one supporting surface to another as an incident to each stepping movement whereby to turn the parts and induce draining of the excess fluid therefrom.

10. The method of cleaning metal parts which comprises discharging the parts one by one onto two substantially horizontal supports, flowing a cleaning fluid onto the parts to wash the same, and advancing the washed parts step by step along said supports through a drying zone while transferring each part alternately from one support to the other in the course of each stepping movement whereby to turn the parts and induce draining of the excess fluid therefrom.

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