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INDUSTRIAL WASHING MACHINE

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2 Sheets-Sheet 1

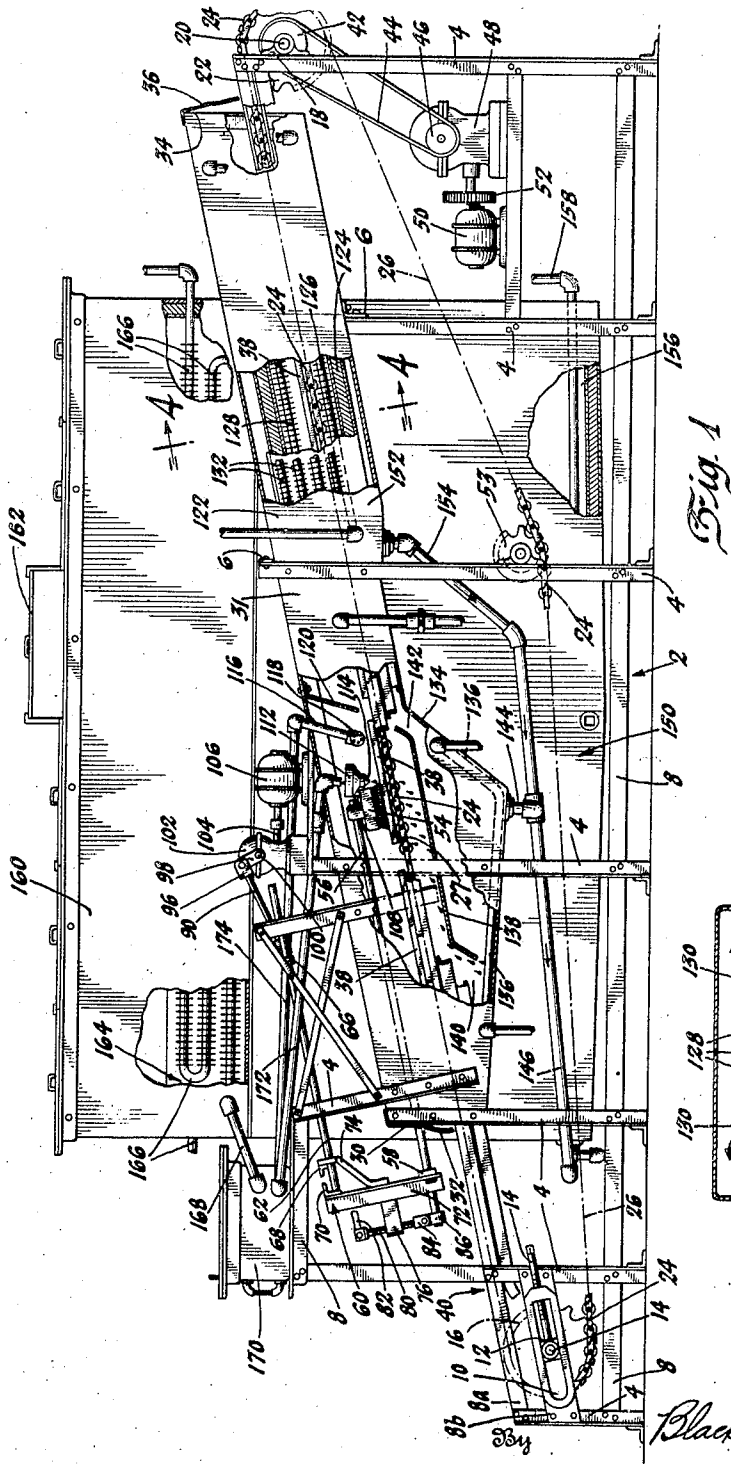


Fig. 1

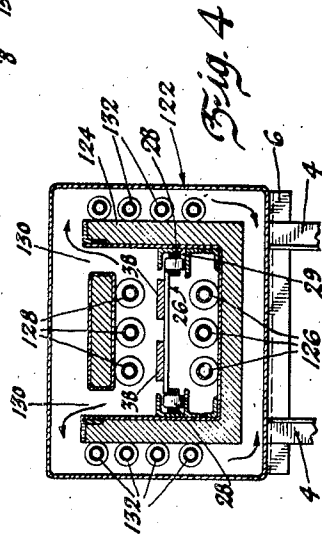


Fig. 4

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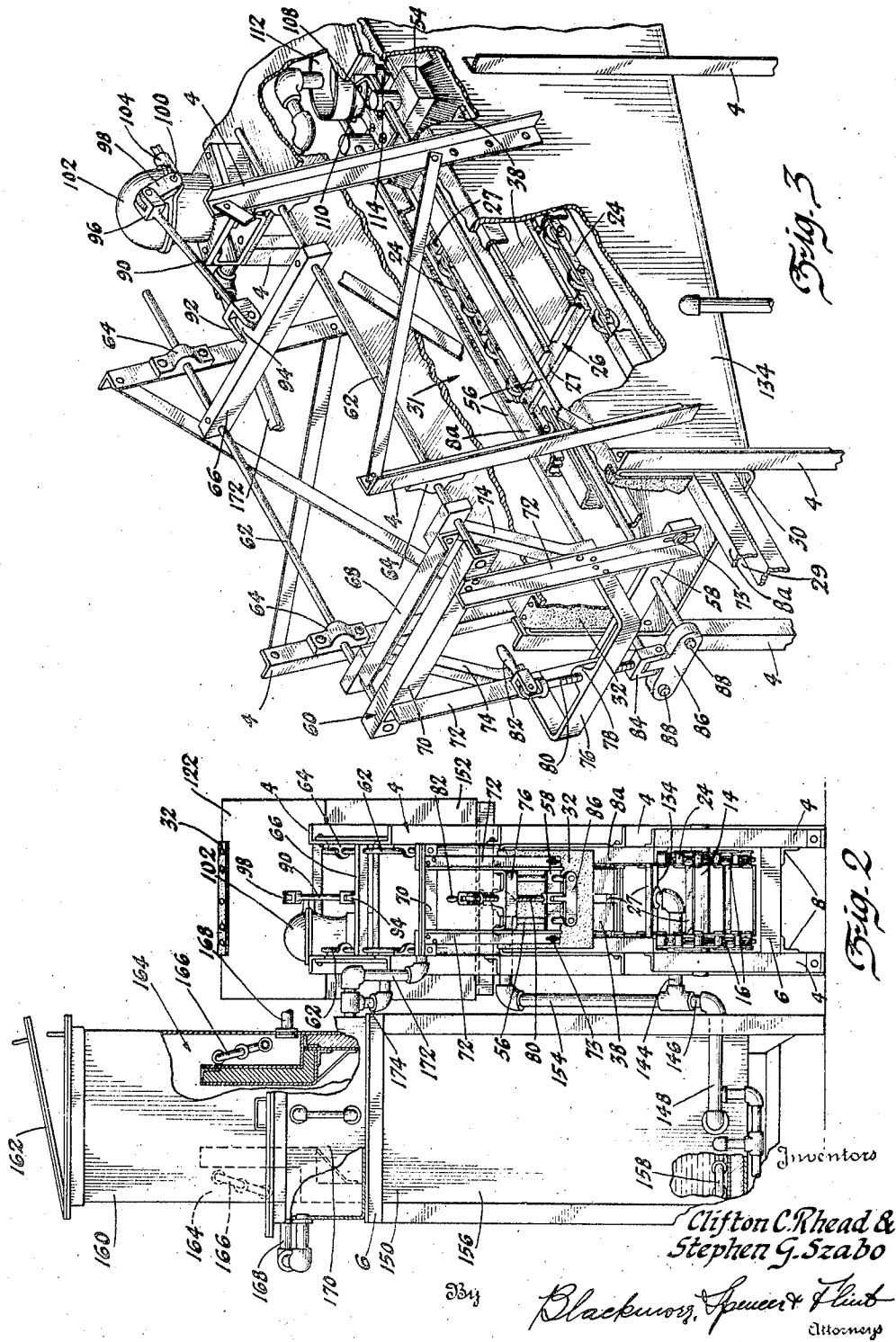
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UNITED STATES PATENT OFFICE

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INDUSTRIAL WASHING MACHINE

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5 Claims. (Cl. 15—77)

This invention relates to scrubbing machines and has particular reference to a machine used for scrubbing metal articles to remove grease and dirt therefrom to prepare them for engraving or embossing or for plating or enameling.

Articles which are to be finely embossed or engraved, or which are to be plated or enameled, must be perfectly clean or free from accumulated grease or dirt.

The machine of the invention makes use of a cleaning fluid which is commercially known as "Cecolene", an organic solvent and believed to be trichlorethylene. The trichlorethylene is vaporized and condensed in a still and the condensate led to the machine where it is used to clean the work. The machine itself comprises a frame including the still. The frame has an inclined and elongated cleaning chamber built therein and an endless belt travels through the cleaning chamber and carries the work therethrough. Each end of the cleaning chamber is closed by a rubber apron so that the entire cleaning chamber is enclosed. A brush is mounted in the cleaning chamber and is given a reciprocating movement through a suitably operated frame. The brush is positioned near the belt and scrubs the work passing the cleaning chamber. The condensed cleaning fluid or "Cecolene" is led to the cleaning chamber and deposited on the article to be cleaned adjacent the brush so that the scrubbing action of the brush also scrubs the cleaning fluid over the work. The endless belt travels on the incline of the cleaning chamber and the cleaning fluid is delivered at a higher point ahead of the brush so that it tends to flow over the work and between the brush and the work. The cleaning fluid as it drops from the work is caught in a pan which has a plurality of cooling pipes which cool the cleaning fluid. A suitable system of pipes returns the cleaning fluid to the still where it is re-used.

Beyond the brush a flow of condensed cleaning fluid is sprayed or flushed over the scrubbed article to clean or flush away any dirt which has been loosened by the brush. Beyond the flushing or cleaning spray the work passes through a heating chamber having a plurality of steam coils which vaporize the remaining cleaning fluid and cause it subsequently to pass over cooling coils to condense it. The cleaning fluid from both the flushing operation and the drying operation is caught in suitable pans and returned to the still. Beyond the heating chamber the work passes through a rubber door or partition and is delivered to the end of the belt in a perfectly clean

and dry condition ready to be engraved or plated.

On the drawings:

Figure 1 is a side view of the apparatus with parts being broken away and shown in section better to illustrate the construction.

Figure 2 is an end view of the structure of Figure 1 looking from the left, with parts broken away and sectioned better to illustrate the construction.

Figure 3 is a perspective detailed view showing the mechanism for operating the brush.

Figure 4 is a sectional view on the line 4—4 of Figure 1.

Referring to the drawings, the numeral 2 indicates the frame of the washing machine. The frame comprises the uprights 4, transverse members 6 and longitudinal members 8.

At the left end of the machine, as shown in Figure 1, the uprights 4 are shorter and have secured thereto the longitudinal members 8a and 8b. The longitudinal members 8b have elongated slots 10 therein in each of which there is received a bearing 12 movable in the slots by a setscrew 14. The bearings 12 support an axle 14 having a pair of sprocket wheels 16. The opposite end of the machine has secured to the end uprights 4, two brackets 18 in which there is mounted an axle 20 having a pair of sprocket wheels 22. Over the sprocket wheels 16 and 22 there are trained the endless chains 24 which form a part of an endless belt 26, the belt including a plurality of transverse metal plates 27 as shown in Figure 3. The chains 24 have the usual rollers 28 and travel in guideways 29 in a cleaning chamber 31.

The shaft 20 has a pulley 42 attached thereto and is driven from the belt 44 trained around a pulley 46 driven from a suitable gear reducing mechanism 48 driven from a motor 50 through the transmission gears 52. One or more idler sprocket gears 53 may be used. The movement of the belt 26 through the cleaning chamber 31 will carry the work from the loading end at 40 through the entrance 30 through the cleaning chamber and out at the exit 34.

The belt 26 passes through an elongated inclined cleaning chamber 31. The entrance 30 to the chamber is closed by a rubber door or apron 32 and the exit 34 of the chamber is closed by a rubber apron or door 36. The cleaning chamber is inclined from the entrance upward to the exit as shown in Figure 1. The work to be cleaned is indicated at 38 and is loaded on the endless belt at the loading end at 40.

Inside the cleaning chamber, a short distance

beyond the entrance 30, there is mounted a scrubbing brush 54. The brush 54 is secured to the free ends of two rods 56 which extend rearwardly through openings in the apron 32 and through openings in a transverse member 58 of a movable frame indicated as a whole at 60. The frame 60 comprises the upper longitudinal rods 62 slidably mounted in the brackets 64 secured to the uprights 4 of the washing machine frame. The rods 62 are rigidly connected by the transverse members 66, 68 and 70 and vertically extending members 72 are rigidly secured to the end transverse member 70 and extend downwardly and are adjustably mounted at 73 at their ends to the transverse member 58. Suitable braces 74 connect the transverse member 68 with the vertical uprights 72. A U-shaped iron 76 is secured to the uprights 72 intermediate the ends thereof and in a threaded boss 78 formed on the base of the U there is received the screw 80 having an operating handle 82 at the top thereof. Secured to the lower portion of the screw is the yoke 84 pivoted to the crosshead 86 to which the ends 88 of the rods are rigidly secured. By causing the screw 80 to move either upward or downward, the degree to which the brush 54 will bear on the work is determined.

The frame 60 is given a reciprocating motion by means of a link 90 having a yoke 92 at its end pivoted to an ear 94 on the cross member 66. A yoke 96 at the other end of the link 90 is pivoted to an arm 98 secured to a shaft 100 journaled in a dome 102 which houses a suitable mechanism for translating the rotary motion of the shaft 104 of the electric motor 106 into a reciprocating motion so that the link 90 and arm 98 will impart a reciprocating motion to the frame 60 and give to the brush 54 a corresponding reciprocating motion.

The brush 54 has secured to the upper portion thereof a plate 108 having an angle end 110 to which there is fastened the cup or container 112. The bottom of the container is formed with a suitable outlet 114 for the distribution of the cleaning fluid. The outlet may be formed so that the cleaning fluid will drip on the metal or will be spread therealong from a narrow slot.

Immediately beyond the brush 54, or higher up in the cleaning chamber 31, there is secured the pipe 116, the lower end of which has secured thereto a spray pipe 118 the purpose of which is to spray cleaning fluid on the work after it has left the brush and to flush away any dirt or grease which has been loosened by the brush. The spray pipe 118 may be of any suitable form and is preferably of a length of pipe which extends substantially the width of the cleaning chamber and sprays the cleaning fluid over the entire area of the work. After the work leaves the spraying fluid it passes under a bridge or partition 120 into the heating chamber 122, the heating chamber being formed at the upper end of the cleaning chamber 31. The heating chamber comprises the box 124 through which the endless belt 26 travels. At the bottom of the box there are positioned the steam pipes 126 and at the top of the box are the steam pipes 128. Steam passing through the pipes will heat the heating chamber so that any cleaning fluid remaining on the work 30, belt 26 or chains 24, will be volatilized. The vapors will pass upward through the spaces 130 in the direction indicated by the arrows in Figure 4 and down the outside of the box 124 or between

the box and the cleaning chamber 31 and over the cooling coils 132. As the vapors will be condensed in passing over the cooling coils 132, the liquid will fall to the common bottom of the heating chamber 122 and the cleaning chamber 31. After passing through the heating chamber 122 the work passes under the rubber closure 36 and is delivered at the end of the belt to any suitable mechanism or device where it may be removed for the plating or engraving operation.

Referring to Figure 1, the cleaning chamber 31 below the brush 54 and the spray pipe 118 is provided with a chamber 134 which has the cooling coils 136 along its bottom and side. A plate 138 is secured across the cleaning chamber and is inclined in the same manner as the cleaning chamber. Openings 140 at the lower end and 142 at the upper end allow the cleaning fluid which drops from the brush and the work and from the spraying pipe 118 to flow to the end of the cooling coils 136 and over the cooling coils to cause the liquid to cool and prevent any vaporization. From the cooling coils, the liquid flows to the outlet pipe 144 to a pipe 146, to a pipe 148 which leads to the bottom of a still 150.

A suitable chamber 152 at the bottom of the heating chamber 122 collects the liquid condensed by the cooling coil 132, and a pipe 154 conducts the condensed cooling liquid to the pipe 146 to return it to the still.

The still 150 comprises the lower chamber 156 in which the liquid is heated by the steam coils 158 and caused to vaporize and to ascend to the condensing chamber 160. The chamber 160 is shown in Figure 2 with its cover 162 open but this cover is normally closed so that the only exit for the vapors will be down through the condensing chambers 164 over the cooling coils 166. When the vapors come in contact with the cooling coils, they will be condensed and the clear condensate will fall to the bottom of the condensing chamber and flow from the pipes 168 to the receiving tank 170. From the receiving tank 170, pipes 172 and 174 lead to the container 112 and the spray pipe 116, respectively, for the purpose of delivering the condensed cleaning liquid from the condensing chamber 164 to the work. Preferably, the cooling coils of the invention have cold water run therethrough, the water being of such a temperature effectively to accomplish the condensation of the vapors of the cleaning liquid.

We claim:

1. In a cleaning and washing machine using a cleaning fluid, an elongated chamber having two separated sections, means to transport the work to be cleaned through the chamber, means in the first section of the chamber for scrubbing the work, means adjacent said scrubbing means to distribute the cleaning fluid to the scrubbing means, means in the same section of the chamber beyond the scrubbing means to flush the work with the cleaning fluid after the scrubbing operation, means under the scrubbing and flushing means to catch and cool the cleaning fluid, the second section of the chamber being located beyond the flushing means, and heating means in said section to dry the work.

2. In a cleaning and washing machine using a cleaning fluid, an elongated chamber having two separated sections, means to transport the work to be cleaned through the chamber, means in the first section of the chamber for scrubbing the work, means adjacent said scrubbing means to distribute the cleaning fluid to the scrubbing means, means in the same section of the chamber

beyond the scrubbing means to flush the work with the cleaning fluid after the scrubbing operation, means under the scrubbing and flushing means to catch and cool the cleaning fluid, the second section of the chamber being located beyond the flushing means, and heating means in said section to dry the work, and condensing means at the sides of said heating section to condense and cool the cleaning fluid.

3. In a cleaning and washing machine using a cleaning fluid, an elongated chamber having two separated sections, means to transport the work to be cleaned through the chamber, means in the first section of the chamber for scrubbing the work, means adjacent said scrubbing means to distribute the cleaning fluid to the scrubbing means, means in the same section of the chamber beyond the scrubbing means to flush the work with the cleaning fluid after the scrubbing operation, means under the scrubbing and flushing means to catch and cool the cleaning fluid, the second section of the chamber being located beyond the flushing means, and heating means in said section to dry the work, and curtains at the entrance to and exit from said chamber.

4. In a cleaning machine using a cleansing fluid, a frame, an endless conveyor system supported thereby having the discharge end at a

higher level than the other, an elongated enclosed chamber surrounding a portion of the conveyor and having two separate sections, means in one section for scrubbing the work on the conveyor with the cleansing fluid and then flushing with cleansing fluid, means in the other section to heat the work for drying and driving off the fluid by evaporating the same, cooling units in the scrubbing section below the scrubbing means and in the heating section at the sides of the heating means and collecting means for the fluid below the cooling means and cooperating therewith to catch the liquid as it falls.

5. In a cleaning machine having an endless conveyor system for moving work past scrubbing and flushing means, a heating and condensing chamber into which the cleansed work passes comprising a U-shaped trough surrounding the conveyor, a member above the conveyor and partially closing the upper portion of the trough, heating coils carried by the member and the trough above and below the conveyor, a casing surrounding the assembly and cooling coils therein to condense the vapors passing therein which had been driven off the work by the heating coils.

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