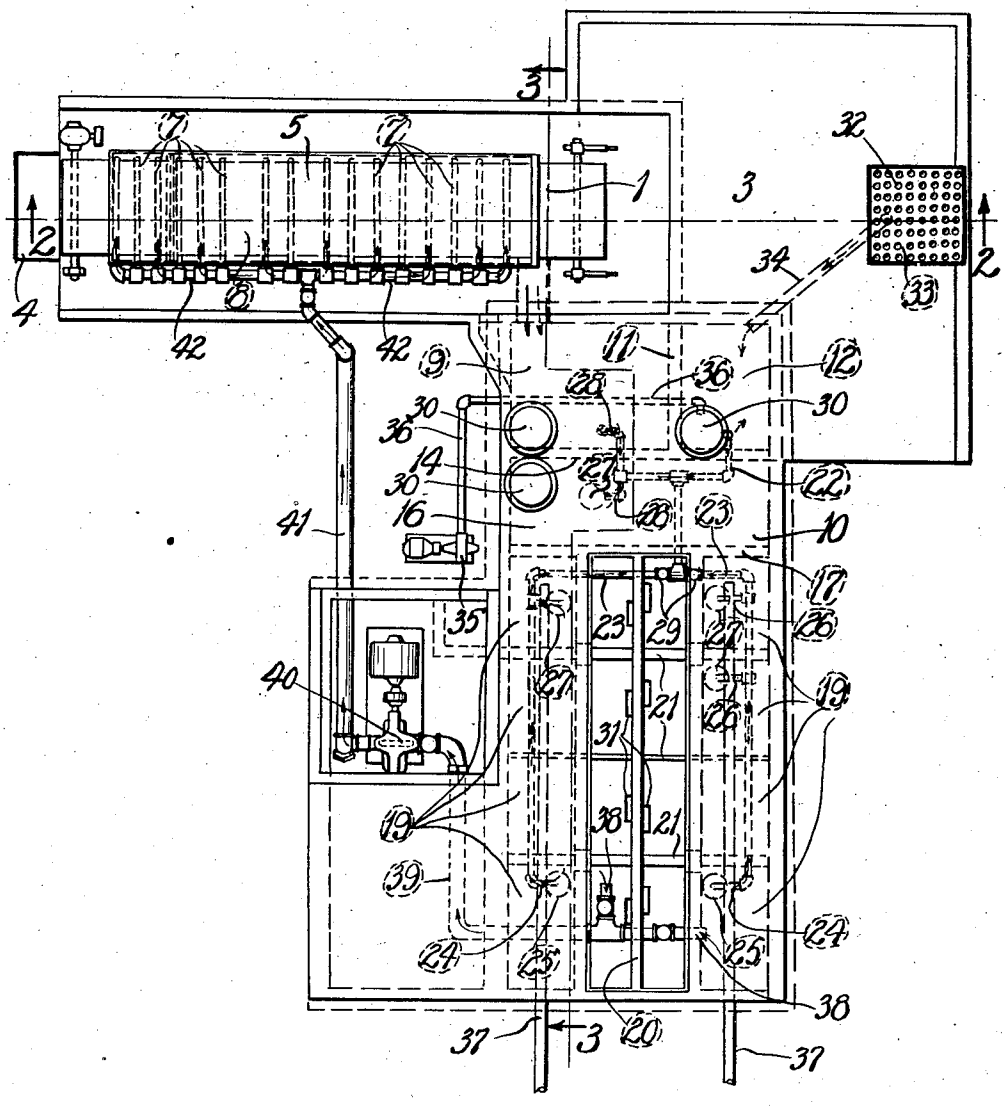
Jan. 14, 1930. O. L. MAAG ET AL 1,743,465

APPARATUS FOR REMOVING OIL FROM METAL

Filed Aug. 13, 1925 2 Sheets-Sheet 1

Fig. 1.



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Filed Aug. 13, 1925 2 Sheets-Sheet 2

Fig. 2.

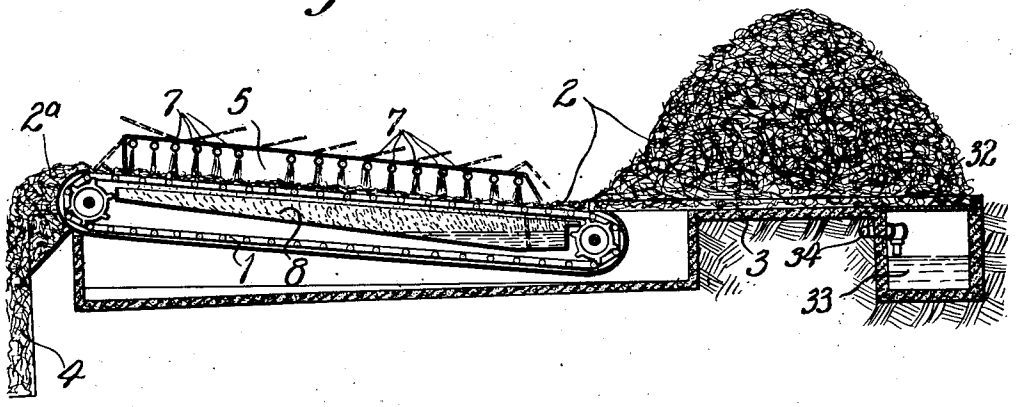


Fig. 3.

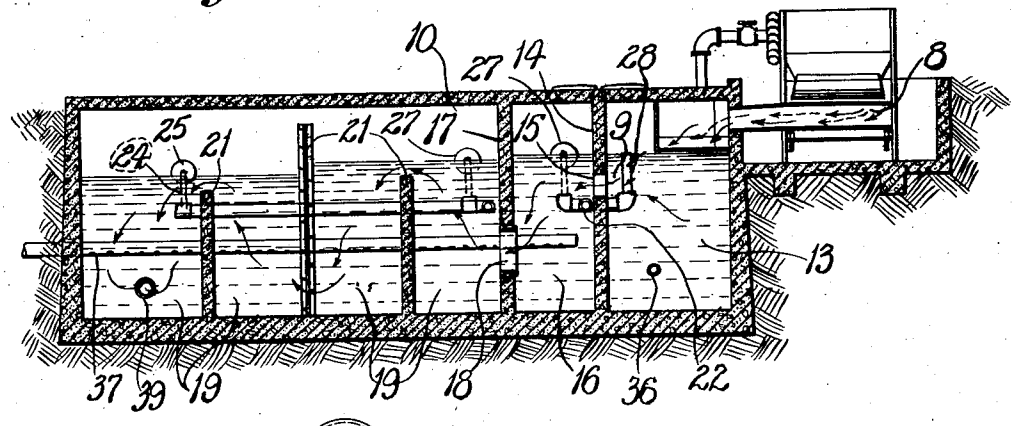
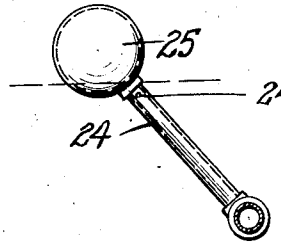


Fig. 4.



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Patented Jan. 14, 1930 1,743,465

UNITED STATES PATENT OFFICE

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APPARATUS FOR REMOVING OIL FROM METAL

Application filed August 13, 1925. Serial No. 50,056.

Our invention relates to machines for removing oil from metal pieces, such as the shavings, chips and cuttings resulting from the operation of lathes, automatic screw machines and the like. As is well known, oil is frequently applied in large quantities to the work and to the tools of lathes, automatic screw machines and the like and the large quantities of chips, shavings and cuttings resulting from the use of such machines are covered with oil and oil is trapped between particles thereof. If such oil can be removed from the metal, the oil can be used over and over again, thus reducing the expense of operating the machines. The metal is used in the manufacture of steel, such steel frequently being manufactured in electric furnaces. If the oil is not removed from the metal pieces before they are placed in an electric furnace, the oil has a deleterious effect, causing the steel to contain excessive amounts of carbon. Accordingly, numerous processes and machines have been devised to remove the oil from such metal pieces. Such machines are usually expensive and so much oil remains after treatment in such machines that it is frequently necessary to burn the oil from said chips before they are suitable for use in an electric furnace in the manufacture of steel. It is the object of the present invention to devise an apparatus whereby practically all of the oil can be quickly, easily and economically removed from such chips, the chips requiring no further treatment to fit them for use in the manufacture of steel in electric furnaces.

The invention consists principally in subjecting the metal chips to sprays of heated water or steam or both. The invention further consists in passing the chips, as by means of a conveyor, beneath a multiplicity of spraying devices that spray the heated water or steam onto the chips. The invention further consists in the apparatus and in the parts and combinations of parts hereinafter described and claimed.

In the accompanying drawing, which forms part of this specification, and wherein like reference characters indicate like views wherever they occur,

Fig. 1 is a top plan view of a preferred form of apparatus for practicing our invention;

Fig. 2 is a sectional view thereof on the line 2—2 of Fig. 1;

Fig. 3 is a sectional view thereof on the line 3—3 of Fig. 1; and

Fig. 4 is a detail view of an oil drain and the float therefor.

A suitable apparatus for practicing the invention is shown in the drawings and comprises a continuous belt or apron conveyor 1 adapted to receive oily metal pieces 2 at one end and to deliver oil-free pieces 2^a at the other. At one end of the conveyor is a loading platform 3 from which the chips and shavings may be deposited onto the conveyor by hand or by machinery, and at the other or delivery end, the conveyor drops the oil-free chips and shavings into a suitable delivery pit 4.

Mounted above the conveyor is a suitable housing 5 comprising a plurality of hinged sections which may be raised as indicated in dotted lines to permit inspection and repair of the apparatus. In said housing is a multiplicity of pipes 7 adapted to receive hot water or steam or both and provided with downwardly extending openings whereby the water or steam may be sprayed onto the oily pieces 2 on the conveyor. Instead of plain water, some solution adapted to remove the oil may be used. Said conveyor 1 comprises mesh work or other material that is provided with openings whereby the oily liquid may drop from the conveyor into a suitable trough 8 mounted between the two passes of the conveyor and supported in any suitable way.

Said trough 8 extends into the endmost compartment 9 of a tank 10 having a plurality of communicating compartments whereby the liquid passes from one compartment to the next.

A preferred form of tank 10 is illustrated in the drawings. In this form, the compartment 9 that receives the oily liquid from the trough 8 occupies only part of the width of the tank; and is separated by a partition wall 11 from a sump 12 or pit that receives the oil 13 that is separated from the oily water,

as hereinafter described. The inner end wall 14 of the liquid receiving compartment 9 is provided with holes 15 through which the oily liquid can pass into the second compartment 16, which compartment extends the full width of the tank 10; and whose end wall 17 is provided with openings 18, near the bottom thereof. The remainder of the tank is divided into a plurality of compartments 19 by means of a longitudinal partition 20 that extends to the top of the tank and transverse partitions 21, said transverse partitions either being low enough to permit the oily liquid to pass over the top, or else having openings therethrough to permit the oily liquid to pass into the next compartment. In the construction illustrated, the middle partition 21 is high and has opening through the lower portion thereof and the partitions 21 on either side are low. As shown by the arrows, the liquid passes over the top of the low partitions and through the opening in the high partition.

Extending into said oil sump 12 is a pipe 22 that extends through the second compartment 16 and then divides into branches 23 that extend through the other compartments 19, one branch on each side of the longitudinal partition 20. Opening into said branch pipes in the endmost compartments 19 are outlet pipes 24 that are secured to ball float members 25 or the like whereby their openings 24ª are held near the surface of the liquid. Thus these outlet pipes receive the oil that has separated from the water and floats on the top thereof. Similar outlet pipes 26 and float members 27 may be provided in other compartments, as shown in the drawing. The compartment 9 that receives the oily liquid from the collecting trough 8 is provided with an overflow pipe 28 that also communicates with said pipe 22 that drains into the oil sump 12.

Suitable valves 29 may be provided for shutting off one or the other of the branch pipes 23 and means may be provided for blocking the openings into the compartments 19 on one side or other of the tank, thus permitting cleaning out of the compartments on one side. For this purpose, manholes and covers 30 are provided and ladder rungs 31 are secured to the longitudinal partition in the several compartments.

The loading platform 3 may be provided with a reticulated portion 32 that permits oil to drop into a pit 33 that is connected by means of a pipe 34 with the oil sump 12. A pump 35 is connected by means of a pipe 36 with said oil sump 12; so that oil may be pumped from the sump and to any suitable permanent storage receptacle or purifying or refining mechanism.

Extending through the several compartments (except the receiving compartment 9) are steam pipes 37 that heat the water in the several compartments. The endmost compartments are provided with inlet members 38 that connect with a pipe 39 that leads to a pump 40. Said pump 40 pumps the water from said endmost compartments and forces it through a delivery pipe 41 that connects with a pipe 42 extending along the housing. The spray pipes 7 open from said pipe 42. If desired, additional hot water or steam may be added to the water that is pumped into the delivery pipe 41 and spray pipes 7, so as to secure the desired temperature for the water that is sprayed onto the metal.

The process will be easily understood from the description of the foregoing apparatus. Oily chips 2, scraps or turnings from metal working machines are placed on the loading platform 3 and are delivered to the conveyor 1, either automatically or manually, as may be desired. The movement of the conveyor 1 carries the metal chips beneath the spray pipes 7 and the hot water or steam is sprayed onto them, the water or steam coming in direct contact with the chips and removing the oil therefrom. The oily water falls through the conveyor 1 into the trough 8, whence it passes to compartment 9 of the tank 10 where the oil and water are separated by gravity during the passage of the oily liquid through the several compartments of the tank. The oil is removed to an oil storage tank and the water heated and pumped out of the tank to be used again in spraying chips.

The above described apparatus has numerous advantages. The chips are subjected to the direct action of the steam or hot water or both, the steam or water being forcibly sprayed over the chips and carrying away almost all of the oil adhering to the chips and trapped in the mass of chips. The chips delivered into the chip delivery pit are almost entirely free of oil. Thus the invention results in the reclaiming of almost all of the oil, which oil may be used over and over again, and metal chips treated according to the invention are so nearly free from oil as to be suitable for use in an electric furnace in the manufacture of steel.

Obviously, numerous changes may be made without departing from the invention and we do not wish to be limited to the precise construction shown.

What we claim is:

1. Apparatus for removing oil from oily metal chips and the like comprising a housing, a multiplicity of spray devices therein, a conveyor for carrying chips beneath said spray devices, a trough beneath said conveyor for collecting oily liquid dropping from said chips, and a separator tank at the discharge end of said trough adapted and arranged to receive said oily liquid from said trough.

2. Apparatus for removing oil from oily metal chips and the like comprising a housing, a multiplicity of spray devices therein,

a conveyor for carrying chips beneath said spray devices, a trough beneath said conveyor for collecting oily liquid dropping from said chips, a separator tank at the discharge end of said trough adapted and arranged to receive said oily liquid from said trough, an oil sump, pipes through which oil flows from said separator tank into said oil sump, an oil pump for pumping oil from said sump, and a pump for pumping the oil free liquid from said separator tank.

3. Apparatus for removing oil from oily metal chips and the like comprising a multiplicity of spray devices adapted and arranged to spray heated water onto said metal chips, a conveyor for carrying chips beneath said spraying devices, a trough beneath said conveyor for collecting oily liquid dropping from said chips, a tank wherein said oily liquid may be separated into oil and liquid, said trough emptying into said tank, means for draining off said oil and means for reheating said liquid and feeding it to said spraying devices.

4. Apparatus for removing oil from oily metal chips and the like, comprising a multiplicity of spray devices for emitting sprays of hot water, an endless conveyor of open work material for carrying chips beneath said spray devices, a trough disposed below said chips on said conveyor and between the two passes of said conveyor, a separator tank disposed at the discharge end of said trough to receive oily water therefrom, and oil collecting pipes disposed in said tank and having oil inlet portions, said oil inlet portions being provided with ball float members for maintaining said inlet portions near the surface of the oil in the separator tank.

5. Apparatus for removing oil from oily metal chips and the like, comprising a multiplicity of spray devices for emitting sprays of hot water, a conveyor beneath said spray devices adapted and arranged to carry metal chips, a trough beneath said conveyor for collecting oily water dropping from said metal chips, and a separator tank at the discharge end of said trough, said separator tank being divided into communicating compartments.

6. Apparatus for removing oil from oily metal chips and the like, comprising a multiplicity of spray devices for emitting sprays of hot water, a conveyor beneath said spray devices adapted and arranged to carry metal chips, a trough beneath said conveyor for collecting oily water dropping from said metal chips, a separator tank at the discharge end of said trough, said separator tank being divided into communicating compartments, the oily water receiving compartment into which said trough opens being separated from the adjacent compartment by a high wall having an opening in the upper portion, succeeding compartments being separated from each other by alternating high and low partitions, the high partitions having openings in their lower portions, and oil receiving pipes in some of said compartments, said pipes being provided with float members.

7. Apparatus for removing oil from oily metal chips and the like, comprising a multiplicity of spray devices for emitting sprays of hot water, a conveyor beneath said spray devices adapted and arranged to carry metal chips, a trough beneath said conveyor for collecting oily water dropping from said metal chips, a separator tank at the discharge end of said trough, said separator tank being divided into communicating compartments, the oily water receiving compartment into which said trough opens being separated from the adjacent compartment by a high wall having an opening in the upper portion, succeeding compartments being separated from each other by alternating high and low partitions, the high partitions having openings in their lower portions, oil receiving pipes in some of said compartments, said pipes being provided with float members, steam pipes in some of said compartments and a pipe leading heated water from said steam heated compartments to said spray devices.

Signed at Canton, Ohio, this 3rd day of August, 1925.

OSCAR L. MAAG.
CLIFFORD M. MARATTA.