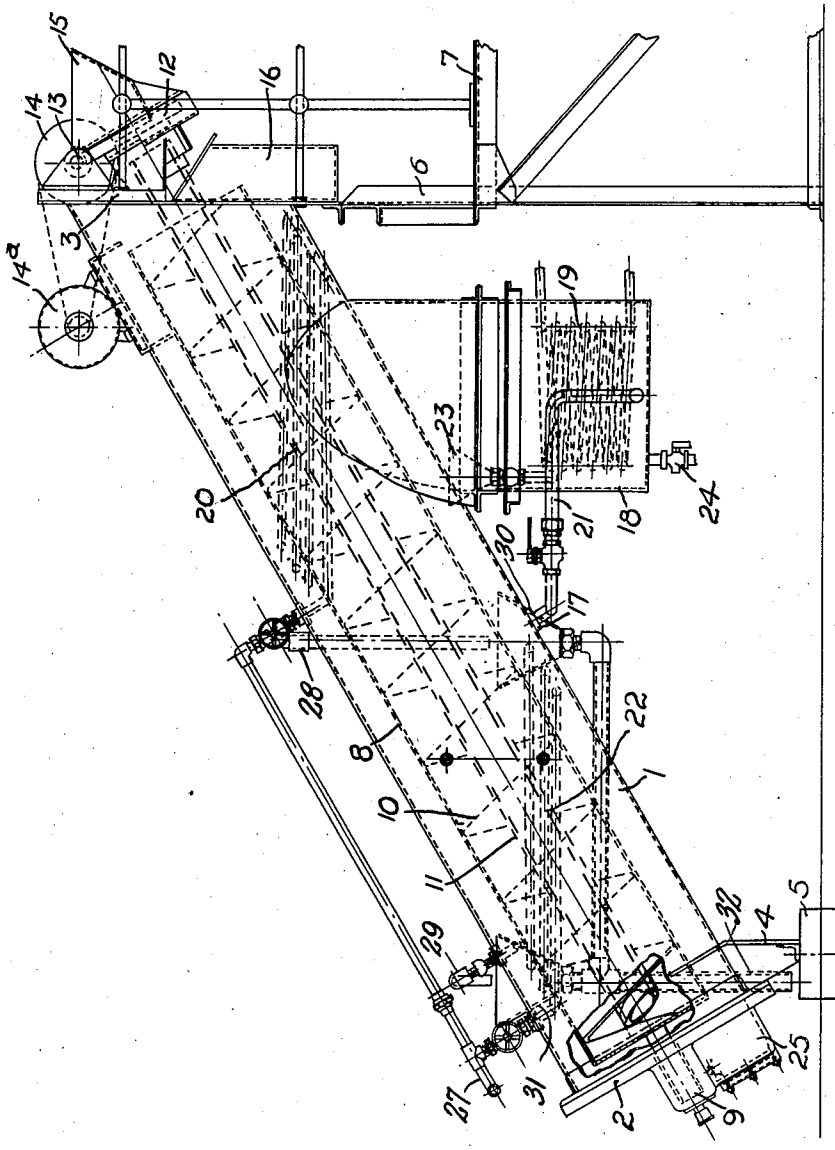
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APPARATUS FOR CLEANING OR DEGREASING MATERIALS

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Inventor
Joseph Savage

By

Attorney

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APPARATUS FOR CLEANING OR DEGREASING MATERIALS

Joseph Savage, Weston Point, Runcorn, England, assignor to Imperial Chemical Industries Limited, a corporation of Great Britain

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5 Claims. (Cl. 87—6)

This invention relates to apparatus for cleaning or degreasing materials, especially metal articles, with the aid of volatile solvents such as trichlorethylene. The principal object of the invention is to provide an apparatus adapted for the continuous treatment of a succession of rigid articles without handling of the same and without damaging the articles or the apparatus.

According to the invention the apparatus is provided with a screw conveyer for continuously moving the materials to be treated through the degreasing zone or zones, i. e. through a body of liquid grease solvent (hot or cold), or through an atmosphere of hot solvent vapour which is condensed on the cold materials, or through a shower of liquid solvent, or through a succession of two or more of these treatments. The screw conveyor is arranged in the annular space between two concentric cylinders inclined at a suitable angle to the horizontal, the screw being fixed to the inner and outer cylinder, the whole being arranged within a suitable casing which may be an inclined cylinder concentric with the others. The cylinder surrounding the screw is perforated or consists of wire netting, and the blade of the screw and the inner cylinder may also be perforated to allow of free passage of liquid and vapour. The materials to be treated are fed to the upper end of the inner cylinder, which may project from the casing or which may connect with a feeding hopper in the upper part of the casing, and travel downwardly to the lower end of the inner cylinder where they are discharged into the closed end of the outer cylinder and are picked up by the screw and are conveyed upwardly through the annulus and finally discharged into a receptacle in the upper part of the casing or outside the same. Baffles or fins may be attached to the outer casing and/or to the outer cylinder surrounding the screw, in order to form a division between the liquid and the vapour space.

Suitable arrangements are made to maintain the liquid in the outer casing at the correct level, connections being provided for addition of fresh solvent and for draining or purging the casing as required. Connections may also be provided to supply vaporized solvent if required.

Cooling or heating coils may be arranged in the body of liquid and cooling coils in the upper part of the casing to prevent escape of vapour or to produce a shower of solvent.

One form of the invention is illustrated in the accompanying drawing, which is a side elevation of the apparatus.

Referring to this drawing, 1 is an inclined cylindrical casing which is fixed to cover plates 2 and 3 at the lower and upper end respectively. The lower end of the cylinder rests in a saddle plate 4 fixed to a foundation 5. The upper plate 3 is fixed to a framework 6 comprising an operating platform 7. This framework is shown broken away in order to save space.

The fixed cylinder 1 contains a rotary cylinder 8 mounted in a step bearing 9 in the cover plate 2, and the cylinder 8 contains a screw 10 which is fixed to the inner surface of cylinder 8 and to the outer surface of a central hollow cylinder 11. The cylinder 8 and the screw 10 are perforated to allow free passage of liquid and vapour solvent. The upper end of the cylinder 11 is fitted with a worm wheel 12 which is driven by a worm 13 on the same shaft as a pulley 14 which is driven by a motor 14a. A feed hopper 15, for the articles to be treated connects with the upper open end of the cylinder 11. The lower end of cylinder 11 is cut away along the line of its intersection with the last turn of screw 10, thus providing a communicating passage whereby articles may be discharged from cylinder 11 to cylinder 8. A receptacle or chute 16 is provided for the finished goods which are discharged by the screw 10 at its upper end.

The cylinder 1 is filled with liquid solvent, e. g. trichlorethylene, up to the level of the overflow 17 and a certain amount of the liquid is also placed in the vaporizer 18 which is heated by a steam coil 19. The vaporizer 18 connects over its whole cross-section with the upper part of the cylinder 1 and furnishes a constant supply of solvent vapour to this part of the apparatus. Cooling coils 20 are arranged in cylinder 1 just below the edge of the cylinder where it connects with the chute 16. These cooling coils prevent escape of vapour from the open end of the cylinder and furnish a shower of solvent which trickles through the perforations in the cylinder 8 and over the goods inside. Part of the condensed solvent returns direct to the vaporizer 18 and part falls into the lower portion of the cylinder 1, whence it returns by overflow 17 and pipe 21 to the vaporizer.

A further set of cooling coils 22 is provided just below the level of the liquid in the lower part of the cylinder 1. Water is supplied through pipes 27 to cooling coils 20 and 22 and is discharged therefrom through connections 28 and 29 respectively into the sight funnels 30 and 31 respectively, thence to the drain pipe 32. Fresh solvent is added as required through the funnel 23 which

connects with pipe 21. The fouled solvent or grease is removed as required through a drain cock 24 fitted to the vaporizer 18. A removable cover 25 for cleaning purposes is provided at the lower end of the cylinder 1.

The rotation of the cylinders 8 and 11 together with the screw conveyor prevents any possibility of the articles jamming between the blade of the conveyor and the walls of the cylinders, which would be liable to occur if the screw conveyor alone were rotated as in previously described apparatus for extracting oil or fat from substances containing them.

As many apparently widely different embodiments of this invention may be made without departing from the spirit and scope thereof, it is to be understood that I do not limit myself to the specific embodiments thereof except as defined in the appended claims.

I claim:

1. An apparatus for degreasing materials with the aid of volatile solvents of the kind typified by trichlorethylene, comprising an inclined cylindrical casing adapted to contain in its lower portion a body of liquid solvent, means for cooling said body of solvent, a vaporizer arranged to furnish a supply of solvent vapour to the space above said body of liquid solvent, cooling means arranged in said space to limit the upward extent of the vapour, a conduit arranged to convey surplus liquid solvent from said casing to the vaporizer whereby a constant level of liquid is maintained in said casing and a constant supply of liquid solvent is furnished to the vaporizer, and a screw conveyor comprising a screw fixed in the annular space between two concentric rotatable cylinders extending longitudinally within said casing, said conveyor being adapted to receive the materials to be treated, to convey them upwardly first through and in contact with the body of liquid solvent, then through and in contact with the solvent vapour and finally to discharge the treated materials from the casing above the level of the solvent vapour.

2. In an apparatus wherein metal articles are degreased with volatile solvents, the combination of an inclined screw conveyor comprising a screw fixed in the annular space between an outer foraminous cylinder and an inner cylinder concentric therewith, a casing adapted to hold a volume of degreasing fluid, means for supplying articles to be degreased to the upper end of said inner cylinder, cooling means positioned within said casing adapted to prevent escape of solvent vapor to the atmosphere, and driving means operatively connected to rotate said conveyor to convey articles to be degreased upwardly through the degreasing fluid.

3. In an apparatus wherein metal articles are degreased with volatile solvents, the combination of an inclined screw conveyor comprising a screw fixed in the annular space between an outer foraminous cylinder and an inner cylinder concentric therewith, a casing surrounding both of said cylinders preventing escape of solvent to the atmosphere, said casing being adapted to hold a volume of degreasing fluid, means for supplying articles to be degreased to the upper end of the inner cylinder of said conveyor, said inner cylinder being adapted to deliver the articles at its lower end to the annular portion of said conveyor, and driving means operatively connected to rotate said conveyor to convey said articles upwardly through the degreasing fluid.

4. In an apparatus wherein metal articles are degreased with volatile solvents, the combination of an inclined screw conveyor comprising a screw fixed in the annular space between an outer foraminous cylinder and an inner cylinder concentric therewith, a casing surrounding both of said cylinders preventing escape of solvent vapor to the atmosphere, said casing being adapted to maintain a volume of liquid grease solvent in its lower part and to maintain an atmosphere of solvent vapor above the level of the liquid solvent, means for supplying articles to be degreased to the upper end of the inner cylinder of said conveyor, said inner cylinder being in communication at its lower end with said outer cylinder to deliver the articles to the annular portion of said conveyor, and means operatively connected to rotate said conveyor to convey said articles upwardly through said liquid solvent, thence through said solvent vapor.

5. In combination in a machine of the character described, a tank for containing in the lower portion thereof a volatile cleaning liquid, an inclined casing having its lower portion within and communicating with the lower portion of the tank, said casing being provided remote from its lower end with an outlet for discharge of cleaned articles and being otherwise closed to escape therefrom of articles being treated, a tubular shaft extending into said casing coaxial therewith and open at both ends for delivering to the lower portion of the casing articles to be cleaned, means cooperating with the casing and the shaft for discharging through said outlet cleaned articles, and a cooling coil extending about the casing above the liquid level in the tank.

JOSEPH SAVAGE.