Feb. 11, 1958 M. B. PICKETT 2,823,174

DEGREASING MACHINE WITH COOLING JACKET

Filed Sept. 9, 1953 3 Sheets-Sheet 1

Fig. 1.

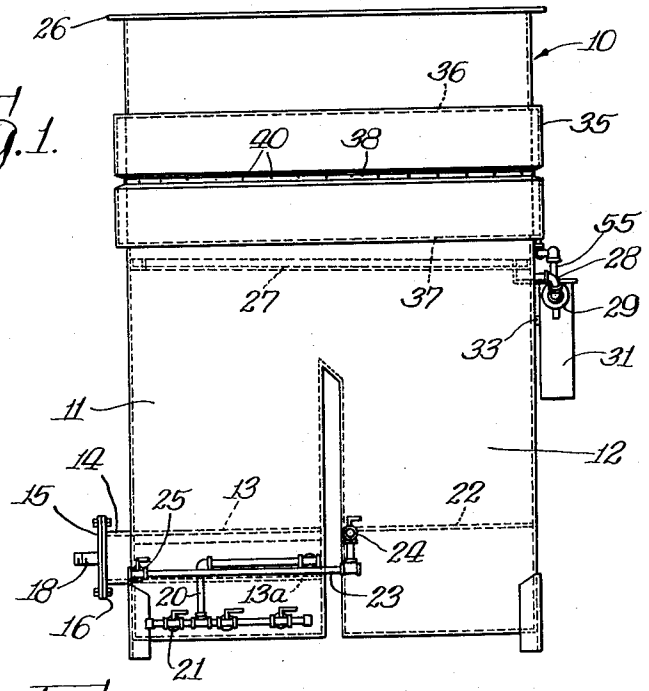


Fig. 3.

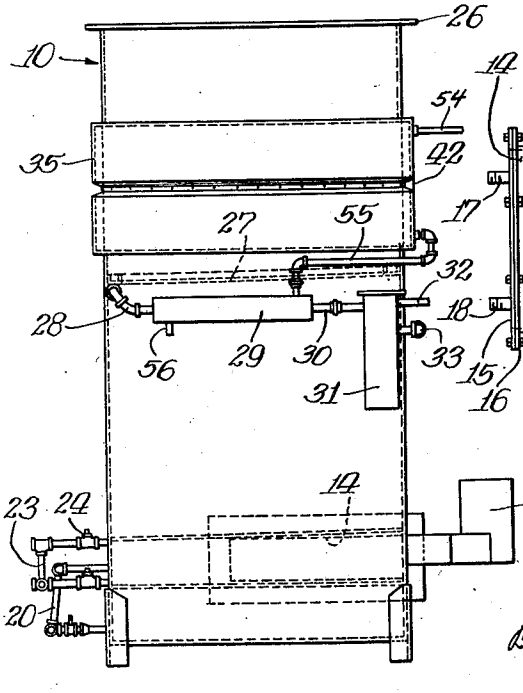
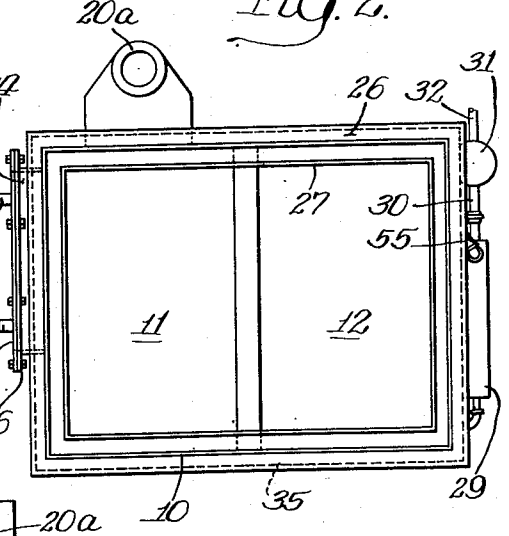


Fig. 2.



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Fig. 4.

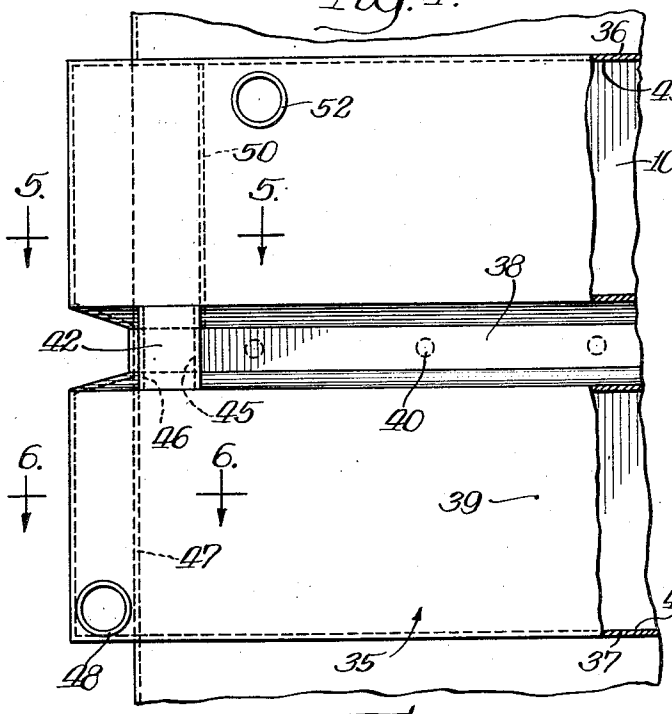


Fig. 5.

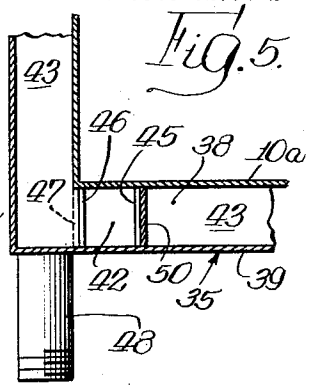


Fig. 6.

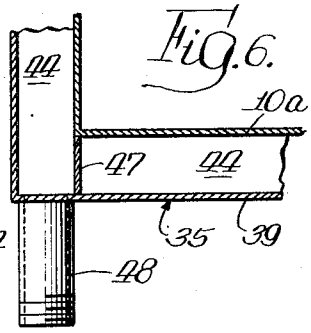


Fig. 7.

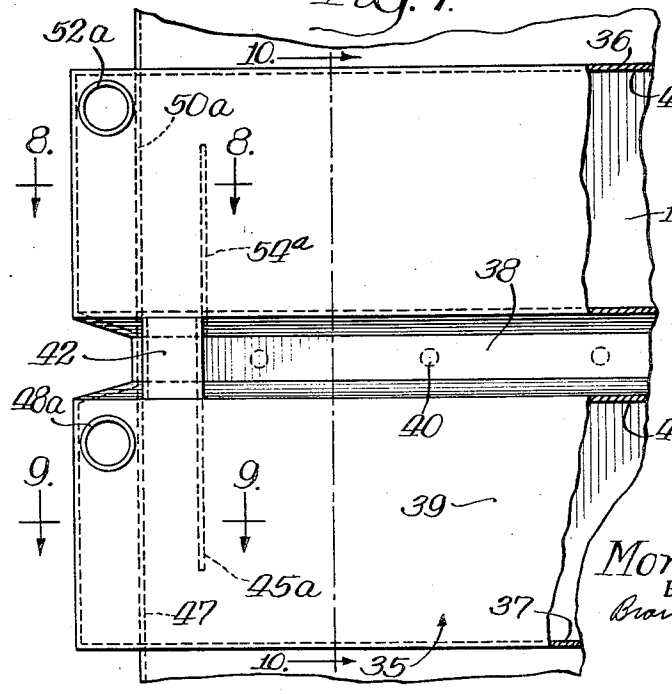


Fig. 8.

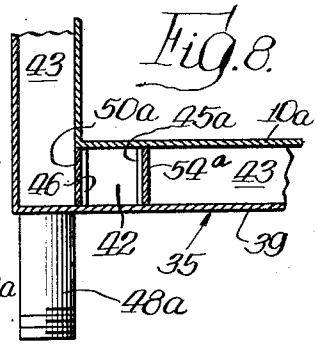
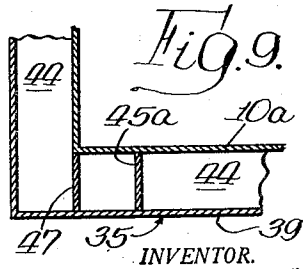


Fig. 9.



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DEGREASING MACHINE WITH COOLING JACKET

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Fig. 10.

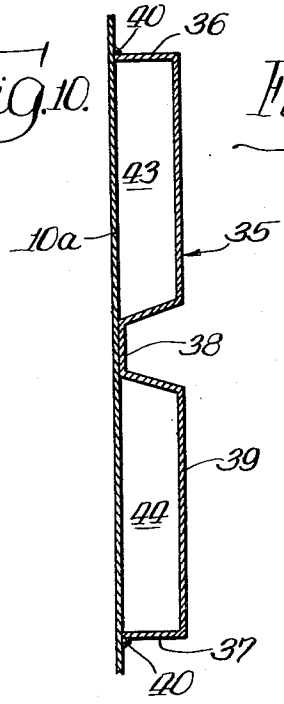


Fig. 11.

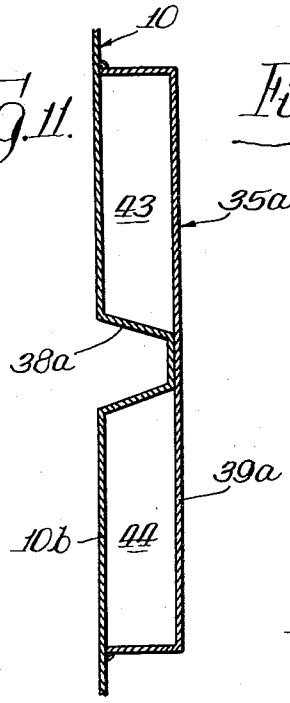


Fig. 12.

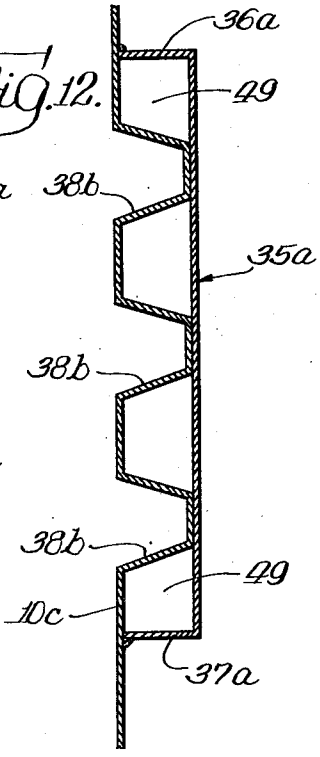


Fig. 13.

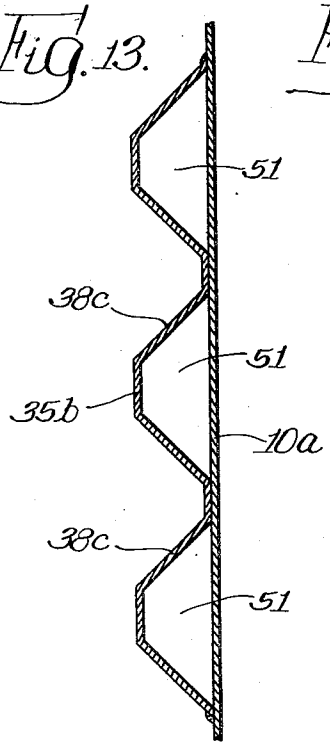
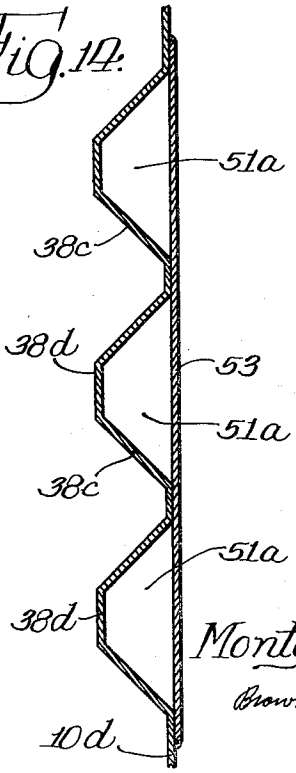


Fig. 14.



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DEGREASING MACHINE WITH COOLING JACKET

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Application September 9, 1953, Serial No. 379,132

4 Claims. (Cl. 202—170)

This invention relates to degreasing machines employing a heated volatile solvent for receiving the articles to be cleansed and provided with a cooling zone for condensing the vapors arising from the heated volatile solvent and returning the condensate to the body of liquid. Machines of this general type are well known and are commonly employed for cleaning metal parts of grease, dirt, wax and the like, so as to produce a chemically clean surface for the purpose of preparing the articles for subsequent operations.

Trichlorethylene is extensively used in degreasing machines. It has a boiling point of around 200° F. and the vapor is several times heavier than air. In order to prevent the escape of solvent vapors from the tank or container in which the degreasing operations are carried out, it is customary to provide cooling means at the upper portion of the tank for chilling and condensing the vapors so as to prevent them from passing the chilled zone and escaping from the tank, the condensed vapors being returned to the liquid in the tank. Generally, ordinary tap water has a temperature sufficiently low to provide the desired cooling effect, and frequently the temperature of the cooling means through which the tap water is directed is sufficiently low that water vapors from the atmosphere, as well as the solvent vapors from the tank, are condensed by the cooling means, becoming mixed with the solvent condensate, and are returned to the tank along with the condensate of the solvent.

The addition of water to the solvent in any appreciable quantity materially reduces the boiling point of the solvent, which is objectionable. Further, the tank or container of a degreasing machine usually is constructed of sheet steel and is suitably coated to guard against rusting and contamination of the solvent. In machines provided with a cooling jacket extending about the upper portion of the tank, it is common practice to secure the jacket to the tank wall by stay bolts extending between the tank wall and the jacket. If water vapor is present in appreciable amount in the solvent vapor, the condensate will contain water which can give rise to the presence of hydrochloric acid. As the condensate flows down the inner face of the wall of the tank, it tends to collect on the heads of the stay bolts and, if hydrochloric acid is present, the protective coating may be rapidly eaten away and rusting of the wall of the tank about the heads of the stay bolts occurs. Further, as the condensate flows down the inner face of the tank wall, if it contains water in appreciable amount the hydrochloric acid may quickly eat away the protective coating thus exposing the sheet steel wall which rapidly becomes rusted or corroded. In cases where the tank or container is constructed of stainless steel, or stainless clad metal, it may be attacked by hydrochloric acid if present in substantial amount or for extended periods of time.

My invention is directed to a degreasing machine having a cooling jacket structure associated with the tank wall in a novel manner eliminating the necessity for using stay bolts while providing effective reinforcement for the

jacket structure, and for the corresponding area of the wall of the tank. To that end, I provide a jacket structure extending about the tank and provided with channel means which imparts desired rigidity and strength to the jacket structure while also effectively reinforcing the corresponding area of the tank wall so as effectively to prevent distortion or warping of the latter under changing operating conditions and temperature variations. The channel means provides, in conjunction with the remainder of the jacket structure and the wall of the tank, passages extending about the tank and through which a suitable coolant, conveniently tap water, is circulated. The passages of the jacket structure may be connected by suitable means establishing communication between them. The jacket structure is provided with coolant inlet and outlet connections and may be further provided with baffles disposed to cause flow of coolant through the passages in desired manner. Further objects and advantages of my invention will appear from the detail description.

In the drawings:

Figure 1 is a side view of a degreasing machine embodying the cooling jacket of my invention;

Figure 2 is a top plan view of the machine of Figure 1;

Figure 3 is an end view of the machine of Figure 1;

Figure 4 is an enlarged fragmentary side view of the upper portion of the machine including the cooling jacket;

Figure 5 is a sectional view taken substantially on line 5—5 of Figure 4;

Figure 6 is a sectional view taken substantially on line 6—6 of Figure 4;

Figure 7 is a view similar to Figure 4 but showing a modification;

Figure 8 is a sectional view taken substantially on line 8—8 of Figure 7;

Figure 9 is a sectional view taken substantially on line 9—9 of Figure 7;

Figure 10 is a sectional view taken substantially on line 10—10 of Figure 7;

Figure 11 is a sectional view similar to Figure 10 but showing a second modification;

Figure 12 is a sectional view similar to Figure 10 but showing a third modification;

Figure 13 is a sectional view similar to Figure 10 but showing a fourth modification; and

Figure 14 is a sectional view similar to Figure 10 but showing a fifth modification.

The degreasing machine to which the cooling jacket of my invention is applied is, in general, of known construction and operation and a brief description thereof will suffice. The machine comprises a tank **10** constructed of sheet steel, which is galvanized or otherwise provided with a protective coating to guard against corrosion or rusting. The lower portion of tank **10** is separated into two compartments **11** and **12**. The number of compartments within the tank may be varied, as is known, two compartments being shown by way of example only. The compartment **11** contains liquid solvent, such as trichlorethylene, which extends to within a short distance of the top of the compartment. This compartment is provided with a false bottom **13** of open construction and with a bottom **13***a* with a space or sump therebetween. A neck **14** extends outwardly from the sump and normally is closed by a clean-out door **15** removably secured, conveniently by bolting, to a flange **16** of neck **14**. A steam heating coil (not shown) may be carried by the door **15** and disposed so as to be positioned within the sump, this coil having end connections or nipples **17** and **18** extending outward therebeyond for connection to a suitable source of supply of steam. Additional heating means, in the form of gas burners (not shown) may be disposed beneath bottom **13***a* of compart-

ment 11, the burners being connected by piping 20 to a suitable source of supply of gas, the piping including valves 21 for controlling the individual burners. The bottom of compartment 12 is closed by a bottom wall 22 and this compartment is filled with liquid solvent, such as trichlorethylene. A pipe 23, provided with suitable valves 24 and 25, is connected to the bottom of compartment 12 and to the bottom of the sump of compartment 11, for draining the compartments as necessary or desired.

The tank 10 is open at its top and is provided with an outer peripheral flange 26 upon which may be mounted sliding covers (not shown) for closing the top of the tank. A condensate trough 27 extends about the interior of tank 10, a substantial distance above the liquid level of the solvent in the compartments 11 and 12. This trough receives condensate flowing down the inner face of the wall of the tank and conducts the condensate, by means of pipe 28, cooler 29 and pipe 30 to a water separator 31 of known type. The trichlorethylene, which is heavier than water, is separated by gravity from the water contained in the condensate delivered from trough 27 to separator 31, the separated water being discharged from separator 31 through pipe 32 and the trichlorethylene being returned to compartment 12 through pipe 33. The substantially pure trichloroethylene overflows from compartment 12 into compartment 11 for replenishing the trichlorethylene in the latter compartment. A flue 20*a* is connected to the burner chamber beneath compartment 11, for taking off the products of combustion. The degreasing machine so far described, including the condensate trough 27, cooler 29 and separator 31, is of known construction and need not be described in further detail, except insofar as relates to my instant invention.

In the use of the machine, the articles to be cleaned are immersed in the hot trichlorethylene in compartment 11, heated to its boiling point. Thereafter the articles are rinsed in the compartment 12 by being immersed in the substantially pure and uncontaminated trichorethylene therein, and are then raised into a vapor zone, between the surface of the liquid trichlorethylene and cooling means disposed above the trough 27, this vapor zone being filled with the solvent vapor generated in compartment 11 by heating the trichlorethylene therein. The rinsed articles may be held in the vapor zone so as to be further cleansed by the action of the vapor which condenses on the articles, the latter being cooled by dipping in the unheated solvent in compartment 12. Alternatively, the articles may be raised from compartment 12 directly into a cooled zone above the vapor zone, in which cooled zone the articles quickly dry. The cooled zone is provided by cooling means, with which my invention is particularly concerned and which will now be described in detail.

A cooling jacket 35 extends about the tank 10 a short distance above the condensate trough 27. The jacket 35 is provided with top and bottom walls 36 and 37, respectively, which seat on and are suitably secured, conveniently by welding, to the wall 10*a* of the tank 10. Jacket 35 also is provided, at about its mid-height, with a channel element 38 extending inward from the outer side wall 39 thereof, channel member 38 being preferably of flattened V-shape in cross section and seating on the wall 10*a* of tank 10, to which it is suitably secured, conveniently by spot welding as indicated at 40. The channel member 38 preferably is formed integrally with the outer side wall 39 of jacket 35 by being pressed inwardly therefrom though within the broader aspects of my invention the channel member 38 may be formed in any other suitable manner. The jacket 35, in conjunction with the wall 10*a* of tank 10 and channel member 38, provides two passages extending about the tank, as will be clear from what has been said. Additionally, the channel member 38 imparts desirable rigidity to the jacket 35 and to the corresponding area of the wall 10*a* of tank 10 so as to resist buckling or deformation of that wall under temperature variations.

The channel member 38 is interrupted, conveniently at one corner of the jacket 35, by a duct 42 bridging channel member 38 and providing communication between the upper and lower passages 43 and 44, respectively, of the jacket 35. The duct 42 is shown more clearly in Figures 4 and 5, and is provided by two plates 45 and 46 extending between the wall 10*a* of tank 10 and the outer side wall 39 of jacket 35 and welded thereto, plate 46 being at the inner face of a baffle 47 aligned with one end wall of tank 10 and closing the lower passage 44 of jacket 35. A connection, in the form of a nipple 48, opens into passage 44 at the bottom thereof and at the opposite side of baffle 47 from the duct 42. A baffle 50 is disposed at the outer face of plate 45 and closes the upper passage 43 of jacket 35 at the opposite side of duct 42 from the baffle 47. A coolant connection, in the form of a nipple 52, opens into passage 43 at the top thereof, at the opposite side of baffle 50 from the duct 42. It will be clear, from what has been said, that coolant, conveniently tap water, entering the jacket 35 through one of the connections 48 or 52 will flow through one of the passages of the jacket around the tank 10 and then through the duct 42 into the other passage and through the latter passage around the tank and thence through the other connection. It may be assumed, for purposes of description, that the water enters through the nipple 48. The water will then flow through passage 44 around the tank to the duct 42 and through the latter to passage 43 and through the latter passage and around the tank to nipple 52, from which the water flows through a pipe 54 to a suitable point of discharge. Preferably, though not necessarily, the cooling water is delivered to the jacket 35 from the cooler 29, through a pipe 55 from the outlet of the cooler, the inlet of the cooler being connected by a pipe 56 to a suitable source of supply of cooling water, as will be understood. The water flowing through cooler 29 absorbs a certain amount of heat from the condensate being delivered to the separator 31, which is advantageous as guarding against ebullition or boiling of the condensate in the water separator 31, which would interfere with gravity separation of the solvent and the water. Further, by preheating to a certain extent the water entering the cooling jacket 35, I guard against objectionably low temperatures in the cooling zone such as might result in condensation of water vapor with the solvent vapors, which is objectionable for reasons previously explained.

While the jacket of Figures 1 to 6, inclusive, provides efficient cooling means suitable for use under normal conditions, if used in an atmosphere of high humidity there might be a tendency to condense water vapor with the solvent vapors, which is objectionable for the reasons stated. In Figures 7 to 9, inclusive, I have shown a modified form of cooling jacket which is suitable for use under conditions of high humidity. This form of jacket is in general similar to that of Figures 1 to 6, inclusive, except as to the arrangement of the baffling. Referring to Figure 7, it will be noted that the upper passage 43 of the water jacket 35 is provided with a baffle 50*a* as a continuation of the baffle 47 in the lower passage 44, baffle 50*a* closing the passage 43. This latter passage 43 is further provided with a second baffle 54*a* at the side of duct 42 opposite to baffles 47 and 50*a*, the baffle 54*a* terminating short of the top wall of passage 43 and closing this passage except for the top opening thus provided. The lower passage 44 is also provided with a second baffle 45*a* constituting a downward extension of the inner side plate of the duct 42, this baffle 45*a* terminating short of the bottom wall of passage 44 and closing the latter passage except for the opening thus provided. The upper passage 43 is provided with a coolant connection or nipple 52*a* at the top thereof and at the opposite side of the baffle 50*a* from

the duct 42. The lower passage 44 is also provided with a coolant connection or nipple 48*a* at the top thereof and at the opposite side of the baffle 47 from the duct 42. In practice, the nipple 52*a* is connected to the pipe 55 so that the water flows from the cooler 29 into passage 43 of the jacket 35 and through this passage around the tank to the baffle 54*a*, over which the water passes downward through duct 42 into passage 44 and beneath the baffle 45*a*, flowing through passage 44 about the tank 10 in the reverse direction to which it flowed through the passage 43, the water then being discharged through the nipple 48*a*. By flowing the water through the jacket in the manner just described, the water, in addition to being preheated to a certain extent by flowing through the cooler 29, is heated during its flow through the upper passage 43 by heat absorbed from the tank wall at the upper portion of the cooling zone, so that when the water enters the lower passage 44 it is at a higher temperature than when it enters the upper passage. Accordingly, the area of the tank wall corresponding to the lower passage 44 is not abruptly cooled to an objectionably low temperature, and the area of the tank wall 10*a* corresponding to the jacket is cooled to a more nearly uniform temperature somewhat higher than the temperature to which the area of the tank wall corresponding to the lower passage 44 is cooled in the form of jacket shown in Figures 1 to 6, inclusive. The top of the vapor zone is at about the center of the water jacket, preferably a little lower, and in either of the two forms of jacket shown the solvent vapor is condensed on the inner face of the tank wall 10*a* and flows down the latter into the condensate trough 27. By preheating the cooling water and passing it through the jacket 35 from the top to the bottom thereof, in the form of jacket shown in Figures 7 to 9, inclusive, cooling of the tank wall 10*a* to such an extent as to condense water vapor with the solvent vapor in objectionable amount is avoided to large extent. That eliminates, or greatly reduces, risk of the formation of hydrochloric acid, thus preventing or greatly reducing removal of the protective coating and resultant corrosion and rusting of the wall of the tank. In both forms of jacket illustrated, stay bolts or equivalent means for mounting the jacket are avoided, thus avoiding the risk of corrosion about the heads of such members. Further, the channel member of the jacket welded to the tank wall provides effective stiffening and reinforcing means therefor and for the jacket and avoids buckling or distortion of the tank wall due to temperature variations. By forming the channel member as an integral part of the jacket, the jacket as a whole may readily be fabricated at comparatively low cost and may also be mounted and secured upon the tank at low cost, which is conducive to low cost of production of the degreasing machine.

In the modification shown in Figure 11, the outer side wall 39*a* of the jacket 35*a* is flat and a channel member 38*a* is pressed out from the tank wall 10*b* and seats on the inner face of wall 39*a* of the jacket 35*a*, to which it is spot welded. That provides the upper and lower passages 43 and 44 for flow of coolant about the tank wall. By pressing the rib or channel member 38*a* outward from the tank wall 10*b*, the cooling area of that wall is increased to a substantial extent, which is desirable in certain cases. It will be noted that the lower arm of the channel member 38*a* is inclined downward and inward of the tank so that any condensate collecting in the channel 38*a* will readily drain therefrom into the tank. The channel member 38*a* effectively reinforces the tank wall 10*b* and the wall 39*a* of the jacket 35*a* and imparts desirable rigidity thereto with the advantages previously described.

The modified form shown in Figure 12 is similar to that shown in Figure 11, except that a plurality of channel members 38*b* are pressed out from the tank wall 10*c* further increasing the cooling area of that wall and providing a plurality of channels 49 extending about the tank. As will be understood from what has been said, the passages 49 may be interconnected by suitably disposed ducts similar to the duct 42 shown in Figures 1 to 6, inclusive. Also, suitably arranged baffles may be provided in the passages 49, if desired. Further, inlet and outlet connections for the coolant may be provided, such connections being disposed to cause flow of coolant through the passages 49 as desired.

In the modified form shown in Figure 13, the jacket 35*b* is mounted on the inner face of the tank wall 10*a* and is provided with a plurality of channel members 38*c* pressed therefrom and extending outward to the tank wall 10*a*, seating thereon and being spot welded thereto. The jacket 35*b*, in cooperation with the tank wall 10*a*, provides a plurality of passages 51 for flow of coolant about the tank. Suitable coolant connections to the passages 51 may be provided and these passages may be connected by suitably disposed ducts. The channel members 38*c* provide increased cooling area at the inner side of the tank wall, as will be clear, in substantially the same manner as the channel members 38*b* of Figure 12. Further, in both Figures 12 and 13, the channel members provide effective reinforcing and thus stiffening means for the jacket and the wall of the tank.

In the modified form shown in Figure 14, the tank wall 10*d* is provided with a plurality of channel members 38*c* pressed outwardly therefrom alternating with inwardly pressed channel members 38*d*, and a flat plate 53 is welded to the outer face of wall 10*d* closing the outer sides of the channel members 38*d*, the channel members 38*c* seating on the plate 53 and being welded thereto. The plate 53 thus cooperates with the channel members 38*c* and 38*d* to provide a jacket structure defining passages 51*a* extending about the wall of the tank. The passages 51*a* may be connected by suitable ducts and have associated therewith suitably disposed coolant inlet and outlet connections providing for flow of coolant through the passages 51*a* in desired direction. The channel members 38*c* and 38*d* together constitute the cooling jacket closed at its outer side by the plate 53 and also effectively reinforce the tank wall 10*d* and impart desired rigidity thereto and to the plate 53.

It will be understood from the above that changes in detail may be resorted to without departing from the field and scope of my invention, and I intend to include all such variations, as fall within the scope of the appended claims, in this application in which the preferred forms only of my invention have been disclosed.

I claim:

1. In degreasing apparatus, a tank having an enclosing wall and adapted to contain a degreasing solvent and vapors thereof, cooling jacket means extending about said tank exteriorly and remote from the bottom thereof, said jacket means comprising upper and lower channel elements and an intermediate channel element fixed to said upper and lower elements and to the tank wall, said upper and lower channel elements being closed at the inner sides thereof by the corresponding portions of the tank wall and defining therewith upper and lower passages extending substantially completely about said tank and having an inner wall of substantial area exposed interiorly of said tank, said channel elements being rigidly connected together and to said tank wall effective for reinforcing the latter, a duct bridging said intermediate channel element and establishing communication between said passages, each of the latter having a coolant connection at the area thereof adjacent said duct, and baffle means in said passages effective for causing coolant entering one of said passages to flow therethrough in one direction around said tank to said duct and through the latter to the other passage and then through said other passage in the opposite direction around the tank to said coolant connection of said other passage, whereby the coolant flowing through said one passage is preheated

by heat absorbed from the solvent vapors within the tank before it enters said other passage.

2. In degreasing apparatus, a tank having a flat wall and adapted to contain a degreasing solvent and vapors thereof, cooling jacket means extending about said tank exteriorly and remote from the bottom thereof, said jacket means comprising upper and lower channel elements and an intermediate channel element fixed to said upper and lower elements and to the wall of said tank, said elements being of substantially rectangular cross section and directed alternately inwardly and outwardly of said tank, said upper and lower elements being closed at one side thereof by the corresponding portions of the tank wall and defining therewith upper and lower passages of substantially rectangular cross section extending substantially completely about said tank and having flat walls of substantial area exposed interiorly of said tank, said channel elements being rigidly connected together and to said tank wall effective for reinforcing the latter, a duct bridging said intermediate channel element and establishing communication between said passages, each of the latter having a coolant connection at the area thereof adjacent said duct, and baffle means in said passages effective for causing coolant entering one of said passages to flow therethrough in one direction around said tank to said duct and through the latter to the other passage and then through said other passage in the opposite direction around the tank to said coolant connection of said other passage, whereby the coolant flowing through said one passage is preheated by heat absorbed from the solvent vapors within the tank before it enters said other passage.

3. In degreasing apparatus, a tank having a flat wall and adapted to contain a degreasing solvent and vapors thereof, cooling jacket means extending about said tank exteriorly and remote from the bottom thereof, said jacket means comprising upper and lower channel elements and an intermediate channel element fixed to said upper and lower elements and to the wall of said tank, said elements being of substantially rectangular cross section and directed alternately inwardly and outwardly of said tank, said upper and lower elements being closed at one side thereof by the corresponding portions of the tank wall and defining therewith upper and lower passages of substantially rectangular cross section extending substantially completely about said tank and having flat walls of substantial area exposed interiorly of said tank, said channel elements being rigidly connected together and to said tank wall effective for reinforcing the latter, a duct bridging said intermediate channel element and establishing communication between said passages, a baffle in said first passage closing it at one side of said duct, and a baffle in said second passage closing it at the opposite side of said duct, each of said passages having a coolant connection adjacent the side of said baffle therein opposite to said duct, said baffles being effective for causing coolant entering one of said passages to flow therethrough in one direction around said tank to said duct and through the latter to the other passage and then through said other passage in the opposite direction around the tank to said coolant connection of said other passage, whereby the coolant flowing through said one passage is preheated by heat absorbed from the solvent vapors within the tank before it enters said other passage.

4. In degreasing apparatus, a tank having a flat wall and adapted to contain a degreasing solvent and vapors thereof, cooling jacket means extending about said tank exteriorly and remote from the bottom thereof, said jacket means comprising upper and lower channel elements and an intermediate channel element fixed to said upper and lower elements and to the wall of said tank, said elements being of substantially rectangular cross section and directed alternately inwardly and outwardly of said tank, said upper and lower elements being closed at one side thereof by the corresponding portions of the tank wall and defining therewith upper and lower passages of substantially rectangular cross section extending substantially completely about said tank and having flat walls of substantial area exposed interiorly of said tank, said channel elements being rigidly connected together and to said tank wall effective for reinforcing the latter, a duct bridging said intermediate channel element and establishing communication between said passages, a first baffle in each of said passages closing the latter and respectively disposed at one and the same side of said duct, and a second baffle in each of said passages respectively disposed at the other side of said duct, said second baffle in said upper passage terminating short of the top thereof and otherwise closing said upper passage and said second baffle in said lower passage terminating short of the bottom thereof and otherwise closing said lower passage, each of said passages having a coolant connection adjacent said first baffle therein and at the side of said first baffle opposite to said duct, said baffles being effective for causing coolant entering one of said passages to flow therethrough in one direction around said tank to said duct and through the latter to the other passage and then through the other passage in the opposite direction around the tank to said coolant connection of said other passage, whereby the coolant flowing through said one passage is preheated by heat absorbed from the solvent vapors within the tank before it enters said other passage, said second baffles retarding flow of coolant through said passages for increased heat absorption by the coolant.

References Cited in the file of this patent

UNITED STATES PATENTS

1,319,984	Wolff	Oct. 28, 1919
2,020,335	Savage	Nov. 12, 1935
2,091,187	Savage	Aug. 24, 1937
2,137,479	Dinley	Nov. 22, 1938
2,223,595	Blakesbee	Dec. 3, 1940
2,289,023	Koch	July 7, 1942
2,305,166	Koch	Dec. 15, 1942
2,318,455	Black	May 4, 1943
2,349,000	Phillips et al.	May 16, 1944

FOREIGN PATENTS

134,375	Switzerland	Oct. 1, 1929
193,935	Switzerland	Feb. 1, 1938
653,451	Great Britain	May 16, 1951
121,609	Australia	June 18, 1946