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SCRAPER BLADE ASSEMBLY FOR THE INTERIOR SIDE
WALL OF A GREASE KETTLE
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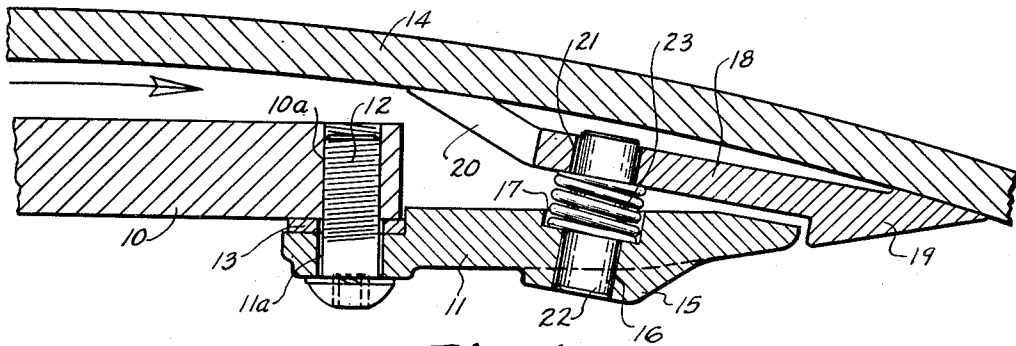


Fig. 1.

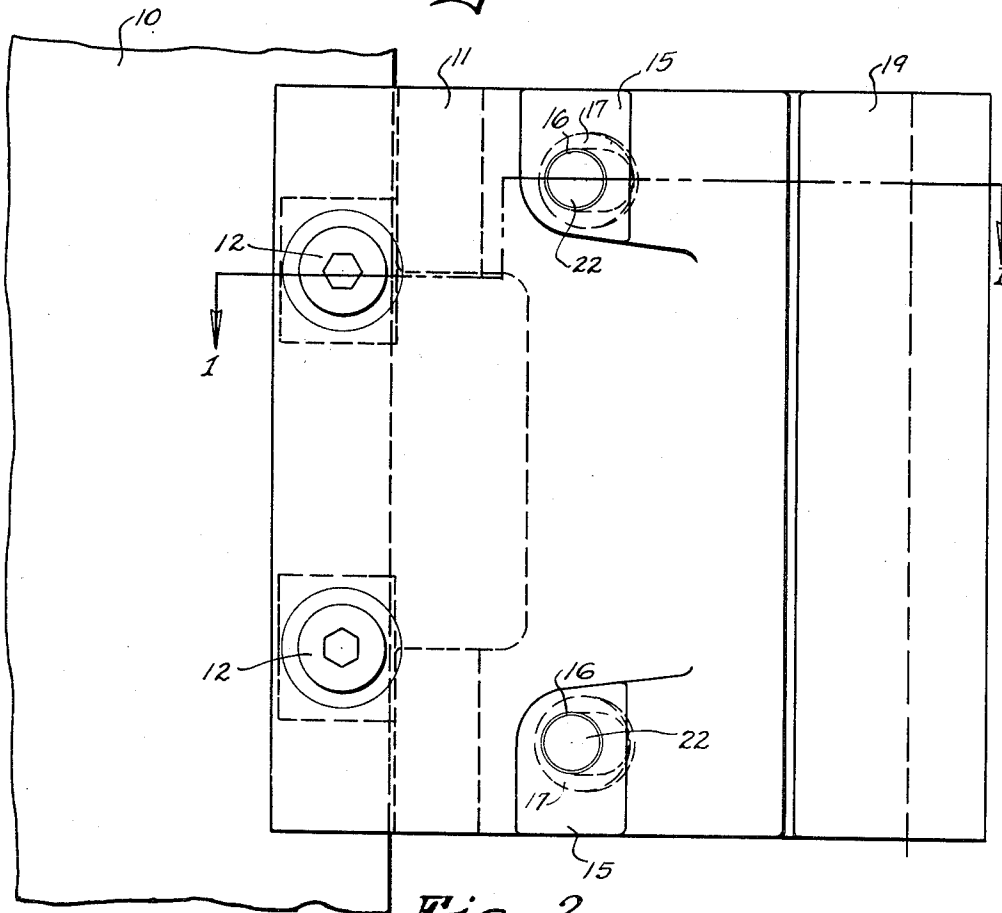


Fig. 2.

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SCRAPER BLADE ASSEMBLY FOR THE INTERIOR SIDE WALL OF A GREASE KETTLE

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9 Claims. (Cl. 15—246.5)

This invention relates to scraper blades for grease formulation kettles and refers more particularly to a scraper blade assembly wherein is provided a free-floating, self-adjusting scraper blade which will not change its position relative to the grease kettle wall despite eccentric motion of the scraper frame.

In grease formulation kettles, the internal scraper blades, which are mounted on a scraper frame in the kettle, are required to perform two main functions. In the first place, during the steps of manufacture, small quantities of additives are combined with oils and soaps in the paddle kettle. Some of these, together with heterogeneous parts of the soap, may cling to portions of the wall and not become well dispersed. The scraper blades should remove all portions of such additives from the wall and return them into the central mixing zone. Secondly, since grease, even in thin films, has a high resistance to heat flow, the film of grease adhering to the inside wall of the jacketed kettle reduces the heat transfer, both in the heating and cooling steps of manufacture. It has been found that the time required to heat or cool a quantity of grease in the kettle may be reduced as much as one-half by the use of good scrapers which effectively remove such films.

In the light of these facts, therefore, it is imperative to good design to have a scraper which will remove nearly all of the grease from the wall of the kettle in the scraping process. In the past, this has been accomplished by a design wherein a scraping blade comprising a kettle wall abutting plate having a leading toe portion and a following heel portion is directly and rotatably hinged to a rotating scraper frame, said scraper blade having no freedom of translation (motion without rotation around the hinge) relative to the driving scraping frame. Since the conventional scraper blade is ground to the precise radius of the vessel wall, any eccentricity of the scraper frame relative to the kettle shell will cause the scraper blade to rock up on its toe in part of a revolution of the frame and back on its heel in the other part of the revolution. Such rocking action causes the scraper blade to act as a cutting tool which gouges, cuts or scores the shell wall. Further, since the hydraulic loads in the scraping operation are high and as the rocking motion of the scraper blade reduces the bearing area, gauling also occurs. To further aggravate this problem, more viscous greases are being currently manufactured and such added viscosity increases the load on the blade and causes failure more often.

In a recent attempt to eliminate such costly described damage to the kettle shell, a blade had been provided wherein the blade shoe was ground to a smaller radius than the internal radius of the kettle shell so as to prevent the toe or heel from coming against the shell during the travel of the blade shoe around the shell. Such a blade eliminated the damage to the shell but actual tests showed that the heat transfer rate had been reduced approximately 40% in such an application. This lowering of the heat transfer rate was caused by the blade design which, after reduction of the blade shoe radius, no longer acted as a knife edge in scraping grease from the wall but actually

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rode on a grease film as it traveled around the inside wall of the kettle. Thus, although the failures due to scoring and machining of the kettle shell were eliminated an inefficient scraping blade was produced.

Therefore, an object of the present invention is to provide a free-floating, self-adjusting scraper blade having freedom of translation relative to the driving scraper frame for use in grease manufacturing kettles which will automatically allow for eccentric motion of the driving scraper frame without changing the scraper blade's position relative to the internal wall of the kettle.

Another object of the invention is to provide a scraper blade assembly wherein the scraper blade is driven by radial pins rigidly attached relative to the rotating scraper frame, said radial pins so fixed in position as to exert only a component force in the direction tangent to the circular motion described by the scraper blade.

Another object of the invention is to provide a scraper blade assembly wherein the point of application of driving force to the scraping blade is placed more directly behind the center of the resisting hydraulic force and more nearly coaxial to this force, thus reducing the radial component of the hydraulic force which pushes the blade against the shell and thereby relieving the pressure on said shell.

Another object of the invention is to provide a scraping blade comprising a double contact unit having a blade contact and a divided tail contact with the internal kettle surface, the non-continuous tail portion of the blade thus allowing grease which may get under the blade a path of escape.

Still another object of the present invention is to provide a double contact scraping blade having a toe and a heel contact with the internal surface of the grease kettle, the areas of the toe and heel of the blade which contact the shell so designed as to give substantially equal wear in order that the blade unit or shoe will not change its position (other than its distance from the center of the vessel) due to wear.

Other and further objects of the invention will appear in the course of the following description.

In the drawings, which form a part of the instant specification and are to be read in conjunction therewith, an embodiment of the invention is shown and, in the various views, like numerals are employed to indicate like parts.

Fig. 1 is a side sectional view of a scraper blade assembly for use in grease manufacturing kettles embodying the present invention and is a view taken along the lines 1—1 of Fig. 2 in the direction of the arrows.

Fig. 2 is a plan view of the scraper blade assembly shown in Fig. 1.

Referring to the drawings, the numeral 10 designates a scraper frame having scraper drive plate 11 fixedly mounted thereon. Frame 10 has threaded openings 10a near the front end thereof and drive plate 11 has openings 11a near its rear edge to receive bolts 12. Shims 13 permit precise adjustment of plate 11 on frame 10. The frame is adaptable for mounting on any conventional radial driving arms or impellers (not shown) for driving the blade assembly in its circular motion relative to the internal surface of a grease kettle shown at 14. Scraper drive plate 11 is mounted axially of frame 10 and extends past the end thereof in the direction of rotation. Drive plate 11 has raised portions 15 on the inner surface thereof having openings 16 therethrough and spring receiving cavities 17 in the outer side thereof. Scraper blade 18 preferably is formed in cross section as a shoe having two areas of contact with the interior surface of kettle wall 14. Toe portion 19 of shoe 18 is preferably of knife edge design and heel or tail portion 20 is divided or non-continuous to permit grease which may get

under the blade to escape. Blade 18 has openings 21 therein to removably receive the outer ends of preferably radial pins 22 which are fixed at their inner ends in drive plate opening 16. The tolerance between the outer diameter of pins 22 and the inner diameters of openings 21 is such as to allow sufficient angular deflection of the blade shoe around its two non-radial axes to compensate for any ordinarily encountered irregularities in the kettle. It is contemplated that an allowed rotation of plus, or minus, one quarter of a degree ($\frac{1}{4}^\circ$) around the non-radial axes together with the in and out radial motion (translational motion) would compensate completely for any such kettle surface irregularities. Such rotation is not intended to be limiting but illustrative only. The blade shoe 18 is ground to the radius of the shell 14 at its point of contact therewith. The areas of the toe 19 and tail 20 which contact the inner surface of the kettle wall are preferably so designed as to give substantially equal wear so that blade shoe 18 will not change its position (other than its distance from the center of the vessel) due to wear.

The means for mounting blade shoe 18 relative said drive plate 11 cooperate therebetween so as to permit the blade to allow for eccentric motion of the driving scraper frame 10 without changing the position of the blade relative the kettle wall. This mounting means comprises pins 22 and resilient means 23 cooperating between the blade shoe 18 and drive plate 11 which permit shoe 18 to be essentially free-floating and self-adjusting in translational motion relative the inner surface of the kettle wall 14. Pins 22 are so fixed in position relative shoe 18 as to exert only a component force in the direction tangent to the circle described by the motion of the blade. The point of application of driving force between pins 22 and shoe 18 is placed essentially directly behind the resisting hydraulic force (of the grease and the kettle wall) and essentially coaxial to the latter force. The radial component of the hydraulic force which pushes the blade against the shell is thus reduced and thus the pressure on the shell also. Resilient means 23 preferably comprises coil springs which encircle pins 22, abut at their end faces drive plate 11 and shoe 18 and are received at their inner ends in cavities 17.

In operation, scraper drive plates 11 are fixedly attached to conventional scraper frames 10 in a grease kettle having conventional scraper frame driving means (not shown) radial to the frames. Scraper blade shoes 18 are mounted on pins 22 with resilient means 23 acting between shoes 18 and drive plates 11 to make shoes 18 free-floating and self-adjusting in translational motion relative thereto. When force is applied to frame 10 to drive it in circular motion around wall 14, shoe 18 will ride on the vessel wall, held there lightly by spring pressure. Shoe 18 will not change its position relative wall 14 in its motion because of eccentric motion of the scraper frame due to its freedom of translational motion relative thereto and thus, due to the double resilient support of shoe 18, the blade will not rock upon its toe in part of a revolution and back on its heel in the other part if the frame motion is eccentric relative the kettle wall.

From the foregoing it will be seen that this invention is one well adapted to attain all of the ends and objects hereinabove set forth together with other advantages which are obvious and which are inherent to the structure.

It will be understood that certain features and sub-combinations are of utility and may be employed without reference to other features and subcombinations. This is contemplated by and is within the scope of the claims.

As many possible embodiments may be made of the invention without departing from the scope thereof, it is to be understood that all matter hereinabove set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, I claim:

1. A scraper blade assembly for scraping the interior surfaces of grease kettles comprising a scraper blade having heel and toe contact portions whereby to contact the interior surface of the kettle on at least two portions thereof, a scraper frame, a scraper drive plate fixedly mounted on an end of said frame and at least partially overlying said blade, said plate having a lower face adjacent said blade and an upper face away therefrom, the upper face of the toe portion of said blade angled upwardly from the lower kettle contacting face of said toe portion, the forward edge of said plate approaching the toe area of the blade, and mounting means cooperating between the drive plate and blade so as to permit the blade translational motion relative the drive plate and driving scraper frame without changing the at least substantially flat abutment of the blade on the kettle wall independent of any eccentric motion of the scraper frame relative the kettle wall.

2. A scraper blade assembly as in claim 1 wherein the width of the portion of the plate adjacent the toe of the blade is substantially that of the blade toe.

3. A scraper blade as in claim 1 wherein the width of the plate is substantially that of the blade toe.

4. A scraper blade assembly as in claim 1 wherein the upper face of the plate is angled relative the contact surface of the blade toe substantially the same as the upper surface of the blade toe.

5. A scraper blade assembly as in claim 4 wherein the lower face of the plate adjacent the blade toe is beveled to permit a closer approach of the plate to the blade without contact therebetween.

6. A scraper blade assembly as in claim 1 wherein the upper surface of the blade is recessed after the toe portion thereof whereby the forward end of the plate can be positioned in behind the toe portion of the blade.

7. A scraper blade assembly as in claim 6 wherein the upper face of the plate is angled relative the contact surface of the blade toe substantially the same as the upper surface of the blade toe.

8. A scraper blade assembly as in claim 6 wherein the upper face of the plate is angled relative the contact surface of the blade toe substantially the same as the upper surface of the blade toe and the lower face of the plate adjacent the toe of the blade is beveled to permit a closer approach of the plate to the blade without contact therebetween.

9. A scraper blade assembly for scraping the interior surfaces of grease kettles comprising a scraper frame, a scraper drive plate fixedly mounted to an end of said frame, a scraper blade, said blade having a leading toe portion and a following heel portion giving two areas of contact between the blade and the kettle wall, means for mounting said blade relative said drive plate, said mounting means cooperating between said drive plate and said blade so as to permit the blade to allow for eccentric motion of the driving scraper frame relative the kettle wall without changing the blade's position relative the kettle wall, said mounting means comprising a pair of radial pins, said pins fixedly engaging the drive plate and removably received in openings between the heel and toe portions of the blade, said openings lying axially substantially in the same diametrical plane of the kettle, the pins bearing on the walls of the openings in the blade to drive the blade, and resilient means cooperating between said blade and said drive plate to permit the blade translational motion relative said drive plate and said kettle interior wall.

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