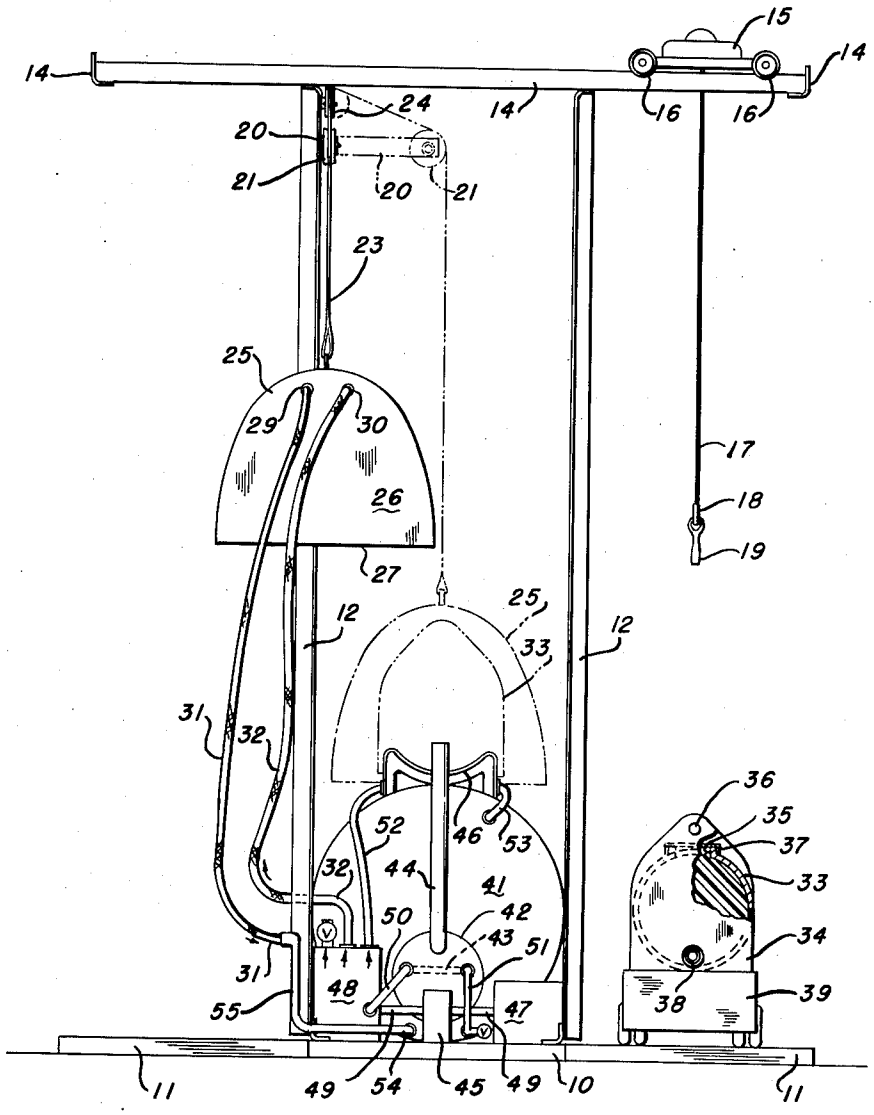
Jan. 3, 1956 W. J. MILLER 2,729,209

APPARATUS FOR HANDLING ASPHALT

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FIG. 1



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FIG. 2

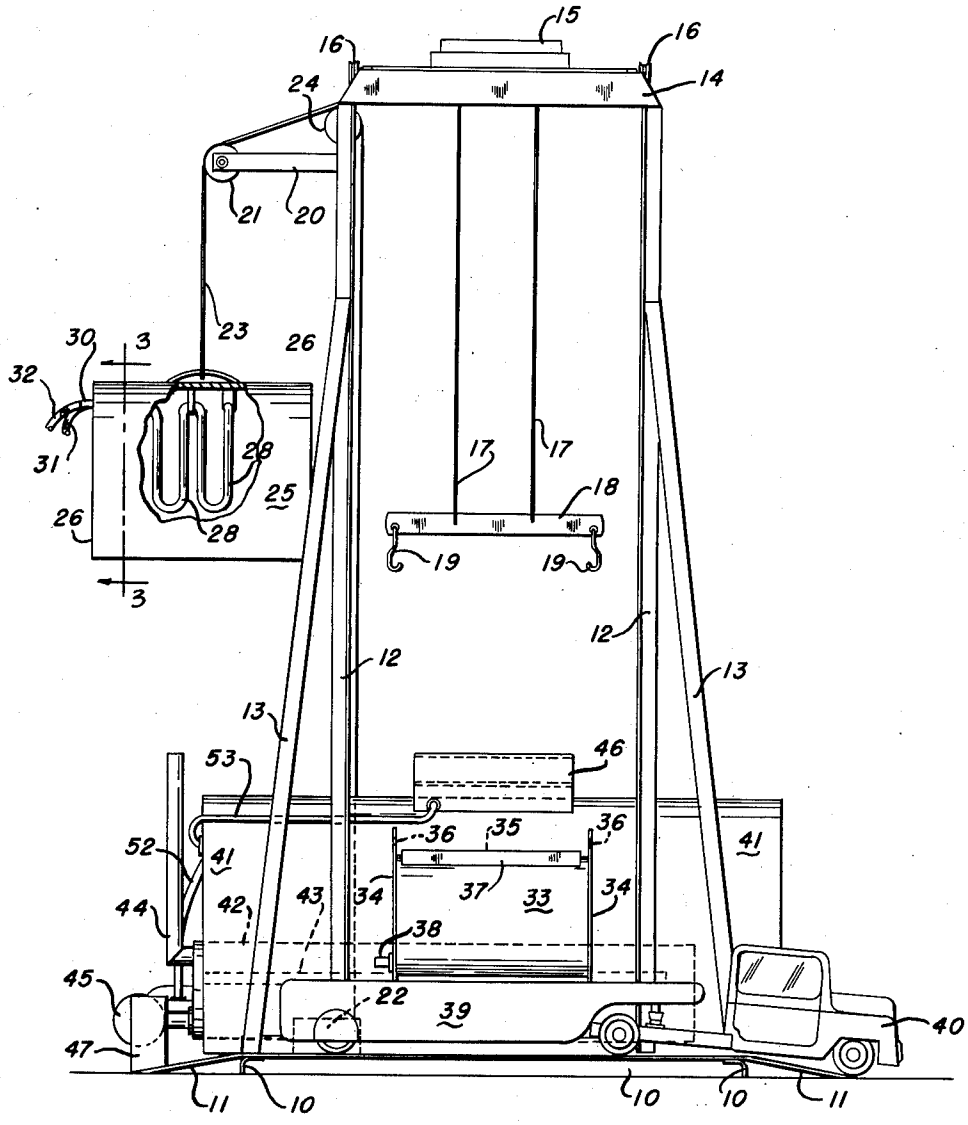
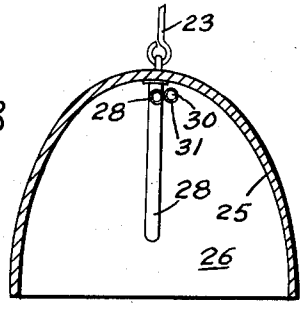


FIG. 3



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APPARATUS FOR HANDLING ASPHALT

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Application November 20, 1953, Serial No. 393,409
9 Claims. (Cl. 126—343.5)

This invention relates to apparatus and equipment usable in handling asphalt and similar bituminous products and more particularly to containers for transporting asphalt and associated apparatus for liquefying the asphalt in the containers to effect its speedy removal therefrom.

The principal object of the invention is the provision of apparatus for handling asphalt in containers and removing the asphalt from the containers.

A further object of the invention is the provision of asphalt handling apparatus that can be transported on a portable basis to new job locations periodically, set up with a minimum of effort and utilized in handling and liquefying asphalt to make the same available for bituminous paving mixing plants, etc.

A still further object of the invention is the provision of an asphalt container incorporating means facilitating the handling of the container as in a shipping operation and means permitting insertion of heating elements to liquefy the asphalt in the container to effect the removal of the same therefrom.

A still further object of the invention is the provision of asphalt handling apparatus incorporating containers which may be filled at a refinery, shipped to a point of use, handled by apparatus incorporating means for heating and liquefying the asphalt in the container and returned to the refinery for reuse.

Those skilled in the art will recognize that the problem of transporting asphalt from a refinery to a remote point of use and liquefying the asphalt for use at such remote point has presented a serious problem which has at times handicapped the building of air bases and similar works in points remote from the asphalt refineries and particularly when such remote locations are in cold climates as, for example, within or near the Arctic Circle.

The building of air bases in northern Canada, Alaska, Greenland, etc., where the average temperatures are quite low has complicated the problem of removing asphalt from steel drums in which it has heretofore been shipped. Such drums have commonly comprised 55 gallon steel drums which are filled with liquid asphalt at the refinery which solidifies when cooled to normal outdoor temperatures. The drums are then shipped to the point of use and the heads removed from the drums and time consuming and expensive removal of the asphalt found necessary.

In actual practice the drums have been heated with torches, have been split completely open and the asphalt removed to a vessel for liquefying. The drums are, therefore, lost, the operation is slow and inefficient and the recovery of the asphalt from the drums is nowhere near satisfactory.

Inasmuch as a considerable volume of asphalt is employed in making black-top pavements for use in such locations, the solution of the problem is important to the asphalt industry as well as to the successful construction of the projects.

The present invention relates to a portable apparatus including a heat source and means for handling containers in which the asphalt is shipped so as to liquefy the asphalt in the containers, permit the same to be drawn therefrom as a fluid quickly and inexpensively and accordingly recovers practically all of the asphalt from the containers and by not damaging the containers, permits their reshipment to the refinery for reuse.

The apparatus includes relatively large containers adapted for shipping and handling and for the insertion therein of heating elements so that the asphalt therein may be readily liquefied. The apparatus itself is so designed that it may be shipped to almost any location and readily assembled, used and disassembled and reshipped for subsequent use elsewhere.

With the foregoing and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being the intention to cover all changes and modifications of the example of the invention herein chosen for purposes of the disclosure, which do not constitute departures from the spirit and scope of the invention.

The invention is illustrated in the accompanying drawing, wherein:

Figure 1 is a front view of the asphalt handling apparatus, broken lines illustrating an alternate positioning of a heating element.

Figure 2 is a side elevation of the apparatus shown in Figure 1.

Figure 3 is a cross sectional elevation of a portion of the apparatus shown in Figure 1.

By referring to the drawings it will be seen that a structural frame including base members **10—10**, portions of which are covered by ramps **11—11**, serve to support a vertical frame structure **12—12** including diagonally positioned bracing members **13—13** and horizontally positioned frame members **14—14**. The horizontally positioned members **14—14** form a rectangular frame on a horizontal plane on the uppermost ends of the vertical frame members **12—12**. The front and back members **14—14**, as shown in Figure 1 of the drawings, form rails upon which a remotely controlled crane **15** is positioned for movement therealong.

The crane **15** includes spaced pairs of flanged wheels **16—16**. The crane **15** includes winch operating cables **17** which support a beam **18** on their lowermost ends, the beam **18** having a pair of oppositely disposed hooks **19—19** suspended therefrom in spaced relation.

By referring to Figure 2 of the drawings it will be observed that the crane **15**, the cables **17** and the beam **18** are movable transversely of the structure so that it may be moved from position over each of the ramps **11—11** as well as into an intermediate position with respect thereto.

The vertical frame members **12** hingedly support a horizontally positioned arm **20** which is provided with a pulley **21** on its outermost end, the arm **20** being arranged so that it can be moved from the position shown in solid lines in Figures 1 and 2 to the position shown in broken lines in Figure 1 where the pulley **21** will be in the substantial center area defined by the vertical frame members **12—12**.

A winch **22** positioned on the base members **10** operates a secondary cable **23** which is carried over an idler **24** hingedly mounted on the frame members **12**, the secondary cable **23** extending outwardly over the pulley **21** of the arm **20** and downwardly to a heating cap **25**.

The heating cap **25** comprises an inverted trough-shaped member having ends **26—26** and an open bottom **27**. A plurality of vertically positioned heating coil loops **28—28** depend from the uppermost portion of the heating cap **25**, as best shown in Figure 2 of the drawings

wherein a portion of the heating cap **25** is broken away to disclose the interior thereof. The heating coils **28** terminate in tubular connections **29** and **30** on the exterior of one of the ends **26** of the heating cap **25**. Flexible hoses **31** and **32** adapted for carrying a fluid heating medium such as hot oil are connected with the tubular connections **29** and **30** and extend downwardly to a fluid heat source hereinafter described.

By referring to Figures 1 and 2 of the drawings it will be observed that an asphalt container **33** which comprises a cylindrical tank having enlarged semi-rectangular ends **34—34** extending beyond the radius of the container **33** has been provided and includes a longitudinally extending opening **35** in its upper portion, which opening extends substantially the entire distance between the ends **34—34** and which ends extend upwardly therebeyond and are provided with secondary openings **36—36**.

As best shown in Figure 1 of the drawings, wherein a portion of one of the ends **34** is broken away, the container **33** is formed so that longitudinal flanges exist on either side of the opening **35** in the top thereof and which flanges permit the attachment of rectangular flanged closure members **37** if desired.

One of the ends **34** of the container **33** is provided with a valve outlet **38**. Still referring to Figure 1 of the drawings, it will be seen that the bottom portion of each of the ends **34** is designed to form flat transversely extending base portions which support the container **33** during shipment.

In the drawings a tractor trailer combination is disclosed, the trailer **39** being illustrated as carrying one of the containers **33** with the tractor **40** and the trailer **39** positioned on one of the ramps **11** at one side of the vertical frame structure **12** and bracing members **13** of the apparatus. In such position the hooks **19**, which are located on the beam **18** carried by the crane **15**, may be moved outwardly over the container **33**, as shown in Figure 1, and the hooks lowered and engaged in the openings **36** so that the container **33** may be lifted and moved into the area defined by the vertical frame members **12**.

Means for receiving the asphalt container **33** is located within the area defined by the frame members **12** and comprises an oil heating and circulating unit such as heretofore known in the art and disclosed in my Patents Nos. 2,607,337, 2,613,665, 2,636,490 and in my copending applications Serial Nos. 288,608, filed May 19, 1952, and 345,418, now Patent No. 2,690,172. As disclosed in these several patents and patent applications, oil heating equipment such as used in the present disclosure comprises generally a tank **41** in which a secondary smaller tank **42** is partially positioned. An end portion of the secondary smaller tank **42** extends outwardly at one end of the tank **41**.

The tank **41** normally contains a fluid heating medium such as oil and the secondary tank **42** defines a combustion chamber which may incorporate the heat exchanger illustrated in several of the above mentioned patents and patent applications and preferably includes a combination baffle and heat exchanger **43** positioned transversely of the secondary tank **42** between its upper and lowermost portions and extending inwardly thereof from the front end thereof to a point spaced with respect to the rear end thereof.

The front wall of the secondary tank **42**, which is positioned outwardly of the end of the front wall of the tank **41**, has a pair of vertically spaced openings the upper one of which is connected with a flue stack **44** and the lower one of which is connected with an oil burner **45**. Thus, products of combustion taking place within the secondary tank **42**, pass around the horizontally disposed heat exchanger and baffle **43** and into the flue stack **44**. The majority of the heat released by the combustion of fuel within the combustion chamber defined by the secondary tank **42** is transferred to the fluid heating medium

within the combination heat exchanger and baffle **43** and in the tank **41**.

The tank **41** has a saddle **46** positioned on its uppermost surface, the saddle **46** comprising a hollow structure through which the fluid heating medium from the tank **41** may be circulated and on which saddle **46** the container **33** may be positioned. The length of the saddle **46** is less than the length of the container **33**, as best shown in Figure 2 of the drawings, so that when the latter is positioned on the saddle **46** a considerable area thereof is directly engaged by the upper heated surface of the saddle **46**.

It will thus be seen that when the container **33** is lifted by the crane **15** from its position on the tractor and trailer and moved inwardly and lowered into position on the saddle **46**, the hooks **19** may be disengaged, the beam **18** and the hooks **19** moved away from the container **33** and the heat cap **25** moved into position thereover and lowered thereon.

It will occur to those skilled in the art that as the heat cap **25** is lowered into position on the container **33**, the vertically positioned heating coils **28** in the heat cap **25** will engage the asphalt in the container **33** through the opening **35** and move rapidly down into the same and liquefy the asphalt in the process. In immersed position, the heating coils **28** plus the heating action from the heated saddle **46** rapidly liquefy the entire contents of the container **33** which may then be drawn out through the valved outlet **38**, heretofore described, and pumped to a point of use or storage.

As soon as the asphalt has run out of the container **33**, the heat cap **25** is elevated and swung outwardly away therefrom, the crane **15** used to pick up the empty container **33** and replace it on the trailer **39** where it may be returned to the refinery or to a ship which in turn will transport it to a refinery. The container **33** may thus be refilled at the refinery, re-shipped to the same or different point of use and the contents rapidly liquefied and removed with the apparatus herein disclosed to meet the several objects of the invention.

It will be obvious that a plurality of such containers **33** are necessary and that they may be of relatively large capacity and yet be efficiently loaded, handled and emptied to the end that a suitable supply of asphalt may be established at a remote location regardless of the temperature of the area in which the apparatus is located.

Those skilled in the art will recognize that circulating means is essential for moving the fluid heating medium from the tank **41** and the heat exchanger **43** of the heating unit of the apparatus, through the heated saddle **46** and the coils **28** in the heat cap **25**. In the drawings the motive power for such operation is supplied by an engine **47** which may operate the oil burner **45** and a plurality of circulating pumps **48** by means of a shaft **49**.

The pumps **48** are connected with an inlet **50** which preferably communicates directly with the combination baffle and heat exchanger **43**. The fluid heating medium is supplied to the combination baffle and heat exchanger **43** by a tubular member **51** which communicates with the interior of the tank **41**. A secondary tubular member **52** connects one of the pumps **48** with the saddle **46** and the third tubular member **53** establishes communication between the saddle **46** and the interior of the tank **41**.

A secondary inlet in the tank **41** is indicated by the numeral **54** and the return flow of fluid heating medium from the heat cap **25** communicates with the same by way of a tubular member **55**. One of the pumps **48** delivers the fluid heating medium directly to the flexible hose **32** to complete the circulation through the coils **28** of the heat cap **25**.

Those skilled in the art will recognize that asphalt is preferably stored in a fluid condition in heated storage tanks and that asphalt mixing plants such as used in mixing bituminous paving concrete require heat and that the heating unit comprising the tank **41** and its associated

equipment provides a practical and efficient source of such heat. Coils in asphalt storage tanks may readily be connected with one of the pumps 48 and the return inlet 54 or 51 to achieve desirable heating in such storage or mixing plant facilities. Thus the apparatus disclosed herein, in addition to serving its intended function of rapidly removing asphalt from shipping containers, serves to maintain the asphalt in liquid condition while in storage and when mixing the asphalt with other paving materials and, therefore, throughout its handling and usage at the particular location. At such time as the equipment is no longer needed, as upon the completion of the paving, etc., the equipment may be readily disassembled and transported by tractor trailer or ship to another location where it may again be re-assembled and used.

Thus, the problem of successfully handling and using asphalt in locations remote from a refinery or a regular commercial asphalt handling plant are solved by the apparatus herein disclosed and the several objects of the invention are thus accomplished.

Having thus described my invention, what I claim is:

1. In apparatus for handling asphalt including a source of a fluid heating medium a horizontally disposed cylindrical container having an access opening in the upper part thereof and a valved opening in the lower part thereof and structure by which said container may be handled, an internally heated saddle for the reception of said container and a movable heat retaining cap for enveloping said container on said saddle, heating coils extending downwardly within said heat retaining cap and terminating short of the bottom thereof and acting to enter the access opening of said container when said heat retaining cap is positioned thereover, said heated saddle, heating coils and heat retaining cap acting to liquefy the contents of the said container so that the same may be removed through said valved opening.

2. The improvement in asphalt handling apparatus set forth in claim 1 and wherein the container has enlarged vertically positioned end portions extending above the sides of said container and defining said structure by which said container is handled and wherein said access opening is formed in said container between said end portions.

3. The improvement in asphalt handling apparatus set forth in claim 1 and wherein the heat retaining cap comprises a shell of inverted U-shape in cross section having oppositely disposed end sections affixed thereto with the longitudinal edges of said shell defining an open bottom area and wherein the heating coils are secured to said shell at its uppermost portion.

4. Apparatus for handling asphalt comprising a container having an access opening in the top thereof extending substantially the width thereof and a tank for a fluid heating medium, a heat exchanger in the form of a hollow saddle on said tank and communicating with said tank for the circulation of said fluid heating medium therethrough, means for placing said container on said heat exchanger, auxiliary heating means for said container comprising a member incorporating a plurality of depending hollow heat exchange elements and means for lowering said member to enter said heat exchange elements into said container, flexible communication means establishing circulation between said hollow heat exchange elements and said tank, said member including a top and depending side walls of greater length than said hollow heat exchange elements so that said member and said saddle enclose said container.

5. The improvement in asphalt handling apparatus as set forth in claim 4 wherein the hollow heat exchange elements are arranged in in-line relation to one another.

6. Apparatus for handling asphalt comprising a framework structure including a base, upright members and a horizontal structure on the uppermost end of said upright members, a tank for a fluid heating medium on said base between said upright members and a crane movable on said horizontal structure, a hollow saddle on said tank and a container for asphalt comprising a cylindrical tank having an elongated opening in one wall thereof and structure engageable by said crane for lifting said cylindrical tank onto said hollow saddle, a member having hollow heating elements depending therefrom movably positioned on said framework for engagement with said cylindrical tank and engagement of said hollow heating elements with said elongated opening, means for heating a fluid in said tank and means for circulating said fluid through said hollow saddle and through said hollow heating elements for liquefying asphalt in said cylindrical tank, said cylindrical tank having a valved opening through which liquefied asphalt may be drawn.

7. The improvement in asphalt handling apparatus as set forth in claim 6 wherein said member having said hollow heating elements is dome-shaped for enveloping said cylindrical tank when said hollow heating elements are engaged in said elongated opening therein.

8. Apparatus for handling asphalt comprising a structure including a tank for a fluid heating medium, a hollow saddle on said tank and means establishing communication between said tank and said hollow saddle, lifting means in said structure above said tank, an open bottom enclosure movably positioned in said structure, a heat exchanger positioned vertically within said enclosure and secured at its uppermost end thereto, means establishing communication between said heat exchanger and said tank, a container for asphalt having an access opening in its upper portion, means on said container to which said lifting means may be attached so that said container may be positioned thereby on said saddle, said enclosure adapted to enclose said container on said saddle when lowered thereover with said heat exchanger engaged in said opening in said container, said container having a valved opening through which said asphalt may be drawn when liquefied.

9. Apparatus for handling asphalt comprising a structure for use with a source of a fluid heating medium and comprising a hollow saddle and means establishing communication between said source and said hollow saddle, lifting means in said structure above said saddle, an open bottom enclosure movably positioned in said structure, a heat exchanger positioned vertically within said enclosure and secured at its uppermost end thereto, means establishing communication between said heat exchanger and said source, a container for asphalt having an access opening in its upper portion, means on said container to which said lifting means may be attached so that said container may be positioned thereby on said saddle, said enclosure adapted to enclose said container on said saddle when lowered thereover with said heat exchanger engaged in said opening in said container, said container having a valved opening through which said asphalt may be drawn when liquefied.

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