United States Patent

Stewart

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[54] PREPARATION OF ASPHALT PAVING MATERIAL

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[52] **U.S. Cl.** **259/158,** 259/177

[51] **Int. Cl.** **B28c 5/46**

[58] **Field of Search** 259/158, 157, 159, 156, 148, 259/155, 161, 172, 169, 3, 30

[56] **References Cited**

UNITED STATES PATENTS

2,305,938	12/1942	Turnbull	259/158
2,867,421	1/1959	Camm	259/158
2,487,887	11/1949	Eachran	259/158

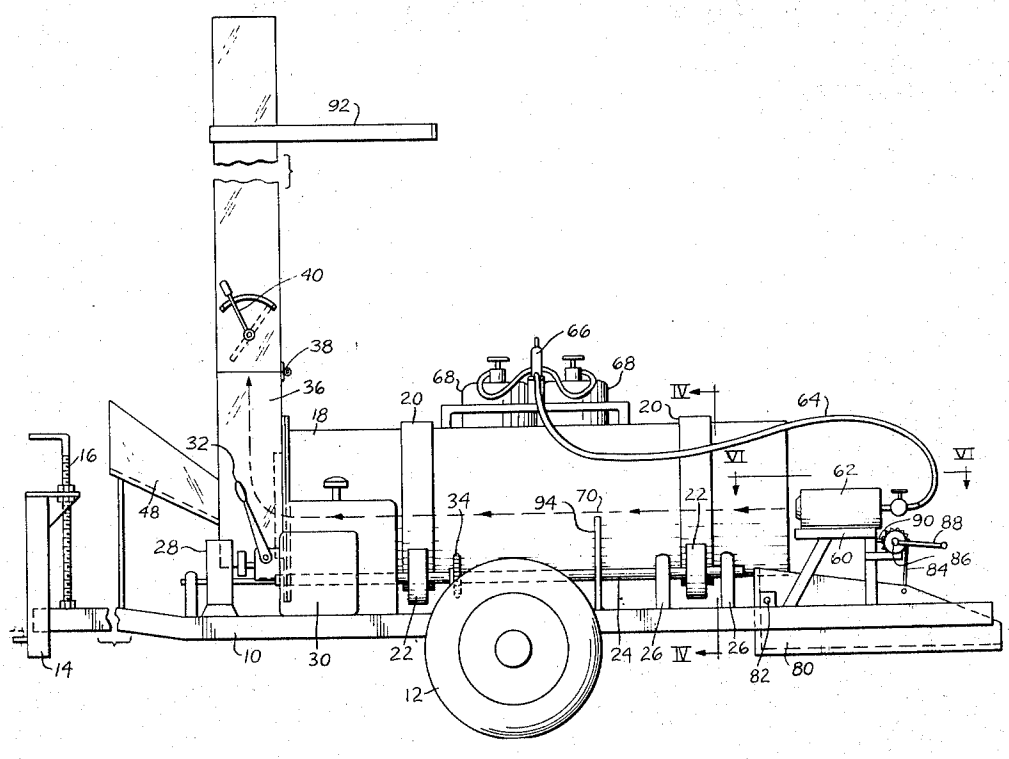
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[57] **ABSTRACT**

The specification discloses a machine in which asphalt paving materials are treated by mixing and heating the materials, particularly for repair work and the like. The machine consists of an elongated drum rotatable on a horizontal axis and having fins therein for agitating the material as the drum rotates. The asphalt materials, preferably at least partially premixed with an aggregate such as crushed stone, are fed into one end of the drum and progress therethrough to the other end. At the discharge end of the drum, burners supply a hot blast which passes through the drum in counter flow to the asphalt material passing therethrough and is taken off through a stack at the opposite end of the drum.

A tray at the discharge end of the drum receives the material as it drops out of the drum and is thus in position for a workman to remove the material from the tray by a shovel or by scraping it therefrom and placing it in the paving region to be repaired.

10 Claims, 6 Drawing Figures



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SHEET 1 OF 2

FIG-5

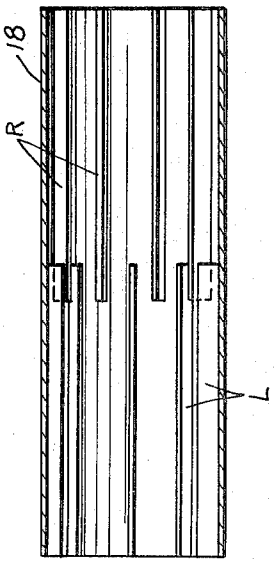


FIG-1

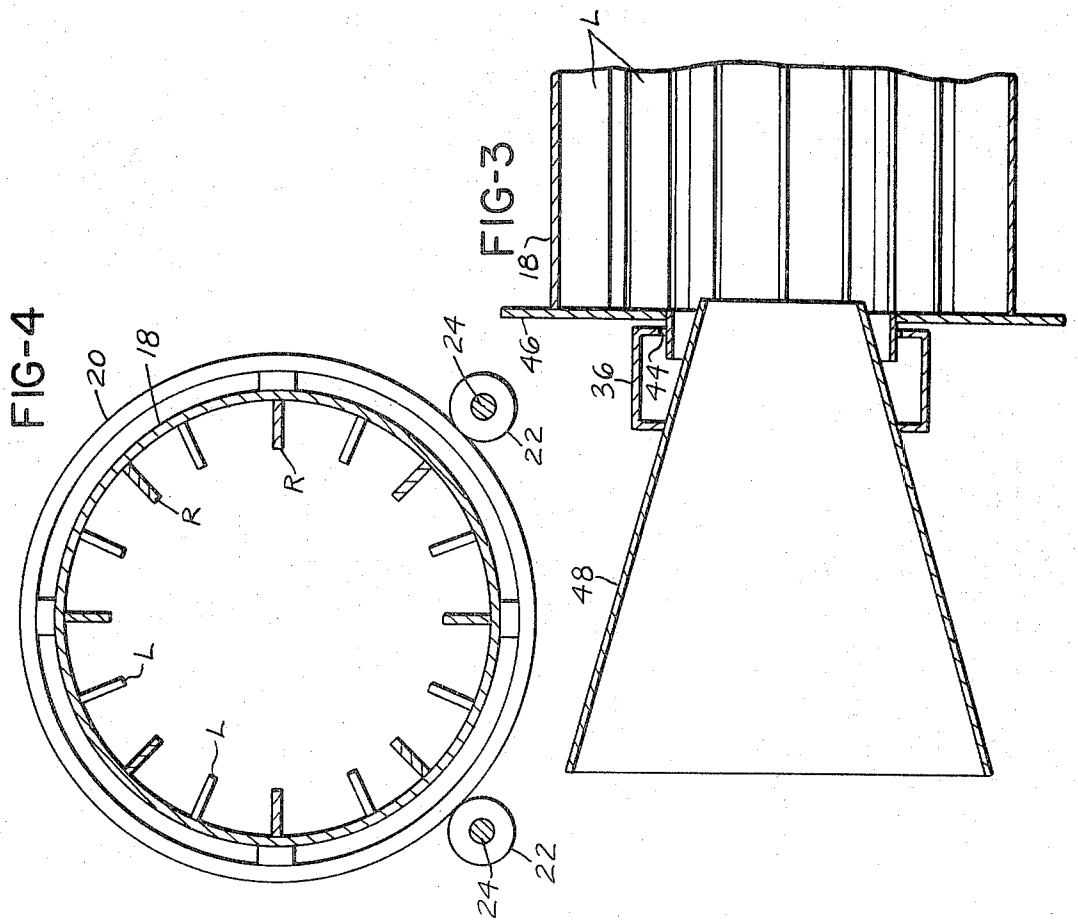
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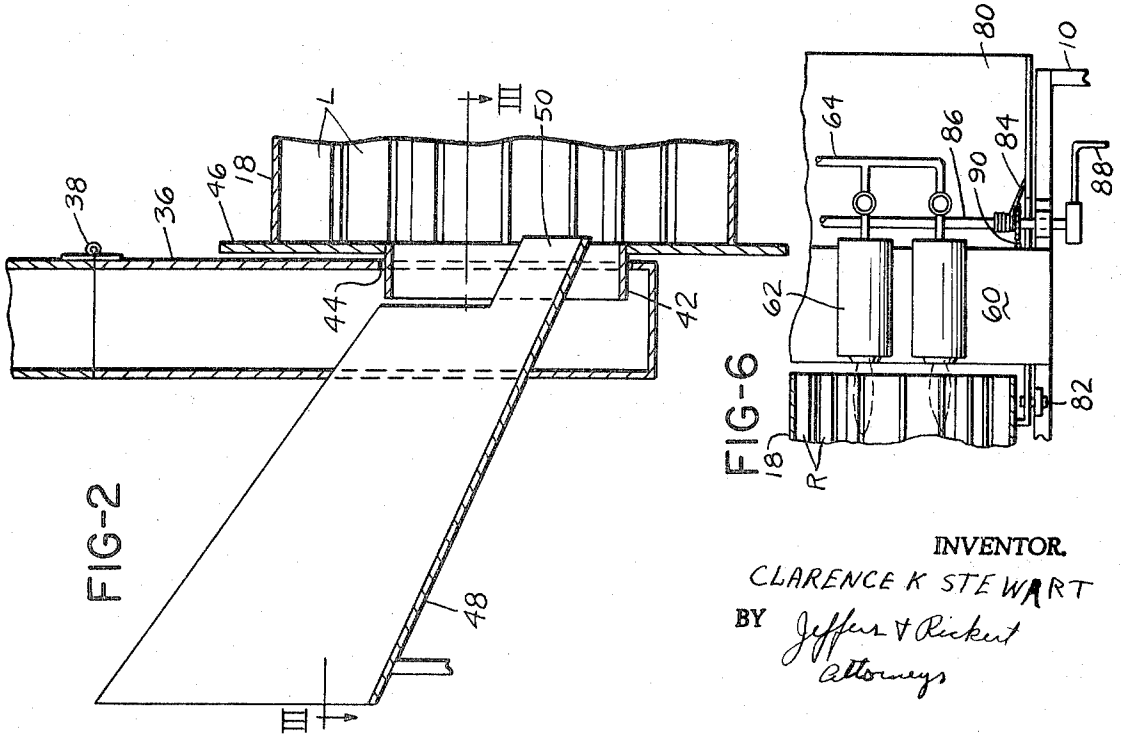
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PREPARATION OF ASPHALT PAVING MATERIAL

The present invention relates to a portable machine for use in repairing road surfaces and the like and is particularly concerned with a machine for mixing and heating asphalt paving materials.

The use of asphalt materials for paving and for repairing roadways is well known. In general, such materials comprise an aggregate which is crushed or screened to the desired average particle size and with this is admixed asphalt, or bituminous, material which serves as a binder. The binder material is characterized in that it will soften and become quite sticky when heated so that material of the nature referred to is applied when hot so that it will adhere to the substrate and be worked to the desired surface condition.

When large roadways are installed it is not uncommon to have a mixing plant on the job so that the asphalt paving material is mixed and immediately applied to the roadway. Such a mixing plant is shown, for example, in the U.S. Pat. No. 2,487,887 and still another is shown in U.S. Pat. No. 2,305,938. The arrangement shown in each of these patents is for the purpose of mixing and supplying asphalt material at such a rate that complete roadways can be laid down. For the patching and repairing of roadways, however, and for the paving of relatively small areas, there is no equipment known to me which is readily transportable and which will process small quantities of the material to a satisfactory mixed and heated condition at the job site.

Heretofore, when doing patch and repair work and the like, the asphalt paving material has been mixed and heated to temperature in a central plant and then conveyed by truck to the job site and applied to the area to be surfaced. The asphalt material, when it is thus conveyed from a central plant, particularly in colder periods, is quite apt to become too cold to do a proper job and paving laid down from such material might be poorly adhered to the substrate and to adjacent paving material and, furthermore, might be extremely difficult to work down to the proper level and could easily break up thereafter.

With the foregoing in mind, a primary objective of the present invention is the provision of a readily portable apparatus in which fairly small quantities of asphalt paving material can be processed so that it can be applied on the area to be paved while still hot and in good condition.

Still another object of the present invention is the provision of a portable apparatus of the nature referred to which is entirely self-contained and which merely requires a towing vehicle to move it from place to place.

Still another object of the present invention is the provision of a portable apparatus of the nature referred to which, while especially useful for mixing relatively small quantities of asphaltic paving material, can be operated substantially continuously and produce fairly large quantities of material when necessary.

A still further object of this invention is the provision of a portable apparatus of the nature referred to which is relatively inexpensive to manufacture and operate.

The foregoing objects as well as still other objects and advantages of the present invention will become more apparent upon reference to the following detailed specification taken in connection with the accompanying drawings, in which:

FIG. 1 is a somewhat schematic side elevational view of a portable apparatus according to the present invention;

FIG. 2 is a vertical section taken through one end of the drum of the device showing the stack for hot gases leading away from the device and showing the filling chute by means of which material to be mixed and heated is charged into the device;

FIG. 3 is a fragmentary plan section indicated by line III—III on FIG. 2, showing details in connection with the stack and filling chute;

FIG. 4 is a sectional view indicated by line IV—IV on FIG. 1, showing details in connection with the drum of the device and the vanes therein;

FIG. 5 is a schematic longitudinal section taken through the drum of the device, indicating the placement therein of the fins which agitate the material passing through the drum;

FIG. 6 is a fragmentary plan sectional view showing the burner arrangement which supplies hot gas to pass through the drum in counter flow to the material passing through the drum for heating the material to working temperature.

BRIEF SUMMARY OF THE INVENTION

According to the present invention, a wheeled chassis is provided which is readily movable, as by a pick-up truck or the like, and on which wheeled chassis is a rotatable drum mounted on a horizontal and longitudinally extending axis. Asphalt paving material is fed into one end of the drum and passes longitudinally therethrough while being admixed within the drum by rotation of the drum. The drum has fins on the inside so that the material passing through the drum is picked up and carried upwardly in the drum and dropped downwardly so that the material is completely admixed during its passage through the drum.

At the end of the drum opposite the end where the material is fed into the drum is a burner arrangement which supplies a hot gas blast which passes axially through the drum and out at the end where the material is fed into the drum and up a stack provided for the hot gases. The hot gases pass through the material that is dropping inside the drum and uniformly heats the material so that when the material discharges from the burner end of the drum it is in workable condition.

At the discharge end of the drum there is carried a tiltable tray which catches the material emerging from the drum and from which tray the material can be scraped or shovelled so that it can be placed on areas to be treated.

The entire arrangement is compact and easily moved from place to place and is particularly efficient for providing small batches of hot, mixed, asphalt paving material quickly.

DETAILED DESCRIPTION

Referring to the drawing somewhat more in detail, as will be seen in FIG. 1, the apparatus according to the present invention comprises a chassis **10** having ground wheels **12**. At the left end of the chassis, as is viewed in FIG. 1, there is a hitch member **14** for connection to a complementary hitch member carried, for example, on the bumper of a pick-up truck or the like. Advantageously, a screw **16** is provided for the purpose of adjusting the elevation of the left end of chassis **10** on hitch member **14** so the chassis can be caused to tilt downwardly toward the back or can be brought to the point where the chassis is substantially horizontal.

Positioned above the chassis is a hollow drum **18** open at both ends and having its longitudinal axis parallel to the chassis **10**. Drum **18** is provided with a pair of axially spaced heavy rings **20** which are supported on rollers **22** arranged on opposite sides of the chassis. The rollers **22** are arranged in pairs with the rollers of each pair spaced laterally a smaller distance than the diameter of rings **20**, thus forming a cradle in which the rings rest and whereby the rotation of rollers **22** will drive the drum in rotation. Each pair of rollers **22** on the same side of the drum is carried on a shaft **24** journalled in bearings **26** on the respective side of the drum. One of the shafts **24** is driven by a speed reducer **28** from a gasoline engine **30** via a clutch mechanism under the control of a lever **32**.

The driven shaft **24** may have a sprocket **34** thereon which is connected by a chain with a sprocket on the other one of shafts **24** so that both of the shafts **24** rotate in unison and in the same direction when the engine **30** is running and the clutch connecting the engine with the speed reducer **28** is closed by actuation of lever **32**.

The drum **18**, at the left end, as viewed in FIG. 1, enters a stack **36**, details of which will also be seen in FIGS. 2 and 3. Stack **36** extends upwardly and preferably is jointed as at **38** so that the upper portion can be laid down flat on top of drum **18** for transporting the device. The upper portion of the stack

may comprise a damper mechanism **40** to control the flow of gas through the drum from the burners to be described hereinafter.

Reference to FIG. **2** will show that the left end of the drum has a reduced diameter axial flange portion **42** thereon extending through a hole **44** provided therefor in the stack, and immediately outside the stack is a radial flange plate **46** connecting flange **42** with drum **18** and projecting radially outwardly from the drum so as to assist in sealing the drum to the stack.

Extending into the stack **36** from the side opposite drum **18** is an inclined feed chute **48**, which extends through the stack and has a portion at **50** extending directly into the open end of the drum so that material supplied to chute **48** will slide downward into the drum. The hot gases, of course, are mainly carried off by stack **36**.

The drum **18** is provided with internal fins which may consist of simple axially extending blades. FIG. **4**, which is a cross section of drum **18**, shows a plurality of the axial fins arranged in circumferentially spaced relation within the drum. The fins in section are marked R and are in the right end of the drum as it is viewed in FIG. **1**, while the others thereof are marked L and are in the other end of the drum.

Referring to FIG. **5**, it will be seen that the fins marked L extend from the left end of the drum to slightly more than half way down the length of the drum, while the fins marked R extend from the right end of the drum to slightly beyond the midpoint of the drum, while the R fins are staggered circumferentially from the L fins.

Referring again to FIG. **1**, taken together with FIG. **6**, it will be seen at the discharge end of the drum there is a support plate **60** on which is mounted a pair of burners **62** supplied with gas via conduit means **64** leading through a regulator **66** to the gas bottles **68**. The burners **62** supply a blast of hot gases which moves axially through the drum **18**, as indicated by the arrow **70** and out the stack. Due to the fins in the drum, material passing therethrough is picked up and dropped across the path of the hot gases so that the material becomes thoroughly heated and also thoroughly admixed during its passage axially through drum **18**.

Also at the discharge end of the drum is a discharge tray **80** pivotally supported on the chassis **10** as by pivot shaft **82** and adapted for being tilted upwardly and downwardly by cable means **84** which are wrapped about a shaft **86** adapted for being rotated by a crank **88** and, furthermore, adapted for being stopped in rotated positions as by the ratchet **90**. Tray **80** is provided with a back wall and side walls and a bottom wall but is open at the top and front so that material will drop therein from drum **18** near one end, while it can be removed from the other end either by scraping it therefrom or by shovelling it therefrom. At the discharge end of the drum, chassis **10** is open to give free access to the tray **80**.

The described arrangement provides for an adequate supply of hot asphalt paving material so that at least small areas can be paved and so that patching of existing pavement can be carried out rapidly and with the asphalt material hot and in the best condition for adhering to the surface being treated and to the edge regions of areas which are patched and so that the asphalt material can be worked down to provide for the desired surface.

It will be understood of course that the material will also be thoroughly dried out by the time it reaches tray **80** so that no problems are encountered in respect of moisture. Further, any flammable gases given off by the material during the heating thereof will readily be burned and pass off through the stack **36** so that no hazard is represented to the workers by the use of the burners **62**.

It will be noted that the hot gases move in counterflow to the material passing through the drum and the most efficient heat transfer conditions are thereby maintained.

For transporting the apparatus, the upper portion of stack **36** is tilted downwardly and when so tilted the members **92** projecting backwardly from the sides of the upper portion of the stack will engage the opposite sides of the drum and thereby hold the stack in position. It is of advantage to provide clamping arrangements on the chassis as indicated at **94**, for clamping engagement with the members **92**, whereby not only is the stack locked in its tilted down position, but also the drum is locked in position and the apparatus can thereby be transported over the highway at substantially highway speeds.

During transporting of the apparatus, the chassis **10** is preferably tilted to about its horizontal position, as it is shown in FIG. **1**, while tray **80** may be tilted upwardly somewhat at the rear end. On a job site, it is of advantage to tilt the left end of chassis **10** upwardly by manipulating screw **16** and to tilt tray **80** downwardly to the most convenient position for the discharge of material therefrom.

It will be appreciated that the asphalt material can be brought to the apparatus in a partially premixed condition and treated therein, or it can actually be completely mixed and heated in the apparatus. The apparatus is entirely self-contained, requiring only a motive vehicle to move it from place to place. The gas bottles carried on the chassis supply the fuel for the burners **62** and the engine **30** provides the motive power for driving the drum in rotation.

The apparatus is relatively inexpensive and is easy to maintain and can easily be operated.

While the machine, or plant, disclosed herein is capable of carrying out the complete mixing operation in respect of paving materials, it finds its greatest utility in processing premixed material at or near the job site. In practice, the paving material is premixed in a central plant, for example, during the summer months and is stored in stock piles for future use. The material is withdrawn from the stock piles as may be needed during winter months, or in other months, as may be required for small repair jobs.

Since the apparatus of the present invention heats the material passing therethrough in addition to mixing and agitating the material, the stone, sand and asphalt making up the paving mix can be mixed in the proper proportions cold and placed in the stock pile.

In general, three grades of stock are provided in the form of:

1. A bituminous mixed base material;
2. A binder material; and
3. A surfacing material.

With these three basic mixes available in the form of premixed stock piles and by availing of the machine of the present invention, any repair situation encountered can be dealt with.

As mentioned, a cold mix when run through the plant or machine of the present invention will be heated to the point that moisture and solvents will be driven off and a hot, readily workable, and rapid setting material will be produced adequate for any bituminous payment repair work.

A particular advantage is that the material is hot and workable and, thus, there is no loss of material when placed on a cold surface for repair work. A good bond of the repair material to the surface being repaired will be obtained because the repair material is hot and readily workable.

With heretofore practices wherein the repair material was conveyed from a central plant to a job site by a truck, substantial heat loss could occur, particularly in cold weather and inferior repair work resulted.

Modifications may be made within the scope of the appended claims.

What is claimed is:

1. In a portable apparatus for treating paving pre mixed material comprising aggregate and a heat softenable binder such as asphalt; a frame, a pair of support wheels on said frame between the ends thereof, a drum supported on said frame and open at the ends and having its axis extending longitudinally of said frame, means carried by the frame for rotating said drum on the axis thereof, a feed chute on the frame extending into one end of the drum for feeding paving material into the drum, a tray receiver on the frame beneath the other end of the drum for receiving treated paving material from the drum, burner means on the frame at said other end of

the drum for directing a blast of hot gas into the drum in counterflow to the paving material passing through the drum, and a stack on the frame at said one end of the drum and extending upwardly from the drum for receiving hot gases from the drum and for conveying the gases upwardly away from the drum.

2. An apparatus according to claim 1 in which said means for rotating said drum comprises rollers rotatable on the frame and arranged in laterally and longitudinally spaced relation, drive rings on the drum resting on the rollers and supporting the drum on the rollers, and an engine on the frame drivingly connected to said rollers.

3. An apparatus according to claim 1 in which said frame at the end opposite said tray has hitch means thereon for connecting the frame to a draft vehicle, and adjustable means interposed between said frame and said hitch means for tilting the frame about the axis of said support wheels.

4. An apparatus according to claim 1 in which said drum has interval staggered fins spaced circumferentially within said drum and operable during rotation of the drum to lift the paving material therein and drop it through the path of the hot gases passing through the drum.

5. An apparatus according to claim 1 in which said receiver is in the form of a tray disposed beneath said other end of the drum, means pivotally supporting said tray on said frame on a horizontal axis, and means for tilting said tray on said horizontal pivot axis.

6. An apparatus according to claim 5 in which said tray has bottom and side walls, and has one end wall disposed underneath the drum and is open at the opposite end, said frame extending along opposite sides of said tray and being open at the end to expose the open end of said tray for the removal of treated paving material therefrom.

7. An apparatus according to claim 1 in which said feed chute extends through said stack and is inclined downwardly toward said drum.

8. An apparatus according to claim 7 in which said drum has a reduced diameter axial flange projecting into said stack and a radial flange joining the drum to said axial flange and said feed chute extends into said axial flange.

9. An apparatus according to claim 7 in which said stack is jointed at about the level of the top of the drum to permit the upper portion of the stack to be folded down on top of said drum.

10. An apparatus according to claim 9 which includes means for clamping the folded down portion of said stack to said frame.

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