Dec. 1, 1942. H. A. BARBER 2,303,812

HEATER FOR ROAD FINISHING MACHINES

Filed Aug. 2, 1940 3 Sheets-Sheet 1

Fig. 1

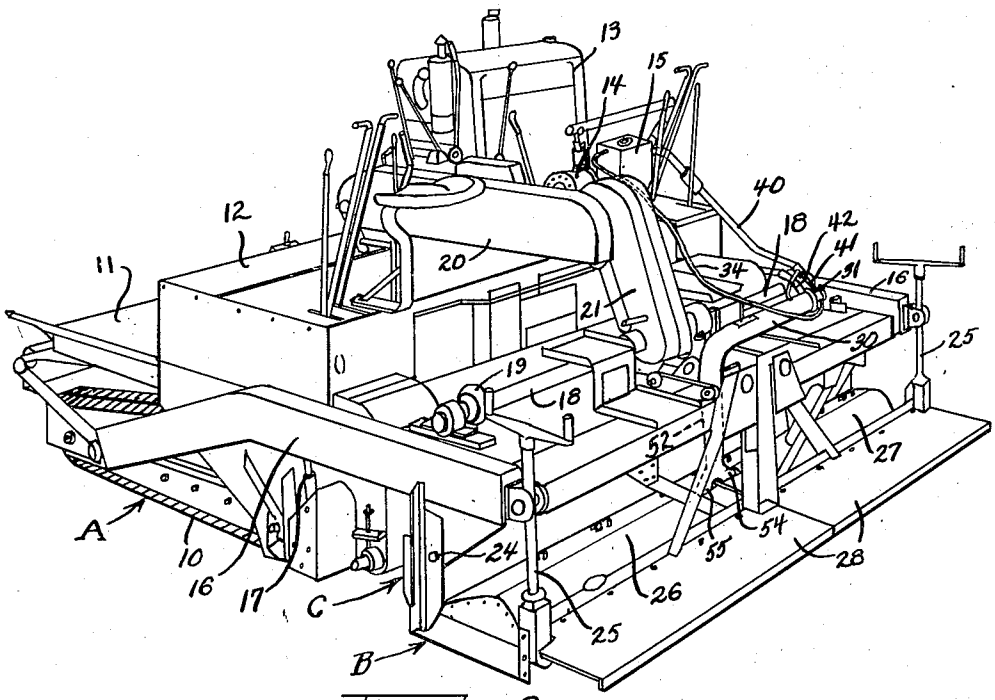
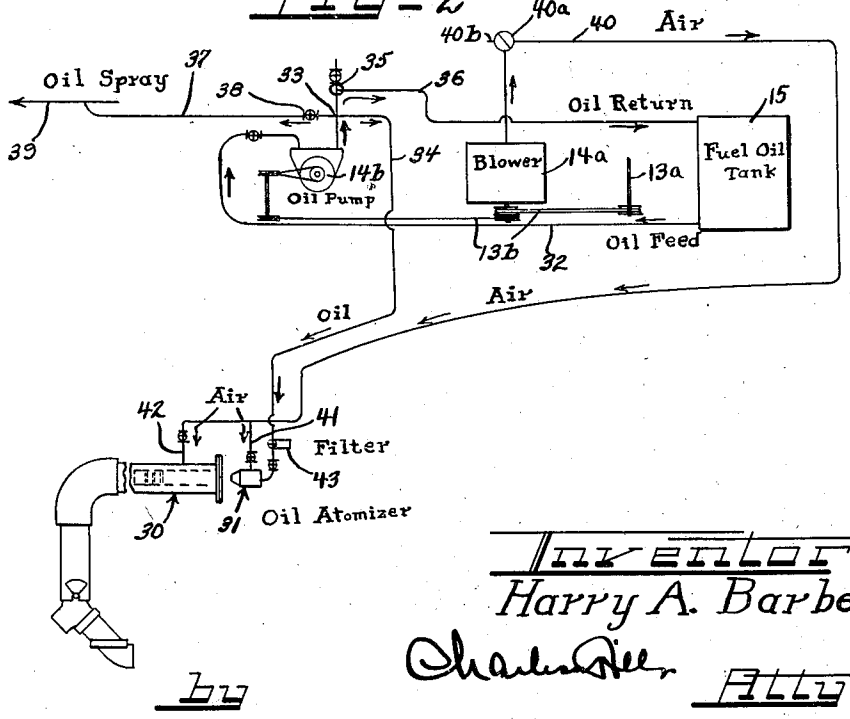


Fig. 2



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Dec. 1, 1942. H. A. BARBER 2,303,812

HEATER FOR ROAD FINISHING MACHINES

Filed Aug. 2, 1940 3 Sheets-Sheet 2

Fig. 3

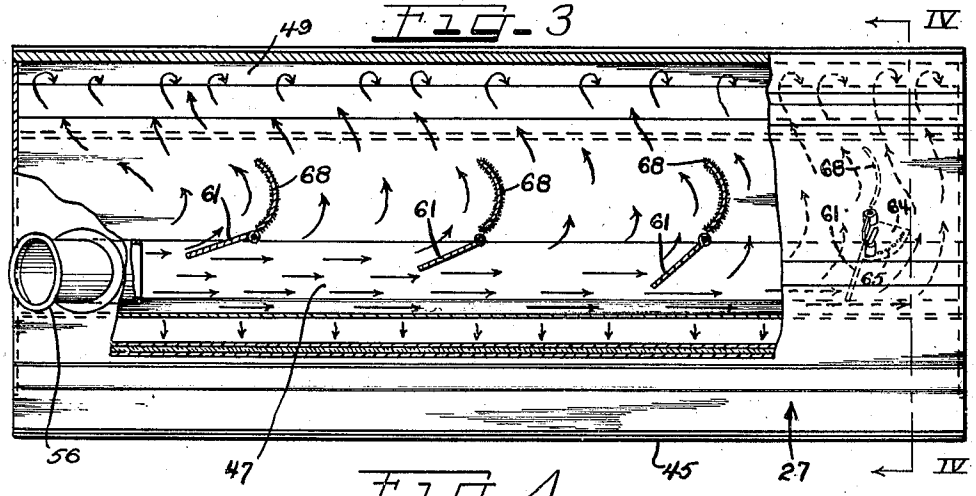


Fig. 4

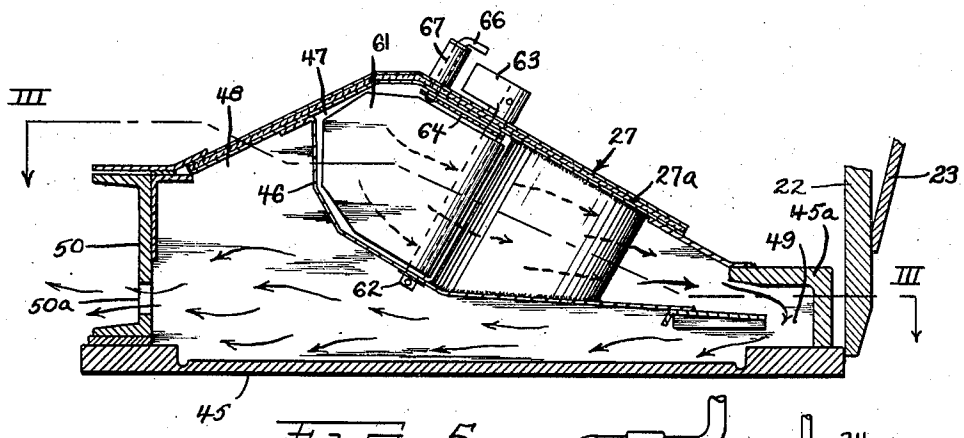
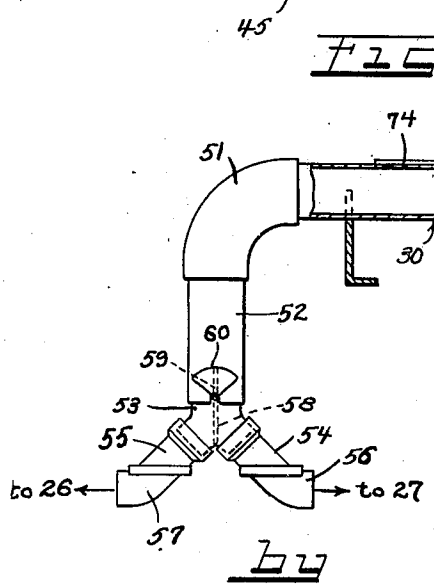


Fig. 5



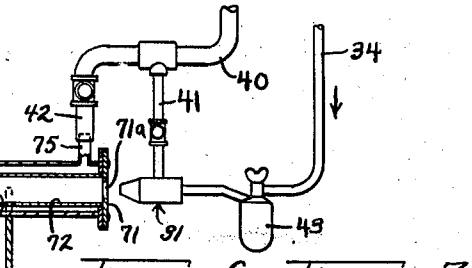


Fig. 6

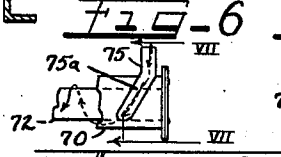
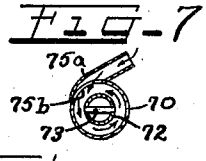


Fig. 7



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Dec. 1, 1942. H. A. BARBER 2,303,812

HEATER FOR ROAD FINISHING MACHINES

Filed Aug. 2, 1940 3 Sheets-Sheet 3

Fig. 8

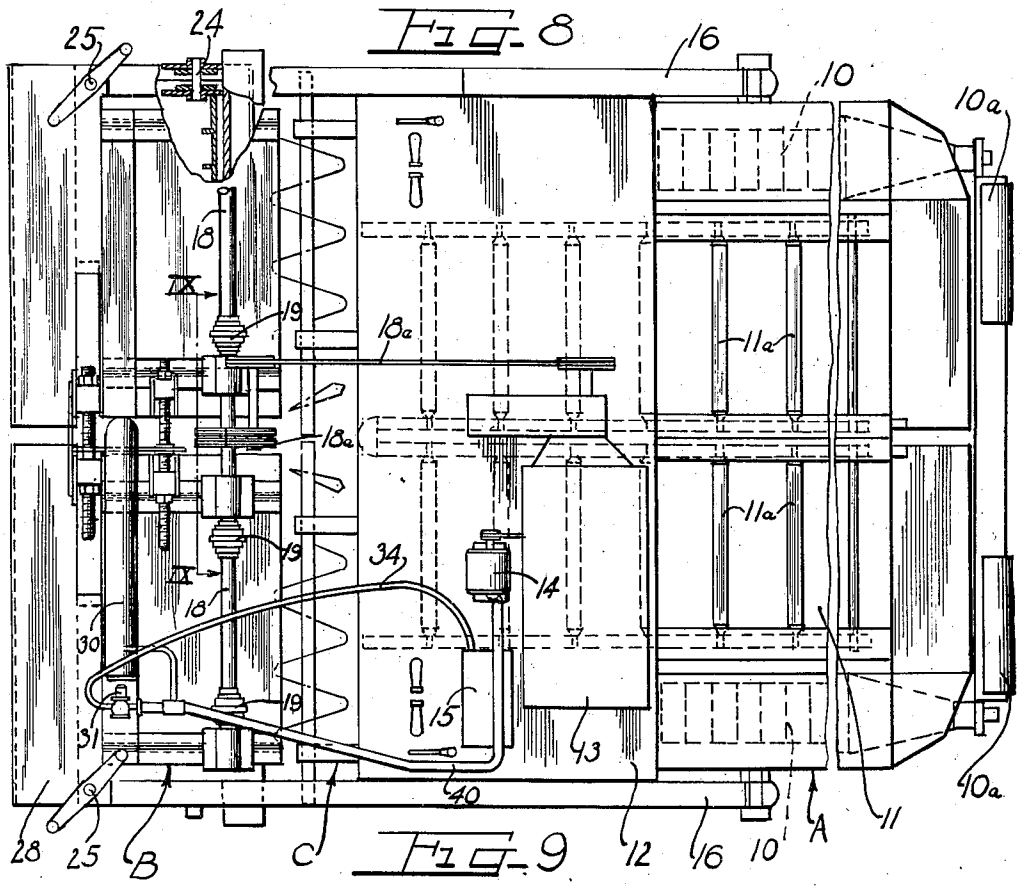
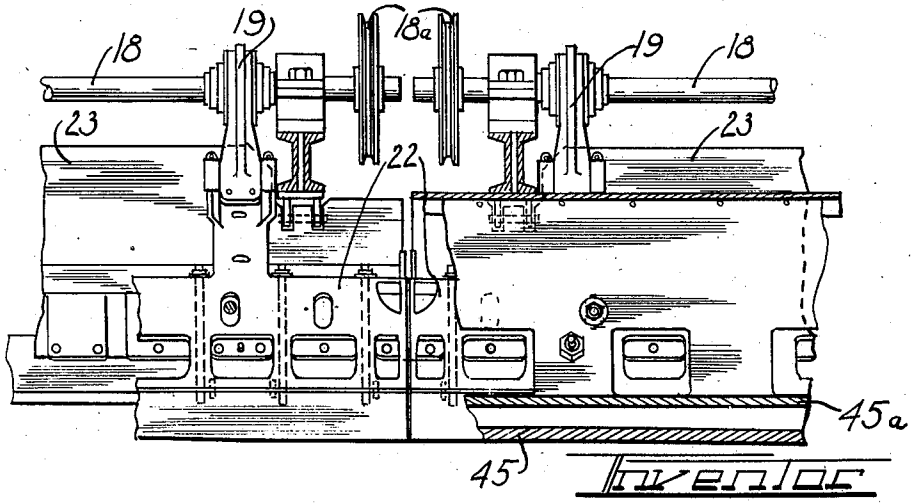


Fig. 9



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2,303,812

UNITED STATES PATENT OFFICE

2,303,812

HEATER FOR ROAD FINISHING MACHINES

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Application August 2, 1940, Serial No. 349,529

8 Claims. (Cl. 94—45)

This invention relates to mechanisms for heating the ironing device or screed of a material laying machine. More specifically this invention relates to a hot air heater for the screed assembly of a road finishing machine.

The invention will be hereinafter specifically described in connection with a self-propelled road finishing machine having a tamper and screed unit in spaced trailing relation to the propelling unit. In machines of this type the propelling unit deposits road paving material on the roadbed and spreads out this material across the width of the entire machine. The tamper and screed assembly then comes over the material to form a completed mat or road therefrom.

When the road finisher is used for making a road from asphalt mixes that are hot at the time of laying the same, it is desirable to provide a means of heat to those working surfaces that contact the hot material, in order to prevent chilling of the material which might result in tearing and dragging on the finished pavement surface.

To prevent the boiling up of material acted on by a tamper or other compressor and to iron out the pavement surface, it is quite desirable to have the screen heated in order that the asphaltic mix will not adhere to the screed and also in order that the screed will be a more efficient ironer.

According to this invention the road finishing machine is equipped with an air pump or fan which supplies a blast of air to a pipe. A tube is telescoped into one end of this pipe in spaced relation from the side walls thereof. A fluid burner such as an oil burner nozzle discharges a jet of atomized fuel into the tube, where it is completely burned. The air in the pipe surrounding the tube is heated, and the burned gases are discharged from the tube into the pipe to travel with the heated air to housings formed on top of the screed. These housings are preferably equipped with partition walls dividing the housings longitudinally into top and bottom sections. The lower section of the housing has the bottom wall thereof formed by the screed plate itself.

The hot air blast of burned gases is introduced into the upper portion of the housing near one end thereof. A plurality of adjustable baffles is provided in this upper portion of the housing to direct the gases toward the front end of the housing portion which communicates with the lower housing portion. Since the tamper is mounted adjacent the front end of the screed this tamper is heated by radiation from the housing. As the gases pass from the upper portion of the housing to the lower portion they are directed over the screed plate itself and are discharged out of the rear end of the machine at the rear end of the screed plate.

A feature of the invention includes very flexible connections in all parts of the heating device, in order that the respective units of the machine can be moved, vibrated and adjusted without interfering with the heater.

It is then an object of the invention to provide a heater for material laying machines adapted to maintain the material being laid in a heated condition.

A further object of the invention is to provide a hot air blast heater for the screed assembly of a road finishing machine.

A specific object of the invention is to provide efficient air circulating and air heating apparatus for the screed assemblies of road finishing machines.

Another specific object of the invention is to provide, in a road finishing machine, an oil burner hot air heater to uniformly heat the screed assembly of the machine.

Another specific object of the invention is to provide a housing above the screed plate of a road finishing machine for circulating hot air over the screed plate to heat the same.

Other and further objects of the invention will become apparent to those skilled in the art from the following detailed description of the annexed sheets of drawings, in which:

Figure 1 is a perspective view of a road finishing machine equipped with a screed heater according to this invention.

Figure 2 is a piping diagram of the heating system used in the machine shown in Figure 1.

Figure 3 is a top plan view with parts broken away and shown in horizontal cross section of one of the screed units of the machine shown in Figure 1.

Figure 4 is a cross sectional view taken along the line IV—IV of Figure 3.

Figure 5 is a side elevational view, with parts broken away and shown in vertical cross section, of the oil burner portion of the heating apparatus.

Figure 6 is a fragmentary plan view of a portion of the apparatus shown in Figure 5.

Figure 7 is a cross sectional view taken along the line VII—VII of Figure 6.

Figure 8 is a broken top plan view of the road finishing machine shown in Figure 1.

Figure 9 is a fragmentary cross-sectional view taken along the line IX—IX of Figure 8 and with

parts broken away to show other parts lying ahead of the broken away parts.

In the road finisher shown in Figures 1 and 8, the letter A designates a self-propelled unit mounted on a pair of crawlers such as 10 and including framework defining a paving materials receiving platform 11, an engine platform 12, an engine 13 mounted on the platform 12, a combined air and oil pump 14 driven from the engine 13, and a fuel oil tank 15. The self-propelled unit A is connected through drawbars 16 pivoted to the sides of the unit and carrying a tamper and screed assembly B in spaced trailing relation from the unit A.

The road material deposited on the platform 11 from trucks pushed ahead of the unit A by rollers 10a adapted to engage the rear truck tires, or any other source, is moved by flight conveyors 11a (Fig. 8) and discharged out of the rear end of the unit A onto the roadbed in the space C between the units A and B. As the machine moves forward the deposited road material is acted upon by the tamper and screed assembly to form a mat of completed road from the material.

Jacks, such as 17, are mounted on the unit A of the machine and serve to raise and lower the drawbars 16. In operation of the machine, however, these jacks are not used since the weight of the screed and tamper assembly B is borne on the finished road.

Axially aligned drive shafts 18 extend transversely across the machine between the drawbars 16 and are driven from the motor 13 through driving belts 18a (Figures 8 and 9) encased in housings 20 and 21 (Figure 1). The drive shafts have eccentric connections such as 19 suspending a pair of longitudinally aligned vertical tampers such as 22 (Figures 4 and 9). These tampers operate vertically directly in front of the screed, and deflector plates such as 23 (Figures 4 and 9) are mounted in front of the tampers.

Two abutting longitudinally aligned screeds are used. These screeds are pivoted at their forward ends through brackets and pivot shafts such as 24 to the drawbars 16 and are suspended at their rear ends from the drawbars through screw rods 25. Each screed is covered with individual housings 26 and 27. An operator's platform 28 extends from the rear end of each screed assembly and is supported by the screed assembly in spaced relation above the finished road.

According to this invention, an air heater 30 is mounted on the screed assembly B and is connected through pipes with the housings 26 and 27 over the screeds. The air heater 30 includes an oil atomizer or nozzle 31 supplied with oil from the pump 14 and also supplied with atomizing air from the blower connected to the pump.

As best shown in Figure 2, fuel from the tank 15 is pumped out of the tank through a feed line 32 by means of the pump 14b which, for purposes of clarity, is indicated as being separate from the air blower 14a. Both the air blower and the oil pump are driven from the engine 13 through suitable shaft and belt connections 13a and 13b. The pump 14b discharges the oil under pressure to a four-way coupling 33 having one leg communicating with the oil supply line 34 to the atomizer 31, having a second leg communicating with a pressure relief valve 35 adapted to discharge into a return line 36 back to the fuel oil tank, and having still another leg thereof connected to a valved extension pipe 37 having a shut-off valve 38 therein and adapted to be connected at 39 with a spray gun for spraying the machine with oil to clean and lubricate the same.

The air blower 14a discharges air under pressure through a valved pipe line 40. The valve 40a in the pipe line can be opened to discharge the compressed air to the atmosphere as at 40b, if desired. The air in pipe line 40 is fed to branch pipe lines 41 and 42 having valves therein as shown. The branch line 41 communicates with the oil atomizer or nozzle to vaporize the oil supplied thereto. The branch line 42 communicates with the heater 30. As shown in Figure 2, a filter 43 may be incorporated in the oil line 34 ahead of the atomizer 31.

From this description it should be understood that the engine 13 drives an air blower and an oil pump to supply an oil atomizer with air and oil and to also supply an oil burner with compressed air that is to be heated by the burning oil.

As explained above, the screed housings 26 and 27 are disposed over individual screed plates such as 45 shown in Figures 3 and 4. In Figures 3 and 4 the housing 27 has top and end walls which may be insulated as at 27a, if desired. These housing walls form a chamber above the screed plate 45. A dividing wall 46 divides this chamber longitudinally into an upper compartment 47 and a lower compartment 48 bottomed by the screed plate 45. The dividing wall 46 terminates short of the non-insulated forward end wall 45a of the screed to define a connecting passageway 49 immediately in rear of the tamper 22. The rear wall 50 of the screed assembly is perforated as at 50a for discharge of the spent air from the compartment 48.

As shown in Figure 5, the heater 30 receives an elbow 51 on one end thereof, connecting the same with a vertical pipe 52. The bottom of the pipe 52 receives a Y-coupling 53 joined to a connecting pipe 54 and a second connecting pipe 55 which communicate, respectively, with air inlets 56 and 57 to the inner ends of the housings 26 and 27. The pipe 52 and Y-coupling 53 have a damper 58 therein, controlled by an arm 59 adapted to be locked in position in a clamp plate 60 on the pipe 52. The damper 58 can control the relative amount of air flow to the housings 26 and 27.

As shown in Figure 3, the hot air blast from the inlet 56 is directed longitudinally into the top portion of the compartment 47 toward the outer end of the housing. Adjustable baffles 61 are mounted at spaced intervals in the upper portion of the compartment 47 and are adapted to project into the air stream from the inlet 56. Each baffle 61 is fixedly mounted on a turn shaft 62 which is pivoted in the top wall of the housing 27 and in the dividing wall 46 of the housing. The turn shaft extends through the top wall of the housing and has an operating handle 63 affixed thereon. A plate 64 parallel with the top wall of the housing is fixedly mounted on the shaft 62 to rotate therewith. This plate 64, as best shown in Figure 3, has a plurality of holes 65 therethrough adapted to receive a locking pin 66 projecting through the top wall of the housing and mounted in a sleeve 67 carried on the top wall of the housing. By means of this construction the pin 66 can be retracted from the plate 64 and the handle 63 can be rotated to position the baffles 61 for cutting off the desired amount of air from the air stream flowing along the top of the housing to deflect this air toward the forward end of the housing. The locking pin is then inserted through

a selected hole 65 in the plate 64 to hold the baffle in its adjusted position.

Each baffle 61 is mounted adjacent a fixed curved baffle 68 extending between the top wall of the housing and the dividing wall 46 just forwardly of the adjustable baffle. These curved baffles cooperate with the adjustable baffles to deflect the air, as shown by the arrows in Figure 3, toward the connecting chamber 49 at the front end of the screed assembly between the compartments 47 and 48. This baffle arrangement provides a very selective adjustment for uniformly heating the entire length of the screed plate 45. Thus the movable baffles 61 can be arranged to cut out selective increments of hot air from the blast issuing out of the inlet 56 to direct portions of the air of desired magnitude to the forward end of the housing from which the air must flow over the screed plate 45. If the outer end of the screed plate is running cool, the baffles can be adjusted so that more hot air is supplied to this outer end by moving the same further out of the air stream from the inlet.

As shown in Figure 5 the heater 30 consists of a pipe 70 having one end connected with the elbow 51 and the other end receiving a centrally apertured plate 71 with the aperture 71*a* in the plate adapted to receive atomized oil from the atomizer 31. A tube 72 is telescoped into the pipe 70 in spaced relation from the walls of the pipe and projects for a desired distance inwardly from the plate 71. This tube 72 serves as the combustion chamber and receives the atomized oil and air mixture from the atomizer 31. The oil is burned in the tube 72. Hot pins 73 can project across the tube 72 near the inner end thereof for reigniting the oil-air mixture in the event that the same should be momentarily extinguished. A trap door 74 is provided in the top of the pipe 70 and may be opened to initially ignite the oil-air mixture in the combustion tube.

A feature of the invention includes the circulation of air from the pipe 42 in a spiral path around the combustion tube 72. To obtain spiral movement of the air around the combustion tube the pipe 70 has an air inlet 75 receiving the air pipe 42. As shown in Figures 6 and 7, this air inlet 75 has an offset leg portion 75*a* communicating along a coextensive slot 75*b* in the pipe 70 to impart a swirling motion to the incoming air. The air will thus circulate around the combustion tube 72 and be heated by contacts with the tube. The burned gases from the combustion tube then emerge out of the open inner end of the tube and mix with the preheated air. The heated air and combustion gases then travel through the remaining length of the heater through the elbow 51, through the vertical pipe 52, and into the inlets 55 and 56 to the respective screed housings. The Y connection 53 permits relative movement between the inlets 55 and 56 and the pipe 52 in order that the screed housings can be moved with their respective screed plates when the plates are tilted for producing a crown in the pavement being laid.

The damper in the Y coupling 53 controls the quantity of hot air passing to either screed housing. This adjustment makes possible a further selective control for heating the screed.

From the above description it should now be understood that this invention provides for the heating of screed assemblies on road finishing machines through the medium of hot air and includes adjustable baffles capable of taking off predetermined amounts of air from a hot air stream to uniformly heat the screed assembly throughout its width. The tamper and deflector plate are in free heat exchange relation with the screed and become heated by radiation and conduction.

The invention also provides a highly effective fluid fuel burner for heating the air which, in turn, heats the screeds. The heating units are highly flexible and will permit all necessary adjustments of other mechanisms to which they are connected without interfering in any way with their operation.

It will, of course, be understood that various details of construction may be varied through a wide range without departing from the principles of this invention and it is, therefore, not the purpose to limit the patent granted hereon otherwise than necessitated by the scope of the appended claims.

I claim as my invention:

1. In a road finishing machine including a self-propelled road material feeding and spreading unit and a tamper and screed assembly in spaced trailing relation from said unit, the improvements which comprise a fluid fuel air heater on said machine, means defining air conduits in heat exchange relation to said tamper and screed assembly for receiving heated air from said heater, and spaced adjustable baffles in said conduits movable into the heated air stream for deflecting said heated air to uniformly heat the tamper and screed assembly along their entire operative areas.

2. A screed assembly for a road finishing machine comprising a flat screed plate adapted to overlie a pavement being laid by the finishing machine, a vertical apertured rear wall member on said plate, an L-shaped front wall member on said plate, an insulated top wall joining said front and rear walls to define a chamber over the plate, a dividing wall extending from the rear end portion of said top wall in spaced relation from said front wall to divide the chamber into upper and lower compartments, a hot air inlet communicating with said top compartment at an end thereof to feed a stream of hot air along the length of the compartment, and adjustable baffles spaced along the length of said top compartment and movable into the air stream from said inlet for deflecting predetermined increments of air from said inlet toward the L-shaped front wall and into the lower compartment whereby the air will flow rearwardly over the screed plate and out of the apertures in the rear wall.

3. In a road finishing machine having a pair of laterally aligned abutting screed plates extending transversely across the entire width of the machine, the improvements which comprise individual housings on each screed plate defining air conduits bottomed by the respective screed plates, hot air inlets for said housings adjacent the abutting portions of the screed plates, means for blowing hot air through said inlets toward the outer ends of said housings, and adjustable baffles in said housings spaced along the lengths thereof and movable into the air streams from said inlets for deflecting selected amounts of air from the streams throughout the width of the screed plates to effect uniform heating of the plates.

4. In a road finishing machine having a chambered screed assembly to be heated, the improvement which comprises an air heater on the ma-

chine including a fluid fuel atomizer, a combustion tube receiving the atomised fuel for burning the same, a pipe surrounding said combustion tube, means for supplying a stream of air to said pipe around the combustion tube, said combustion tube discharging burned gases into said pipe for admixing with said heated stream of air, and a conduit connecting said pipe with the screed chamber for feeding the heated air stream to the screed assembly to heat the assembly.

5. In a road finishing machine including a chambered screed assembly, the improvement which comprises a screed heater on the machine including a pipe communicating with the chamber of the screed assembly, a combustion tube nested in said pipe in spaced relation from the wall thereof, a fluid fuel atomizer for injecting atomized fuel into the said combustion tube to be burned therein, an air inlet to said pipe intermediate the ends of said tube, an offset portion on said air inlet to impart a whirling motion to the air admitted to said pipe for whirling the air around in said pipe, said air being heated by thermal contact with said pipe, and a pin extending across said tube to be heated by the burning gases whereby the heated pin will automatically reignite the combustion mixture upon momentary failure of combustion.

6. In a road finishing machine having a screed plate, the improvements which comprise walls defining a housing on said plate, means for propelling a stream of heating fluid longitudinally through said housing, and spaced adjustable baffles in said housing swingable into said stream to deflect the heating medium across the screed plate for uniformly heating the plate along its entire area.

7. In a road finishing machine including a self-propelled unit for discharging and spreading road material on a roadbed out of the rear end thereof, and a screed assembly in spaced trailing relation behind said self-propelled unit including a flat screed plate adapted to ride on the deposited road material, the improvement which comprises a heater for said screed plate including a fluid fuel burner mounted on the machine above the screed plate, an air pump mounted on the machine for circulating compressed air into said burner in thermal contact with the burning fuel to be heated thereby, a housing mounted on the flat screed plate defining a heating chamber in heat exchange relation with said plate, and a conduit connecting said burner with said housing to supply heated air to said chamber for heating the screed plate.

8. A screed heater for a material laying machine including a screed plate adapted to ride on the material which comprises a pair of telescoped pipes in spaced relation mounted on the machine above the screed plate, the inner pipe of said pair communicating at its inner end with said outer pipe, means for supplying a combustible mixture to said inner pipe for burning therein, means for supplying compressed air to said outer pipe for circulation around the inner pipe to be heated by thermal contact therewith, the preheated air and the burning gases merging together in said outer pipe at said inner end of said inner pipe, a housing on the screed plate defining a chamber bottomed by the screed plate, and a conduit connecting the outer pipe with said housing for conveying the heated air and gases to said chamber to heat the screed plate.

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