Aug. 22, 1939. F. JOEDICKE 2,170,330

ASPHALT LAYING APPARATUS

Filed June 29, 1937

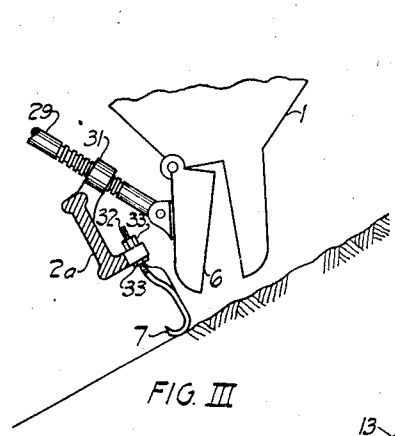


FIG. III

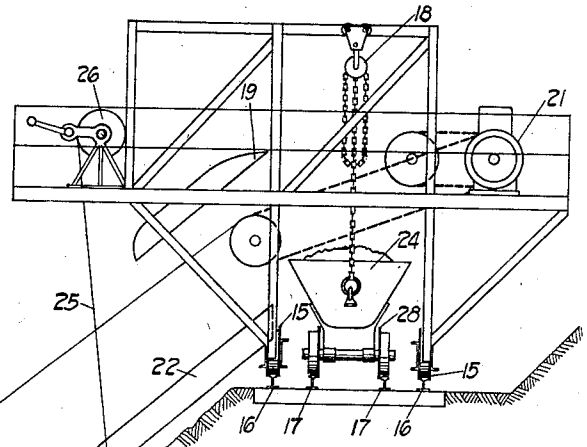
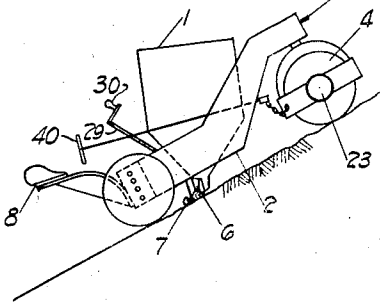


FIG. I



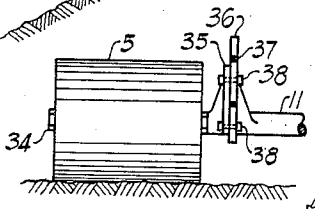


FIG. IV

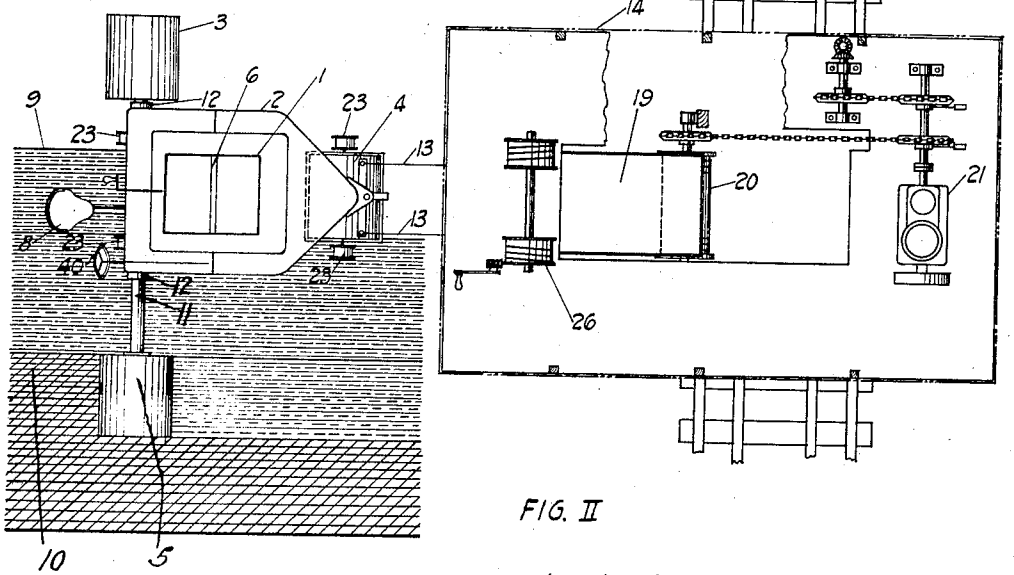


FIG. II

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ASPHALT LAYING APPARATUS

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2 Claims. (Cl. 61—63)

Asphalt coverings for sloping surfaces such as canal banks, reservoirs and embankments have been applied for many years by modification of the procedure used in the construction of roads. In many cases where consolidation of the asphalt covering has been effected by settling, the applied material has run off to a certain extent resulting in an uneven covering to the area being treated.

This invention is concerned with a method of construction in which intensive pressure is applied to the layer. In the application of asphalt layers in hydraulic construction such as canal banks the construction must be compressed intensively as the supplemental compression which road beds receive (which produces final imperviousness and solidity to the road bed due to traffic) is lacking. Furthermore extreme compression is rendered all the more necessary in such sloping hydraulic constructions due to the general poor subsoil conditions.

The methods of construction heretofore used have shown certain imperfections. For example, in cases where the compression of the layer on slopes has been produced by means of tamping, it is necessary for the tamping device to contact the asphalt layer at right angles to its surface. This has necessitated in the case of hand tamping, the employment of a rope which draws the tamper away from the vertical as it descends.

With mechanical tampers it will be realized that difficulties arise when the slope of the bank becomes severe. Furthermore, where mixed coverings such as permeable sand and gravel bound together with asphalt are used, compression by tamping is less suitable as the mixture when spread out and hot offers a relatively small flat tamping surface and when the lower layer consists of gravel the effect of tamping is reduced owing to the elasticity of the gravel layer.

In view of the above and various other disadvantages, the compression of the asphalt is better accomplished by means of rollers. Here, however, there is the disadvantage that the gravel subsoil is not solid enough to bear heavy rollers and furthermore, the heavy rollers cannot be used on slopes. It is therefore necessary to use light rollers, the pressure of which must still be great enough to produce a good compression of the material applied since the covering must be compressed as much as possible immediately after being applied in order that the layer may be made watertight and the surface solid and coherent. Improvement of the surface prepared for underwater use once the asphalt has hardened is generally very difficult. With hand rolling and spreading it will be apparent that the application of asphalt on large slope areas will result in excessive labor costs. It therefore follows that mechanical application and compression is necessary to allow asphalt surfacing on a large scale on sloping areas to be commercially feasible.

An object of this invention is to devise a mechanical asphalt laying and compressing machine which will overcome the above difficulties.

In brief, my invention comprises an apparatus which spreads the material to be applied to the correct thickness and compresses this material with one or more rollers after the same has been spread out and has reached the proper temperature for rolling. The binder used in the binder-material mixture may be either asphalt or a tar product or even contain water glass or cement.

In the development of this apparatus which because of its relatively large dimensions has considerable weight, care has been taken to reduce the surface pressure of the roller for compressing the asphalt layer sufficiently to make it useful in practice and with that end in view, means have been provided for making it possible to change the surface pressure or to lengthen or shorten the time elapsing between application and compression.

The surface pressure is thus kept from being either so high that the applied material becomes crushed or even pressed through into the subsoil when rolled or so low that insufficient consolidation takes place. In addition to a roller which compresses the spread-out material, additional rollers are provided for rolling the subsoil before the asphalt is laid and for finally finishing the surface.

A further understanding of my invention will be had from the following detailed description of a machine made according to my invention. Throughout this description reference is had to the accompanying drawing of which:

Figure I is a diagram showing a side view of the machine and loading arrangement.

Figure II is a diagram showing a plan view of the machine and loading arrangement of Figure I.

Figure III is an elevation of part of the asphalting machine of Figures I and II showing the adjustable outlet and leveling blade in detail.

Figure IV is a side elevation of the roller 5 of said asphalting machine showing the means for vertically adjustment of the roller.

Referring to Figures I and II, the asphalting machine primarily consists of an asphalt mixture hopper 1 mounted on a carriage or frame 2

provided with rollers 3, 4 and 5, which carry the weight of the device. The rollers 3 and 5 form the normal rear wheels of the device and a roller 4 which is pivoted, forms the normal front wheel. The hopper 1 is positioned directly behind the pivoted wheel 4 and is provided with a hinged outlet 6 which may be adjusted to a desired width. A leveling blade 7 is preferably attached to the machine and is adjustable to a desired height. A seat 8 is provided at the rear of the unit from which adjustment may be made of the outlet 6 of the hopper and the roller controlled by steering wheel 40.

The construction of the adjustable leveling blade 7 and the hinging outlet 6 are more readily seen from Figure III. In this figure the hinging outlet 6 is connected to a control rod 29 having a crank arm 30 at its uppermost end (shown in Figure I) for turning the same. The control rod is threaded and passes through a threaded bearing 31 mounted on the frame cross member 2*a*. As will be apparent by turning the rod 29 by means of crank arm 30, the width of the opening in the bottom of the hopper 1 may be varied by the operator. The leveling blade 7 is connected by two threaded vertical rods 32, (only one of which is shown), to the frame cross member 2*a*. The leveling blade is held firmly in position by means of nuts 33. The height of the blade above the ground level can be changed by moving the position of the nuts on the rods 32 as is apparent.

The operation of the machine is as follows: The application of asphalt takes place from the bottom of the slope to the top as shown in Figure I. The roller wheel 3 first preliminarily rolls the subsoil, which is next finally compressed by the dirigible roller 4 which directly precedes the application of the asphalt mixture from hopper which is leveled by the blade 7. The asphalt is rolled after a sufficient length of time has been allowed for the asphalt mixture to partially cool and thus obtain a desired rolling temperature and consistency. In general, I find that the roller 5 should be spaced from the hopper a distance of one width so that while asphalt is being applied to a strip 9 final rolling is being carried out on the strip 10, one removed from strip 9.

The three wheel arrangement with its unsymmetrical arrangement of wheels is chosen for various reasons.

By having the hopper closer to the roller wheels 3 and 4, greater pressure is applied to these roller wheels than to roller wheel 5 which presses the asphalt coating. Furthermore, by the above arrangement, the roller wheel only presses the laid asphalt mixture after the same has had an opportunity to become cooled and partially settled. The pressure applied by the roller wheels may be increased by adding weights to the individual wheels, for example, by filling them with water, or decreased by increasing the area of contact of the wheels.

If the weather is cold or if the distance travelled by the spreading device is greater than usual, the hopper may be moved laterally on the axle 11, a distance equal to the width of one strip, by loosening collars 12 so that the asphalt laid during the last previous trip will be rolled. In order that allowance may be made for the difference in height between the asphalt surface and the subsoil, and to maintain the hopper parallel to the surface the roller wheel 5 is arranged with its position in relation to axle 11 adjustable vertically.

The details of the mechanism for adjusting the roller 5 vertically are shown in Figure IV. Referring to this figure it will be seen that the roller 5 is mounted on a stub axle 34 having a vertical plate 35 at its innermost end. This plate 35 is connected by bolts 38 to a vertical plate 36 forming part of the main axle 11. The plate 36 being provided with a plurality of vertically spaced holes 37, the position of the roller 5 in relation to the main axle 11 may be changed at will.

The spreading machine is connected by means of two cables 13 and to a loading apparatus 14 situated on the top of the slope. This loading device is mounted on wheels 15 which run on rails 16 placed along the canal bank. The asphalt mixture loaded on dump trucks which run on rails 17 is delivered to the loading device. The buckets of these trucks are lifted from the trucks by a suitable travelling crane 18 and dumped out into a chute 19 and so into the hopper of the spreading machine which has been run up under the lower end of the chute 19. The spreading machine is lowered to the bottom of the slope to be treated by means of cables 13 which are unwound from a drum 20 mounted on the loading apparatus. The asphalt spreading machine is moved back up the slope by winding the cables 13 on drum 20 which is actuated by means of a suitable power means, for example, a small Diesel engine 21. After a strip has been laid and it is desired to move the asphalt laying machine laterally one strip, the asphalt laying machine is run on to rails 22 upon which machine rests by means of small wheels 23.

The continual operation of the asphalt laying therefore resolves itself into the following cycle: A bucket 24 filled with the asphalt mixture enters the loading device 14 on the tracks 17 lying within the tracks 16 which carry the loading machine. The bucket is lifted by the travelling crane 18 and moved to the chute 19 where its contents are dumped into the hopper 1 of the asphalt spreading machine which has previously been run onto the rails. The bucket 24 is then let down on to its wheels 28 and returned to the asphalt mixing plant while the asphalt laying machine is lowered down the slope to be surfaced, the bottom of the hopper being kept closed. Upon the machine being positioned to lay a strip to join exactly with a strip previously laid, the operator opens the hinged outlet 6 of the hopper the desired amount and the motor 21 is engaged to wind the cables on drum 20 and draw the machine up the slope and toward the loading machine. Thus a strip of mixture is spread out to the same thickness as the previous strip and at the same time, the next previous layed strip is being rolled. Having laid a strip, the machine is drawn up onto the rails 22, and is then raised by cables 25 operated by winch 26. The entire apparatus, that is, the loader together with the asphalt laying machine, is moved along the bank on the rails 16 a distance equal to the width of one strip. The hopper is then refilled, the platform lowered, and the cycle repeated. In order to ensure that the asphalt reaches the subsoil at the desired temperature, only sufficient asphalt mixture is placed in the hopper for the laying of one strip.

Various modifications of the above method of application and of the apparatus used will be apparent to those skilled in the art.

I claim as my invention:

1. An asphalt applying and rolling machine comprising a pivotable front roller, two rear rollers, an axle connecting said two rear rollers, a

frame connected to said pivotable front roller and slidably mounted on said axle, a hopper mounted on said frame, a lower discharge outlet in said hopper, said axle being greater in length than the width of said frame by a distance equal to substantially the width of said lower discharge outlet and said rollers being substantially equal in width to the width of said lower discharge outlet.

2. An asphalt applying and rolling machine comprising a pivotable front roller, a main axle, a rear roller mounted on one end of said main axle, a vertically adjustable stub axle mounted on the other end of said main axle, a second rear roller mounted on said stub axle, a frame connected to said pivotable front roller and slidably mounted on said main axle, a hopper mounted on said frame, a lower discharge outlet in said hopper, said main axle being greater in length than the width of said frame by a distance equal to substantially the width of said lower discharge outlet and said rollers being substantially equal in width to the width of said lower discharge outlet.

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