June 13, 1939. J. H. MOSEL 2,162,665

ROAD-BUILDING APPARATUS

Filed June 4, 1938 3 Sheets-Sheet 1

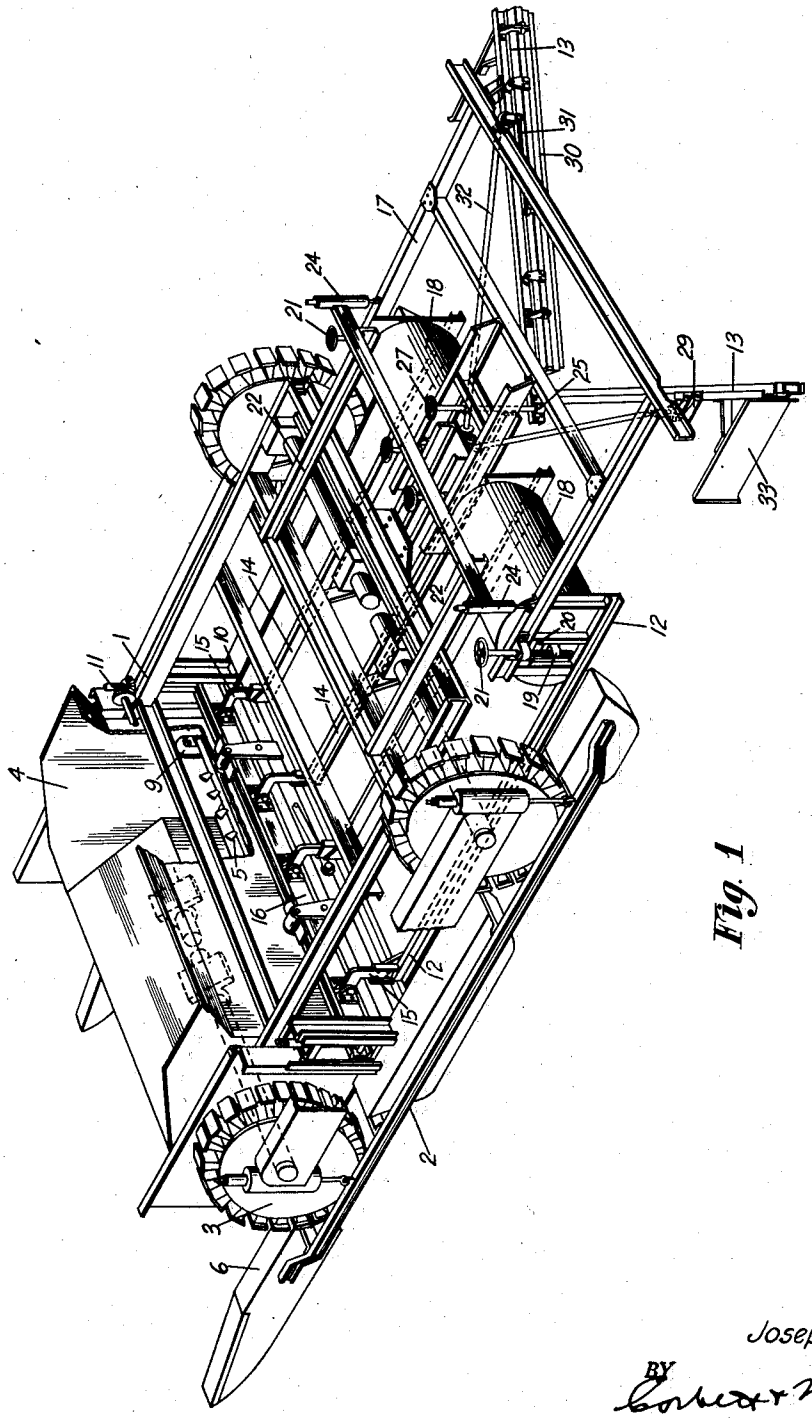


Fig. 1

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June 13, 1939. J. H. MOSEL 2,162,665

ROAD-BUILDING APPARATUS

Filed June 4, 1938 3 Sheets-Sheet 2

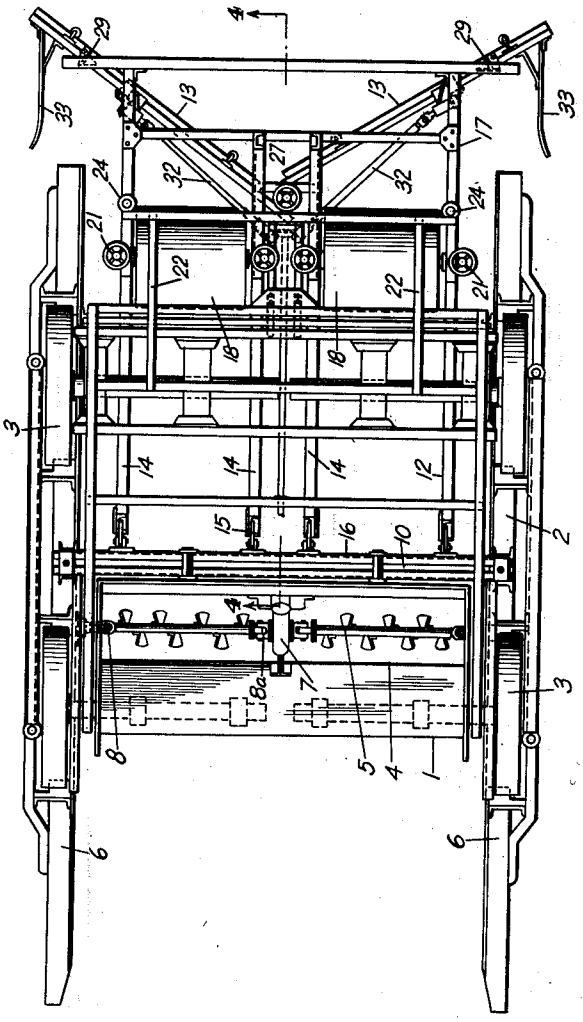


Fig. 2

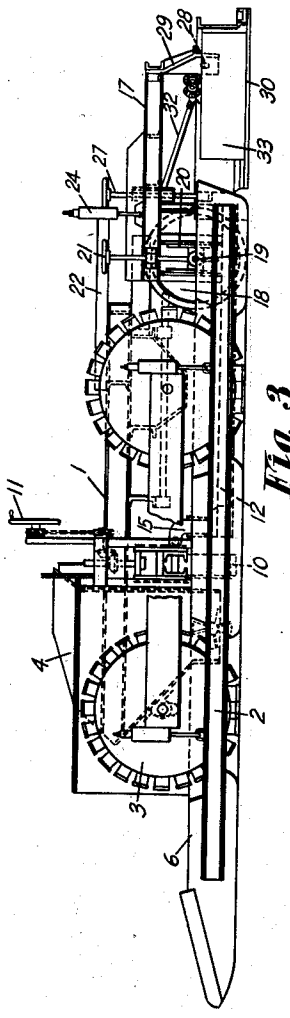


Fig. 3

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June 13, 1939. J. H. MOSEL 2,162,665

ROAD-BUILDING APPARATUS

Filed June 4, 1938 3 Sheets-Sheet 3

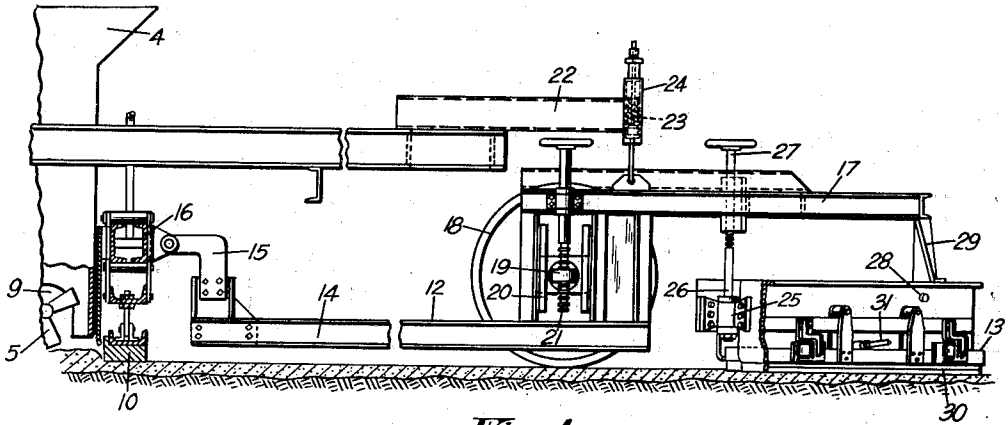


Fig. 4

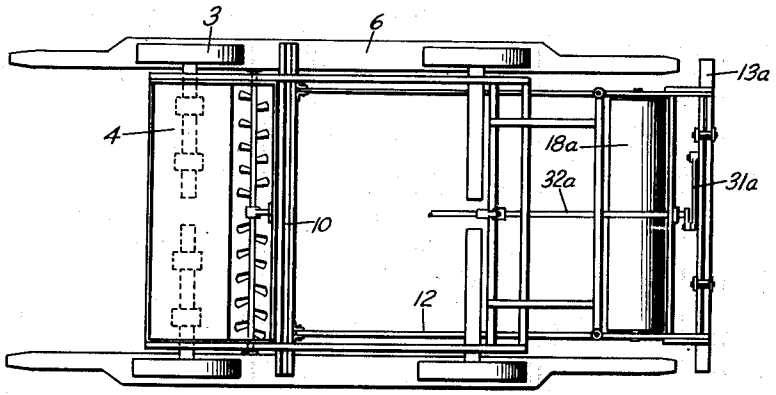


Fig. 5

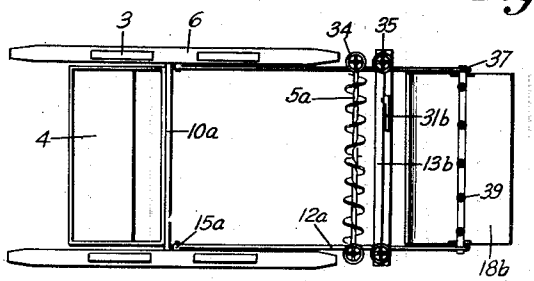


Fig. 6

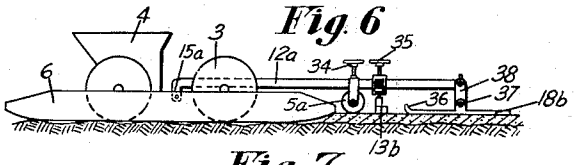


Fig. 7

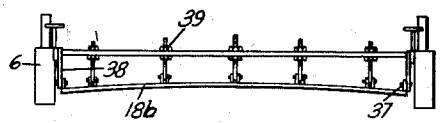


Fig. 8

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Patented June 13, 1939

2,162,665

UNITED STATES PATENT OFFICE

2,162,665

ROAD-BUILDING APPARATUS

Joseph H. Mosel, Columbus, Ohio, assignor to The Jaeger Machine Company, Columbus, Ohio, a corporation of Ohio

Application June 4, 1938, Serial No. 211,902

10 Claims. (Cl. 94—46)

My invention relates to road building apparatus. It has to do, more particularly, with a machine which is particularly suitable for operating on bituminous mixes or other similar material and is adapted to receive such material and to spread it across a surface to be covered forming therefrom a layer or slab of the desired thickness and contour and having straight edges.

The machine embodying this present invention is a machine of the general type illustrated in the patent to Joseph H. Mosel, No. 2,054,437, which issued September 15, 1936. However, it is to be understood that various features of this invention are not necessarily limited to the particular type of machine disclosed in said patent.

The machine disclosed in said patent, No. 2,054,437, consists mainly of two units, viz., an inner material-receiving and spreading unit and an outer material moulding and finishing unit. The inner unit is carried on transporting wheels and includes a material-receiving hopper which is adapted to receive the material and deposit it on the sub-grade. A rotatable screw spreading member is associated with the lower end of the hopper and is adapted to spread the material laterally. The outer unit consists of a pair of laterally spaced longitudinally extending runners that are adapted to slide along the sub-grade and to bridge the irregularities thereof. These runners serve as side forms for limiting spreading of material produced by the screw spreading member and for molding straight edges on the layer of material produced by the machine. The runner members carry a transversely extending screed which is located substantially midway between the ends thereof and at right angles thereto. This screed is disposed behind the hopper and is adapted to level off the material deposited from the hopper on the sub-grade. The two units are so connected together that the inner material-receiving and spreading unit can move vertically, due to the transporting means operating over a rough surface, without causing a corresponding vertical movement of the runner unit. Thus, since the finishing member, which is the screed, is carried by the runner unit, the irregularities of the sub-grade will not be reflected in the finished surface of the layer of material produced by the machine.

In said machine there is also provision made for spreading material laterally behind and beyond the runners. To accomplish this, an angularly disposed auxiliary screed or bleeder member is mounted on the rear end of each runner. These members extend outwardly beyond the runners and will direct the material behind and beyond the runners. The main screed is also provided with bleeder gates to permit material to bleed rearwardly past the main screed and reach the auxiliary screeds.

One of the objects of my invention is to provide apparatus of the type indicated which will receive asphalt or other bituminous or other material and which will spread such material across the surface to be treated in a very efficient manner and form therefrom a layer or slab of the desired thickness and contour which layer will have straight edges.

Another object of my invention is to provide apparatus of the type indicated which will form the layer or slab with straight edges without the use of side forms that are set along the edges of the surface to be covered.

Another object of my invention is to provide apparatus of the type indicated which is particularly adaptable to the spreading of material over an old road bed or over a roughly graded or other rough surface, the apparatus being of such a nature that the longitudinal irregularities in the surface being covered will be practically eliminated in the surface produced by the machine and, consequently, the machine will produce a surface which is very even and which will not be "wavy".

Another object of the present invention is to provide a machine of the general type indicated above which has final finishing or strike-off means associated therewith in such a manner that even though the runners ride up over boulders or other objects there will be no vertical movement of the final finishing means and, consequently, there will be no waves produced in the finished surface.

Another object of my invention is to provide a machine of the general type indicated which has final finishing means associated therewith in such a manner that vertical movement of the material-receiving and spreading unit or of the runner unit will have substantially no effect on the position of the final finishing means.

Another object of my invention is to provide a simple arrangement of structure by which the objects indicated in the two preceding paragraphs may be attained.

In its preferred form my invention contemplates the provision of a machine of the general type illustrated in Mosel Patent No. 2,054,437. However, instead of having the rear auxiliary

screeds supported on the runners I have them supported on the rear on an independent sub-frame. This independent sub-frame is connected to the main portion of the machine at its forward end only which is pivoted, preferably to the main screed structure. Thus, the auxiliary screeds are carried by a subframe which is connected to the runner unit of the machine in such a manner that the runner unit may move vertically without causing a corresponding movement of the auxiliary screeds. The rear end of the pivoted sub-frame is carried by rollers or other means which operate on the layer of material leveled off by the main strike-off member carried by the runners.

I prefer to have the rear auxiliary screeds angularly disposed and extending entirely across the width of the layer to be produced by the machine so that these auxiliary screeds will serve as the final finishing means for the entire width of the layer of material. However, if desired, the auxiliary screeds may be used merely as blender screeds in the same manner as in the machine disclosed in said patent. If they are used merely as blender screeds, they need only extend for a portion of the width of the layer of material to be produced by the machine.

Various other objects and advantages will be apparent from the following description.

The preferred embodiment of my invention is illustrated in the accompanying drawings, wherein similar characters of reference designate corresponding parts and wherein:

Figure 1 is a perspective view partly broken away of a machine constructed in accordance with my invention.

Figure 2 is a plan view of the machine illustrated in Figure 1.

Figure 3 is a side elevation of the machine illustrated in Figure 2.

Figure 4 is a longitudinal section taken substantially along line 4—4 of Figure 2.

Figure 5 is a plan view showing a modified form of my invention.

Figure 6 is a plan view illustrating another modified form of my invention.

Figure 7 is a side elevation of the structure illustrated in Figure 6.

Figure 8 is a detail of a portion of the machine illustrated in Figures 6 and 7.

With reference to the drawings and particularly to Figures 1 to 4, inclusive, I have illustrated a machine of the general type disclosed in said Mosel Patent No. 2,054,437. Since the machine in the main is of a structure practically identical with that disclosed in said patent, a brief description of the main parts of such machine will suffice.

The machine comprises two units, namely, an inner material receiving and spreading unit 1, and an outer material molding and finishing unit 2. The inner unit is carried on transporting wheels 3 and includes a material-receiving hopper 4 extending substantially the entire width of the surface to be covered. This hopper has both its upper and lower ends open. It is adapted to receive the material and deposit it on the sub-grade. A rotatable screw-spreading member 5 is associated with the lower end of the hopper and is adapted to spread the material laterally. This rotatable screw-spreading member in the present machine is mounted in a novel manner to be described hereinafter.

The outer unit consists of a pair of longitudinally extending runners 6 which are secured together in laterally spaced relationship, as disclosed in said patent, and in such a manner that the distance between the runners may be varied. These runner members are adapted to slide along the sub-grade and to bridge the irregularities thereof. They serve as side forms for limiting spreading of the material produced by the screw spreading member 5 and for molding the spread edges on the layer of material produced by the machine.

It will be noted that the screw spreading member 5 is made in two sections. Each of these sections is connected by a universal joint 8a to a rotatable member driven by a worm gear drive 7 supported midway between the ends of the hopper and adjacent the bottom of the hopper. The outer end of each of the screw spreading sections is connected by means of a universal joint 8 to the runner member 6. It will be noted from Figure 1 that the rotatable screw spreading section extends outwardly through an opening 9 in the end wall of the housing. It will be apparent that when the inner unit 1 moves vertically, the inner end of each screw spreading section will move therewith while the outer end thereof will stay at the same height because it is connected to the runner. When the runner members are moved apart so that a wider layer of material can be produced by the machine, a small section of screw spreading member may be connected to the outer end of one of the main sections and to the runner member. The screw will then serve to force the material laterally from the hopper through the opening 9 and beyond the end of the hopper to the runner member which will be spaced therefrom. Thus, it will be apparent that the screw spreading member is supported in a novel manner. One end of each section is connected to the inner or hopper unit and the other end is connected to the runner unit. Furthermore, the connections are such that vertical movement of one of the units relative to the other will be permitted without injury to the screw.

The runner members 6 carry a transversely extending main screed structure 10. Each end of the screed structure is vertically adjustable independently of the other by means of a hand wheel 11 in substantially the same manner as described in said patent. This main screed structure 10 is carried by the runner 6 substantially midway between the ends thereof. The screed extends transversely substantially at right angles to the runners. This screed may be of a structure identical to that disclosed in my co-pending application, S. N. 197,067, filed March 21, 1938, and, therefore, I will not describe it in detail.

The operation of the units of the machine so far described is substantially the same as that of the machine disclosed in said patent. The machine is moved along by a suitable means. The transporting wheels 3 may operate over a rough surface and cause vertical movement of the inner unit 1. However, the inner unit is so connected to the outer unit that this movement will have no effect on the outer runner unit. Since the outer runner unit carries the screed unit 10, the surface finished by the screed member will be very smooth. However, it sometimes happens that either of the runners 6 will strike and ride up upon a boulder or other similar object. This will first raise the forward end of the runner and then, as the machine progresses, raise the rear end of the runner. Since the screed unit 10 is

carried midway between the forward and rear ends of the runners, the effect of this will be minimized. However, I have found it desirable to provide auxiliary screeds which are disposed behind the main screed unit 10 and which will serve as the final finishing means for the surface being produced. These screeds are carried in such a manner that vertical movement of either or both of the runner members 6 or of the inner unit 1 will have substantially no effect on the vertical position of these auxiliary screeds.

Thus, I provide a sub-frame 12 which supports the auxiliary screeds 13 at its rear end. The forward end of this frame is preferably pivotally connected to the runner unit and its rear end preferably supported by means operating on the layer of material leveled off by the main screed unit 10.

The sub-frame 12 is composed of 4 longitudinally extending beams 14. The forward ends of each of these beams is pivotally connected by means of an L-shaped bracket 15 to the main screed unit 10. This screed unit, as previously stated, is the same as that disclosed in my co-pending application. The lower portion thereof is reciprocable transversely but the brackets 15 are pivotally connected to a supporting beam 16 thereof which does not reciprocate but which is adjustable vertically with the screed unit. Thus, the forward end of the sub-frame 12 is pivotally connected to the runner unit of the machine. The rear portion 17 of the sub-frame 12 is at a higher level than the beams 14. This rear portion 17 carries the auxiliary screeds 13. A pair of rollers 18 support the rear end of the sub-frame 12. These rollers are adapted to operate upon the layer of material leveled off by the main screed unit 10.

It will be apparent that each roller 18 is disposed between two of the beams 14 adjacent the rear ends thereof. Each end of the roller member is journaled in a bearing member 19 which is carried by a slide that is vertically adjustable in guideways 20, carried by the sub-frame. The vertical adjustment of each end of the roller is accomplished by means of a screw 21. In order to eliminate a substantial portion of the weight of the sub-frame 12 and associated parts from the rollers 18 which operate on the material previously spread by the machine so that the rollers will not unduly compress the material, the rear end of the sub-frame 12 is suspended from an extension 22 of the main frame of the machine forming a part of the inner unit 1. The suspending means includes adjustable springs 23 disposed in housings 24. The springs are so adjusted that a substantial portion of the weight of the sub-frame will be counterbalanced thereby. Instead of springs I may use counterbalanced weights.

The auxiliary screeds 13 are supported beneath the rearwardly extending portion 17 of the sub-frame behind the rollers 18. These auxiliary screed members are angularly disposed and extend rearwardly and outwardly. As indicated in Figure 2, they extend across the entire width of the layer of material adapted to be produced by the machine. The forward end of each of the screeds 13 is pivotally connected as at 25 to a vertically adjustable member 26. This member 26 is supported in guideways depending from the portion 17 of the frame and is vertically adjustable by means of screw 27, supported by the frame. The rear end of each of the screed members 13 is pivotally connected as at 28 to a depending support 29 having its upper end rigidly secured to the portion 17 of the sub-frame. Thus, the inner ends or forward ends of the two auxiliary screeds may be simultaneously raised or lowered. This adjustment is desirable so that the proper crown may be imparted to the road surface.

Each of the screed structures 13 is substantially identical with the auxiliary screed member disclosed in my co-pending application, S. N. 197,067, therefore, a detailed description is not necessary. Each screed member embodies a reciprocable lower portion 30 which is reciprocated by means of a pitman structure 31 driven by a rearwardly extending shaft 32 which may be rotated by a suitable power unit on the machine. It will be noted that each of the screed members 13 carries a plate 33 at its outer end which is parallel to runner member 6 and which serves to limit spreading of material outwardly by the screeds 13.

In using this machine, the screeds 13 are set at the proper level by vertically adjusting the rollers 18 relative to the sub-frame 12. The screed unit 10 is set so that it will be at a level slightly higher than that of the finished surface to be produced and, consequently, slightly higher than the level of the final finishing screeds 13. As the machine moves along, the screed unit 10 will first level off the material. The rollers 18 will operate on this layer of material. The final finishing screeds 13 operating behind the rollers will finally level off the material and will produce the finished surface thereon. The position of these final finishing screeds 13 will not be affected either by vertical movement of the inner unit 1 or vertical movement of the outer unit 2 or either of the runners 6 thereof. The main screed unit 10 may be adjusted from time to time to permit more material to feed back to the final finishing screeds 13. If desired, the screed unit 10 may be provided with bleeder gates of the type illustrated in my patent and in my co-pending application in order to permit the proper amount of material to bleed back past the screed 10 and to reach the screeds 13. The lower portion of the main screed unit 10 and of each of the screed units 13 reciprocates and enhances the screeding action on the material.

Although the screeds 13, as illustrated in Figure 2, extend for the entire width of the layer of material produced by the machine and serve to finally finish the entire surface, it is to be understood that these screeds 13 may be used merely as blender wings if desired. As described in my patent, the blender wings are used for spreading the material behind and laterally of the runners so that the course being laid is blended into and joined to a course already laid. If the auxiliary screeds are used for this purpose only, they may be shorter and need not extend entirely across the road surface. It is only necessary that they extend outwardly from a point within the runners to a point beyond the runners. If used as blenders, it is desirable to provide the main screed unit 10 with bleeder gates at the end thereof, as previously indicated.

In Figure 5 I illustrate a slightly modified form of my invention. In this figure the sub-frame 12 is carried by a single roller 18a which extends almost the entire width of the machine. Also, instead of having the angularly disposed final finishing screeds 13, I provide a single transversely extending screed 13a. This screed 13a is disposed substantially at right angles to the runners 6. It is mounted on the sub-frame 12 be-

hind the roller 18a in such a manner that it may be reciprocated transversely. It is reciprocated by a pitman structure 31a driven by a shaft 32a.

In Figures 6, 7 and 8 I have illustrated a further modified form of my machine. In this form of my machine the screw spreading member is not carried at the bottom of the material-receiving hopper 4 but is carried by the sub-frame 12a at a point adjacent the rear end of the runner member 6. This screw spreading member 5a has its ends connected to the sub-frame in such a manner that one end may be adjusted independently of the other. This adjustment may be produced by means of the screws 34. The frame 12a in this instance is pivoted directly to the runner member 6 rather than to the main screed member as indicated at 15a. The final finishing screed member 13b is carried by the frame 12a directly behind the screw spreading member 5a. This screed member preferably extends transversely at right angles to the direction of movement of the machine and extends the entire width of the surface to be produced by the machine. Its ends are vertically adjustable independently of each other by means of screws 35. The screed 13b may be reciprocated transversely by means of a pitman structure 31b which may be operated in any suitable manner.

The rear end of the pivoted sub-frame 12a is carried by a shoe or flat plate 18b. This shoe 18b extends substantially the entire width of the machine and is adapted to operate on the layer of material produced by the machine in the manner illustrated in Figure 7. The forward edge of the shoe 18b is upturned as indicated at 36 so that it will not dig into the material. The shoe is pivotally connected at its ends as indicated at 37 to a depending portion 38 of the sub-frame. As indicated in Figure 8 the shoe may be bowed by means of adjustable bolts 39 so that it will conform to the crown of the road.

In the operation of this form of the machine, the material will be dumped into the hopper 4. As the machine advances the strike-off 10a will serve to roughly level off the material. The material will then be engaged by the screw spreading member 5a and will be evenly distributed across the road. Then the material will be engaged by the final finishing screed 13b which will accurately level off the material. The following shoe 18b will slide over the finished surface and will further smooth the material. It will be apparent that the supporting means 18b for the sub-frame, in this instance, is disposed behind the final finishing means. This shoe 18b resting on the finished surface of the material will serve to support the rear end of the sub-frame 12a at the proper height so that the final finishing screed 13b will be at the proper height.

Instead of having the shoe member 18b behind the final finishing screed unit, it may be disposed in front of said screed unit. Also, in the machines shown in Figure 1 and Figure 5, instead of having the rollers in front of the final finishing screeds they may be disposed behind said screeds.

It will be apparent from the above description that I have provided a machine having many advantages. Since the machine embodies two main units, viz., a material-receiving and spreading unit and a runner unit and since the main screed is carried by the runner unit, the irregularities of the rough graded surface will not be reflected in the finished surface because the material-receiving and spreading unit which operates on the rough surface can move vertically without having substantially any effect on the runner unit. Also, because I have provided the final finishing screeds on a sub-frame which is pivotally connected to the runner unit, the runner unit or either of the runners thereof can move vertically without having substantially any effect on the position of the final finishing screeds. It will also be apparent that I have provided a novel arrangement for mounting the screw spreading member adjacent the bottom of the material-receiving hopper.

By the term "screed member" used in the following claims, I intend to cover any member which is used for leveling off the material to the desired thickness and contour, such as a strike-off plate and other equivalent members.

Many other advantages will be apparent from the following claims.

Having thus described my invention, what I claim is:

1. A machine of the type described comprising a runner unit including a plurality of runners which extend longitudinally of the machine, a second unit independent of said runner unit and carried by transporting means, said units being connected together in such a manner as to permit free vertical movement of the second unit relative to the runner unit so that vertical movement of the second unit caused by the transporting means operating over a rough surface will not be transmitted to said runner unit, a screed unit, said screed unit being carried by a frame having its forward end pivotally connected to the runner unit so that vertical movement of the runner unit will have substantially no effect on the position of said screed unit, and means for supporting the rear end of said frame, said means including a member operating on the surface of the layer of material formed by the machine, said member being disposed in front of said screed unit.

2. A machine of the type described comprising a runner unit including a plurality of runners which extend longitudinally of the machine, a second unit independent of said runner unit and carried by transporting means, said units being connected together in such a manner as to permit free vertical movement of the second unit relative to the runner unit so that vertical movement of the second unit caused by the transporting means operating over a rough surface will not be transmitted to said runner unit, a screed unit, said screed unit being carried by a frame having its forward end pivotally connected to the runner unit so that vertical movement of the runner unit will have substantially no effect on the position of said screed unit, means for supporting the rear end of said frame, said means including a roller member operating on the surface of the layer of material formed by the machine, said roller member being disposed in front of said screed unit.

3. A machine of the type described comprising a runner unit including a plurality of runners which extend longitudinally of the machne, a second unit independent of said runner unit and carried by transporting means, said units being connected together in such a manner as to permit free vertical movement of the second unit relative to the runner unit so that vertical movement of the second unit caused by the transporting means operating over a rough surface will not be transmitted to said runner unit, a screed unit, said screed unit being carried by a frame

having its forward end pivotally connected to the runner unit so that vertical movement of the runner unit will have substantially no effect on the position of said screed unit, means for supporting the rear end of said frame, said means including a member operating on the surface of the layer of material formed by the machine, and means for partially supporting the weight of said frame so as to relieve said member of a portion of the weight of the frame, said means being connected to said frame and to a portion of said second unit.

4. A machine of the type described comprising a runner unit including a plurality of runners which extend longitudinally of the machine, a second unit independent of said runner unit and carried by transporting means, said units being connected together in such a manner as to permit free vertical movement of the second unit relative to the runner unit so that vertical movement of the second unit caused by the transporting means operating over a rough surface will not be transmitted to said runner unit, a screed unit, said screed unit being carried by a frame having its forward end pivotally connected to the runner unit so that vertical movement of the runner unit will have substantially no effect on the position of said screed unit, means for supporting the rear end of said frame, said means including a member carrying said frame and operating on the surface of the layer of material formed by the machine, said member and said screed being vertically adjustable relative to each other.

5. A machine of the type described comprising a runner unit including a plurality of runners which extend longitudinally of the machine, a second unit independent of said runner unit and carried by transporting means, said units being connected together in such a manner as to permit free vertical movement of the second unit relative to the runner unit so that vertical movement of the second unit caused by the transporting means operating over a rough surface will not be transmitted to said runner unit, a screed unit carried by said runner unit, an auxiliary screed unit disposed rearwardly of said main screed unit and being carried by a frame having its forward end pivotally connected to said main screed unit, said main screed unit being vertically adjustable, means for supporting the rear end of said frame, said means including a roller member operating on the surface of the layer of material formed by the machine, said roller member and said auxiliary screed unit being vertically adjustable relative to each other.

6. A machine of the type described comprising a runner unit including a plurality of runners which extend longitudinally of the machine, a second unit independent of said runner unit and carried by transporting means, said units being connected together in such a manner as to permit free vertical movement of the second unit relative to the runner unit so that vertical movement of the second unit caused by the transporting means operating over a rough surface will not be transmitted to said runner unit, a main screed unit carried by the runner unit and extending transversely substantially at right angles to the runner members, an auxiliary screed unit disposed behind said main screed unit, said auxiliary screed unit being carried by a frame having its forward end pivotally connected to the runner unit so that vertical movement of the runner unit will have substantially no effect on the position of said screed unit, means for reciprocating said main screed unit and means for reciprocating said auxiliary screed unit.

7. A machine of the type described comprising a runner unit including a plurality of runners which extend longitudinally of the machine, a second unit independent of said runner unit and carried by transporting means, said units being connected together in such a manner as to permit free vertical movement of the second unit relative to the runner unit so that vertical movement of the second unit caused by the transporting means operating over a rough surface will not be transmitted to said runner unit, a main screed unit carried by the runner unit and extending transversely substantially at right angles to the runner members, a pair of auxiliary screed units disposed behind said main screed unit, said auxiliary screed units being carried by a frame and being angularly disposed relative to the line of movement of the machine, said auxiliary screen units being carried by a frame having its forward end pivotally connected to the runner unit so that vertical movement of the runner unit will have substantially no effect on the position of said auxiliary screed units.

8. A machine of the type described comprising a runner unit including a plurality of runners which extend longitudinally of the machine, a spreading unit independent of said runner unit and carried by transporting means, said spreading unit including a rotatable screw spreading member, said screw spreading member comprising a section having one end connected to said runner by a flexible connection and the opposite end connected to said spreading unit by a flexible connection, said units being connected together by flexible connections so that the spreading unit may move vertically independent of the runner unit, said flexible connections of the screw spreading section to the runner unit and to the spreading unit permitting such movement.

9. A machine of the type described comprising a runner unit including a plurality of runners which extend longitudinally of the machine, a material-receiving and spreading unit independent of said runner unit and carried by transporting means, said units being connected together in such a manner as to permit free vertical movement of the second unit relative to the runner unit so that vertical movement of the second unit caused by the transporting means operating over a rough surface will not be transmitted to said runner unit, said material-receiving and spreading unit including a hopper, a screw spreading member located adjacent the bottom of said hopper, said screw spreading member comprising two sections, means for connecting the inner end of each of said sections to the hopper member and the outer end of each of said sections to a runner member, said means permitting the relative vertical movement of said runner unit and said second unit.

10. A machine of the type described comprising a runner unit including a plurality of runners which extend longitudinally of the machine, a second unit independent of said runner unit and carried by transporting means, said units being connected together in such a manner as to permit free vertical movement of the second unit relative to the runner unit so that vertical movement of the second unit caused by the transporting means operating over a rough surface will not be transmitted to said runner unit, said second unit including a material-receiving hopper, a ro-

tatable screw spreading member located adjacent the bottom of said hopper, said screw spreading member comprising two sections adapted to feed the material in opposite directions, each of said sections extending outwardly through an opening in the end wall of said hopper, means for connecting the inner end of each of said sections to the hopper member and the outer end of each of said sections to a runner member, said means permitting the relative vertical movement of said runner unit and said second unit.

JOSEPH H. MOSEL.