R. COUTANT & E. J. J. SALMSON.

MACHINE FOR CONSOLIDATING THE ROAD METAL IN THE CONSTRUCTION AND MAINTENANCE OF METALED ROADWAYS.

APPLICATION FILED FEB. 8, 1911.

1,070,326. Patented Aug. 12, 1913.

4 SHEETS—SHEET 1.

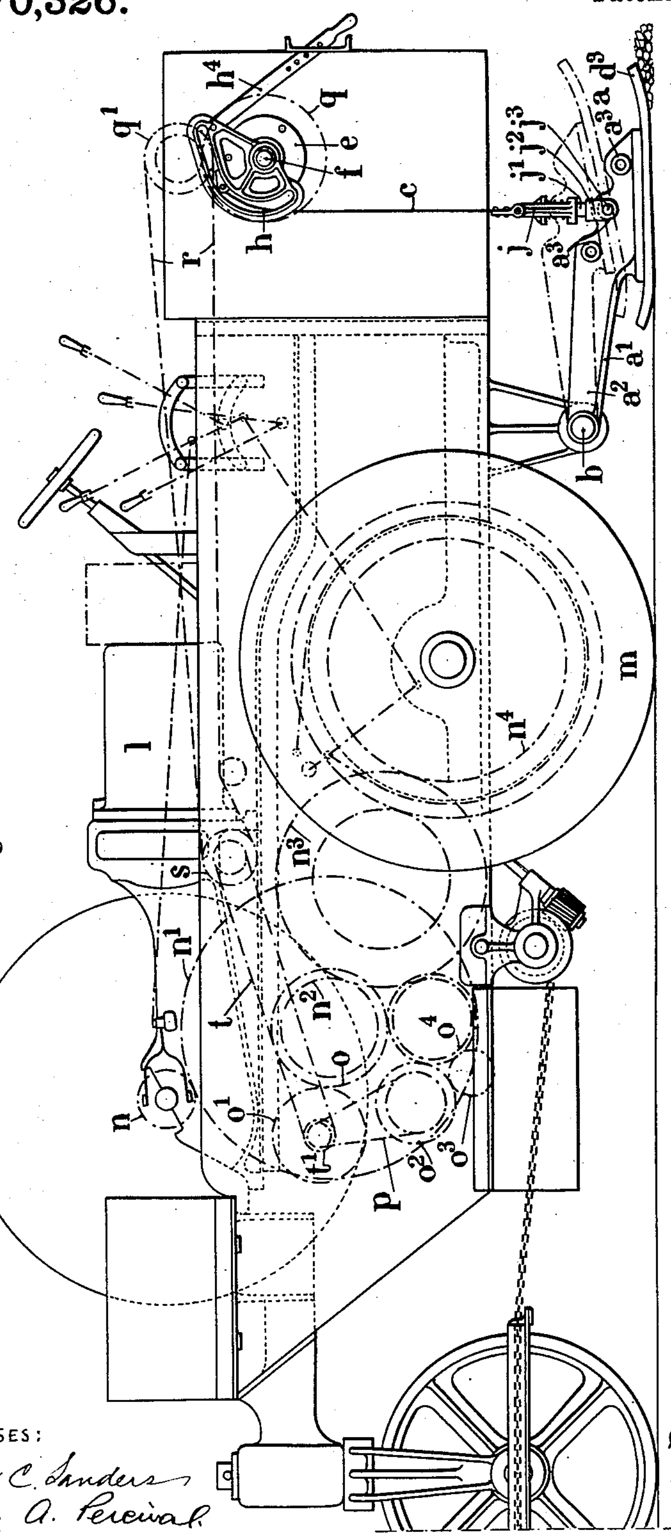

Fig. 1.

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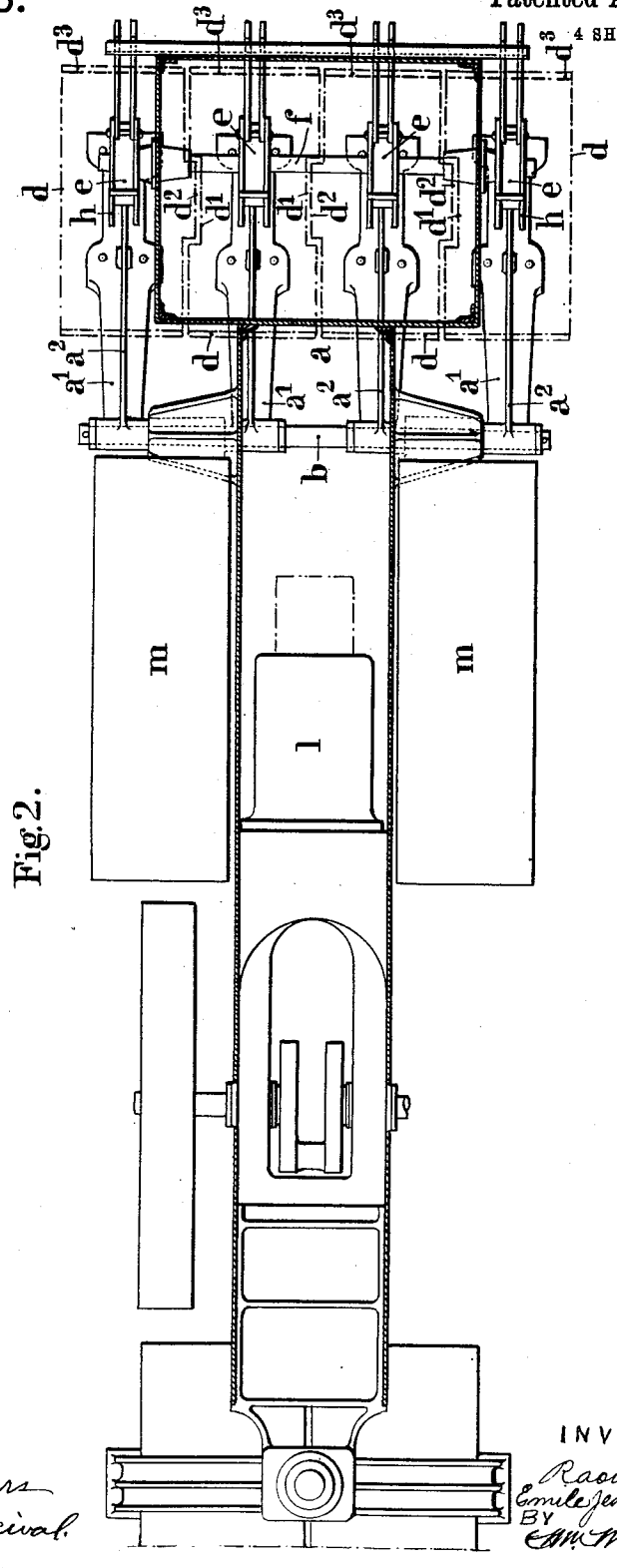

Fig. 2.

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Fig. 3.

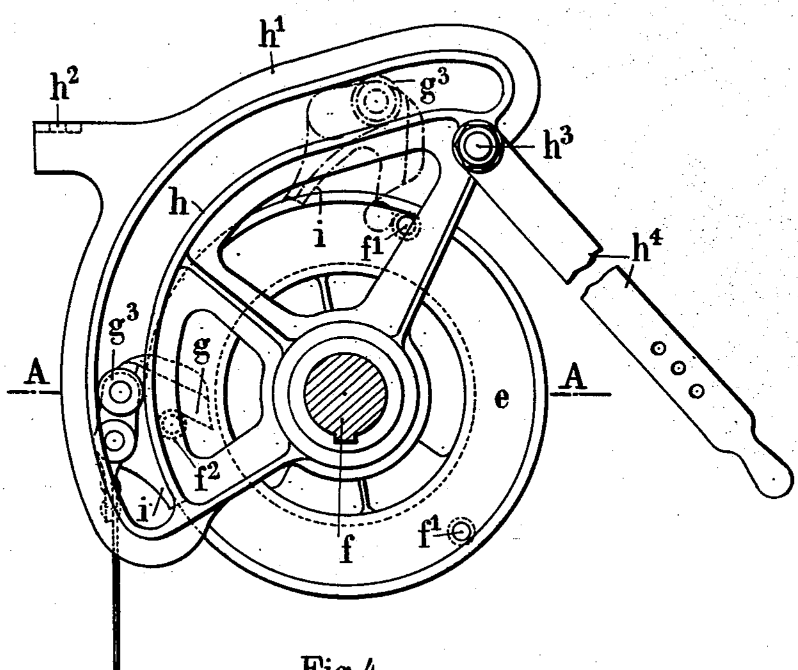

Fig. 4.

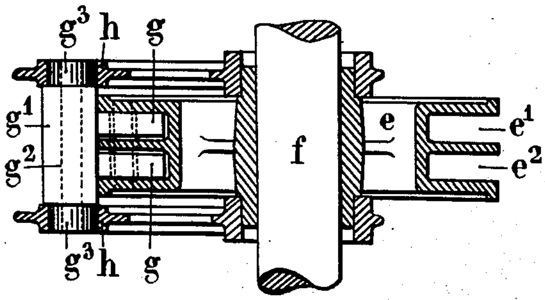

Fig. 7.

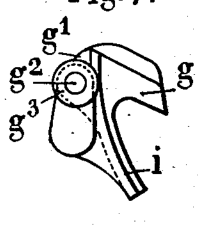

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Fig. 5.

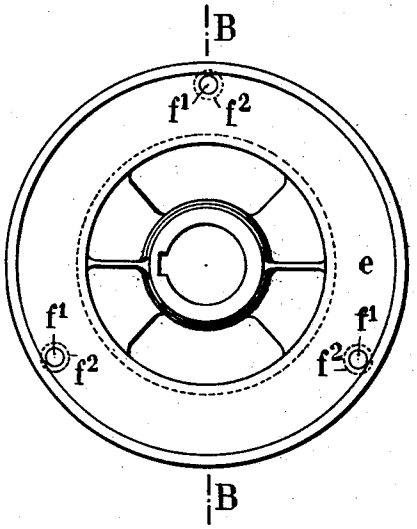


Fig. 6.

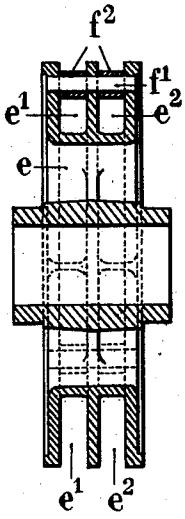


Fig. 8.

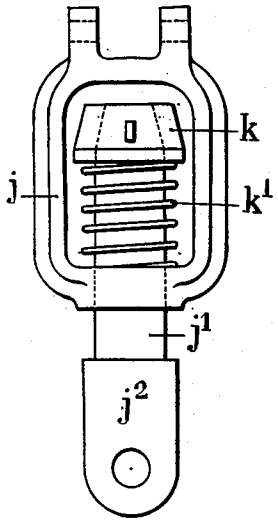
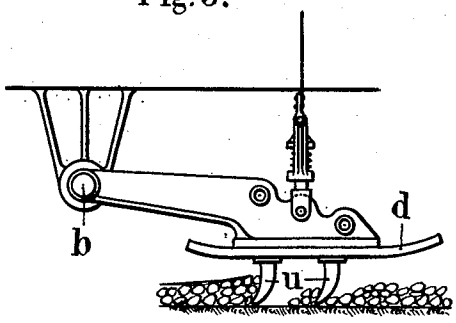


Fig. 9.



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UNITED STATES PATENT OFFICE.

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MACHINE FOR CONSOLIDATING THE ROAD METAL IN THE CONSTRUCTION AND MAINTENANCE OF METALED ROADWAYS.

1,070,326. Specification of Letters Patent. Patented Aug. 12, 1913.

Application filed February 8, 1911. Serial No. 607,384.

To all whom it may concern:

Be it known that we, RAOUL COUTANT, of Champeaux, Seine-et-Marne, Republic of France, mechanical engineer, and EMILE JEAN JULES SALMSON, of 55 Rue de la Grange aux Belles, in the city of Paris, Republic of France, mechanical engineer, have invented an Improved Machine for Consolidating the Road Metal in the Construction and Maintenance of Metaled Roadways, of which the following is a full, clear, and exact description.

For metaling roadways, mechanically driven road rollers are generally employed. These road rollers have the disadvantage that they force the material used in the construction or repair of the roadway, in a longitudinal direction, consequent on the rolling, and force the said material in a transverse direction by sinking into the road metal or stones. On account of this, the said road metal is always in movement and the edges of the broken stone, gravel or other stones used as road metal, are crushed so that the road metal can be easily displaced or broken up after the making or mending of the road is finished. It has also been suggested to employ for metaling roadways, mechanically operated beetles mounted on a suitable kind of locomotive. In such apparatus the beetles operate perpendicularly on the road surface and fall vertically onto the road metal with the result that parts of the road metal struck by the edges of the beetles are driven out and flung to a distance. This causes irregularities which lead to breaking away or raveling of the road material, and which are harmful, and therefore to be avoided in all good constructions of roadway.

The object of the present invention is to remedy these defects and to provide a machine for the construction and maintenance of macadamized roadways, which effects a progressive compacting of the road metal, without displacing the latter or driving it out laterally, in such a manner that the roadway is perfectly consolidated and is of equal resistance or strength at all parts.

The present improved machine is essentially characterized by a group of hammers or metal beaters arranged in a single row, each hammer or beater receiving an angular movement from an elevating mechanism provided for this purpose. Each hammer or beater comprises a plate the forward part of which is turned upward at a selected angle, in such a manner that, when the hammer or beater is operated, the forward part of this plate exercises, on the road metal or material beneath the same, a gradually diminishing pressure which sinks to zero at the leading edge of this turned up part, thus avoiding any displacement of the road metal. The group of hammers or beaters thus combined, is mounted on a locomotive, for example, on the rear end of an ordinary road roller, so as to receive a very slow forward movement which allows of a progressive compacting of the road metal.

The driving mechanism of each hammer or beater is so arranged that the plate thereof, before being raised, in consequence of the advancing movements of the machine, exerts a rubbing or smoothing action on the metal placed beneath it in order to complete the work of consolidation.

In the accompanying drawing: Figure 1 shows in elevation a machine constructed according to the principle of the present invention. Fig. 2 is a corresponding plan. Fig. 3 is a front view, drawn to a larger scale, of the elevating mechanism. Fig. 4 shows a section taken on the line A—A, Fig. 3. Fig. 5 is a detail view of a wheel hereinafter described. Fig. 6 shows a vertical section taken on the line B—B, Fig. 5. Fig. 7 is a detail view of a hook. Fig. 8 is a detail view of a stirrup which in use is mounted at the end of a metal band connecting a hook to a beater. Fig. 9 shows a hammer or beater converted into a pick or scarifier.

As shown in the drawings, the machine which forms the subject of the present invention comprises a group of hammers or beaters a arranged in a single row. In the example illustrated these beaters are four in number but this number can be increased or decreased according to circumstances. Each hammer or beater a comprises an arm a^1 pivotally mounted on a horizontal shaft b, and forming a rib a^2 in which holes a^3 are provided for the attachment of a metal band c employed to raise the hammer or beater by transmitting motion thereto from an elevating mechanism hereinafter described. Beneath the forward part of the arm a^1 is

fixed a metal plate d of rectangular shape. The lateral edges of the two central plates are respectively formed one with recesses d^1 and the other with projecting parts d^2 which enter these recesses as shown in Fig. 2. The two outer plates are also for the same purpose formed one with a recess and the other with a projection d^2. The forward part of each plate a is turned up at d^3, as shown in Fig. 1, at a suitable angle to the face of the said plate. This turned up part d^3 effects a gradually diminishing consolidation of the road metal as will be hereinafter explained. The hammers or beaters thus arranged can be raised mechanically and automatically released, when they have reached the desired height, by means of the following arrangement: Above each hammer or beater a is situated a wheel e keyed on a horizontal shaft f to which a continuous rotary motion is transmitted by any suitable means. In the periphery of each wheel e are formed two deep grooves e^1 and e^2 which are traversed by three or more bars f^1 (Fig. 6). Within the grooves e^1 and e^2 these bars carry rollers f^2 mounted to rotate freely. These rollers f^2 in one groove, in consequence of the rotation of the pulley e, successively come beneath a hook g projecting into the corresponding groove e^1 or e^2. These hooks are mounted in pairs on a single block g^1 traversed by a trunnion g^2 carrying anti-friction rollers g^3, one at each end. The latter respectively enter slots h in corresponding metal side frames h^1 respectively situated one at each side of the pulley e. The slots h in the frames h^1 on opposite sides of each wheel are symmetrically arranged and their edges constitute paths on which the anti-friction rollers g^3 travel. These slots form cams, that is to say, for a part of its length each slot is concentric with the axis of the wheel and for the remaining part of its length it progressively moves away from this axis (Figs. 1 and 3). The side frames h^1 of each wheel are connected together by two tie-bars h^2, h^3. On the tie-bars h^3 are mounted two metal bars h^4 adjustably secured to the frame of the apparatus by pins inserted through holes formed in these bars. By inserting these pins in different holes, the positions of the side frames h^1 and, consequently, the positions of the slots h, can be varied in order to vary the height through which the hammers or beaters are allowed to fall.

The block g^1 carrying the hooks g, at parts opposite to the rim portions on the periphery of the wheel e, are formed with segmental shoulders i which are adapted to make contact with the said wheel. The shoulders serve to guide the hooks during part of the movement thereof. To the block g^1 is likewise fixed one end of a metal band c employed to raise the hammer or beater. The other end of this band is fixed to a stirrup j, the horizontal part of which is pierced by a hole in which slides a metal rod j^1 extending from a cross-head j^2 through which passes a bolt or pin j^3 which can be inserted in one of the holes a^3 in the rib a^2 of the hammer or beater a. The rod j^1 is furnished with a cap k against which bears the upper end of a cylindrical spiral spring k^1, the lower end of which bears against the horizontal member of the stirrup. This arrangement guards against sudden tension being applied to the band c at the commencement of the rising movement of the hammer or beater.

The elevating mechanism thus constructed, operates as follows: In consequence of the rotary movement of the wheel e, the rollers f^2 mounted on one cross bar f^1, engage beneath the hooks g mounted on one block g^1 which is thus set in motion and raises the hammer or beater connected to this block by means of the metal band c. During the rising movement of the hammer or beater the anti-friction rollers g^3 mounted on the trunnion g^2 move along the slots h in the side frames h^1. These anti-friction rollers, in consequence of the curvature of the slots move farther and farther away from the axis of the wheel e. At the same time the rollers f^2, while remaining in contact with the jaws of the hooks g, progressively move out therefrom until they arrive at the extremities of these jaws. At this moment the hooks escape from the rollers, and the hammer or beater a thus liberated falls by its own weight. The hammer or beater is thereafter again raised by the rollers of another cross bar f^1 of the wheel e and so on. The wheels e actuating the various hammers or beaters are keyed on the shaft f in such a manner that their respective cross-bars f^1 do not effect a simultaneous raising of all the hammers or beaters a but preferably effect an alternate or successive raising and releasing of the latter.

In order to effect a progressive consolidation of the roadway it is necessary that the hammers or beaters a may have a slow forward movement. For this purpose the hammers or beaters a are mounted on a locomotive, for example, on the end of the frame of an ordinary road roller, as shown in the drawing. This last mentioned arrangement permits the utilization of existing road rollers when metaling road surfaces according to the present invention. In this case the hammers or beaters a being supported at the rear end of the road roller, the normal direction of motion of the latter is backward. Motion is transmitted from the engine l to the driving wheels m by trains of gearing n, n^1, n^2, n^3 and n^4, when the road roller is traveling in the normal direction, and by trains of gearing n, n^1, o, o^1,

the chain p, and trains of gearing o^2, o^3, o^4, n^3 and n^4, for backward motion, that is to say, for motion in what was previously the ordinary direction of motion. The driving gear also comprises any convenient form of change speed mechanism.

The shaft f carrying the wheels e receives rotary motion through a toothed wheel q gearing with another toothed wheel q^1 driven by a chain r passing around an intermediate sprocket wheel s. The latter is itself driven by another chain t passing around a sprocket wheel t^1 keyed on the shaft of the toothed wheel o^1. The operation of the mechanism thus arranged is as follows: In consequence of the rotation of the wheels e, one of the cross bars f^1 carried by each of the last mentioned wheels comes into contact with the corresponding hooks g, which are carried along therewith, and then released, as has been explained hereinabove. The hammer or beater a being pivotally mounted on the shaft b is thus moved angularly, as shown in broken lines in Fig. 1, and then falls onto the metal from which the road surface is to be formed. At the commencement of the operation, in consequence of the weight of the hammer or beater, the road metal is rammed down or compacted in such a manner that the material around the hammer or beater is at a higher level than that beneath the plate d. Since the hammer or beater is slowly but constantly advanced parallel with the road, the road metal might shift in the direction of motion of the machine, if the plate d is flat. In consequence of the provision of a turned up part d^3 on this plate, such displacement of the road metal does not take place. In fact, this turned up part d^3 exerts on the road metal beneath the same, a gradually decreasing pressure, so that the road metal under this part d^3 actually forms an inclined plane or ramp. The edge of the part d^3 does not exercise any compressing effect, so to speak, on the road metal so that a forward movement can be given to the hammer or beater plate d without the road metal being forced away in front thereof. In the improved machine, this advantage is utilized to exert on the metal beneath the plate, a smoothing action which completes the work of consolidation. For this purpose, the hammer or beater a is not raised again immediately after its descent, but the cross bars f^1 of the wheel e are so arranged that the plate d remains in contact with the ground for some appreciable period. In consequence of the forward movement of the machine this plate is moved a short distance while in contact with the ground and rubs thereon. During this movement the turned up part d^3 of the plate slides on the inclined plane or ramp which it has formed, without the edge thereof displacing the metal in front of it. The hammer or beater having been again raised descends and rams the road metal down harder, and so on, the inclined plane or ramp formed by the turned up part d^3 passing progressively beneath the flat part of the plate d.

According to the nature of the materials employed for metaling the road way, it is necessary that the height through which the hammer or beater descends may be regulated. This regulation or adjustment is effected by inserting the pin j^3 of the crosshead j^2, secured to the end of the metal band c, in one or another of the holes a^3 in the arm a^2. Such adjustment may be further made more exact by adjusting the position of the said frames h^1 of the elevating wheel.

The present machine sets the road metal in checks or squares and progressively rams down the same without rolling it, whereby the homogeneity of the road surface is considerably augmented and its life is increased. Moreover the crushing of the road metal is so reduced that it becomes inconsiderable and it is not driven out laterally, so that the formation of an uneven surface is avoided. Lastly, by suitably regulating the rate of travel of the machine a single passage of the latter is sufficient to complete the construction or repair of the road surface; the first blows of the hammer or beater setting the road metal in place and the subsequent blows consolidating it in the required manner.

The hereinabove described machine can also serve for picking up or scarifying the road surface, in the process of repairing the same. For this purpose it is only necessary to attach teeth u to the underside of the plates d of the hammers or beaters. These teeth u, by the descent of the hammer or beater, are driven into the ground and, by reason of the forward movement of the machine, separate and pull up the road metal. In this case the direction of motion of the machine is the reverse to that which is employed for ramming down the road metal, in order that the hammers or beaters may be drawn along and not pushed from behind. This arrangement is illustrated in Fig. 9.

The above arrangements are only given by way of example; the forms, dimensions and detail arrangements can be varied according to circumstances without departing from the principle of the invention.

Claims:

1. In a machine for the construction and maintenance of metaled roadways, an elevating apparatus for the hammers or beaters, the said apparatus comprising a wheel mounted on a continuously rotating shaft and provided with two deep grooves traversed by cross bars on which rollers are mounted; two hooks secured to a single

block adapted to project within the said grooves in order that the rollers mounted on the cross bars traversing these grooves, can engage successively beneath these hooks, the block to which the latter are secured being traversed by a trunnion carrying an anti-friction roller at each of its extremities and being connected by a metal band to the arms of the hammers or beaters, and two adjustable side frames arranged on each side of the grooved wheel and having slots therein in which travel the anti-friction rollers situated at the ends of the hook block trunnion, these slots forming cams causing the said hooks to be moved away and released from the rollers so that the hammer or beater can descend by its own weight.

2. In a machine for the construction and maintenance of metaled roadways, in combination, a hammer, means for raising said hammer comprising a rotatable shaft, a wheel mounted thereon and provided with a groove, cross bars traversing said groove, a hook adapted to project within said groove and adapted successively to be engaged by said cross bars, a connection between said hook and said hammer, whereby the raising of the hook will raise the hammer, and means for automatically releasing said hook after the hammer has been raised a predetermined height, said cross bars being so spaced from one another that the hammer will remain on the ground a predetermined length of time between the releasing and the subsequent raising thereof.

The foregoing specification of our improved machine for consolidating the road metal in the construction and maintenance of metaled roadways, signed by us this 27th day of January, 1911.

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EMILE JEAN JULES SALMSON.

Witnesses:
DEAN B. MASON,
R. CHIRIOT.