Nov. 30, 1926. 1,609,025

E. H. LICHTENBERG

METHOD OF DISTRIBUTING CONCRETE

Filed March 24, 1922

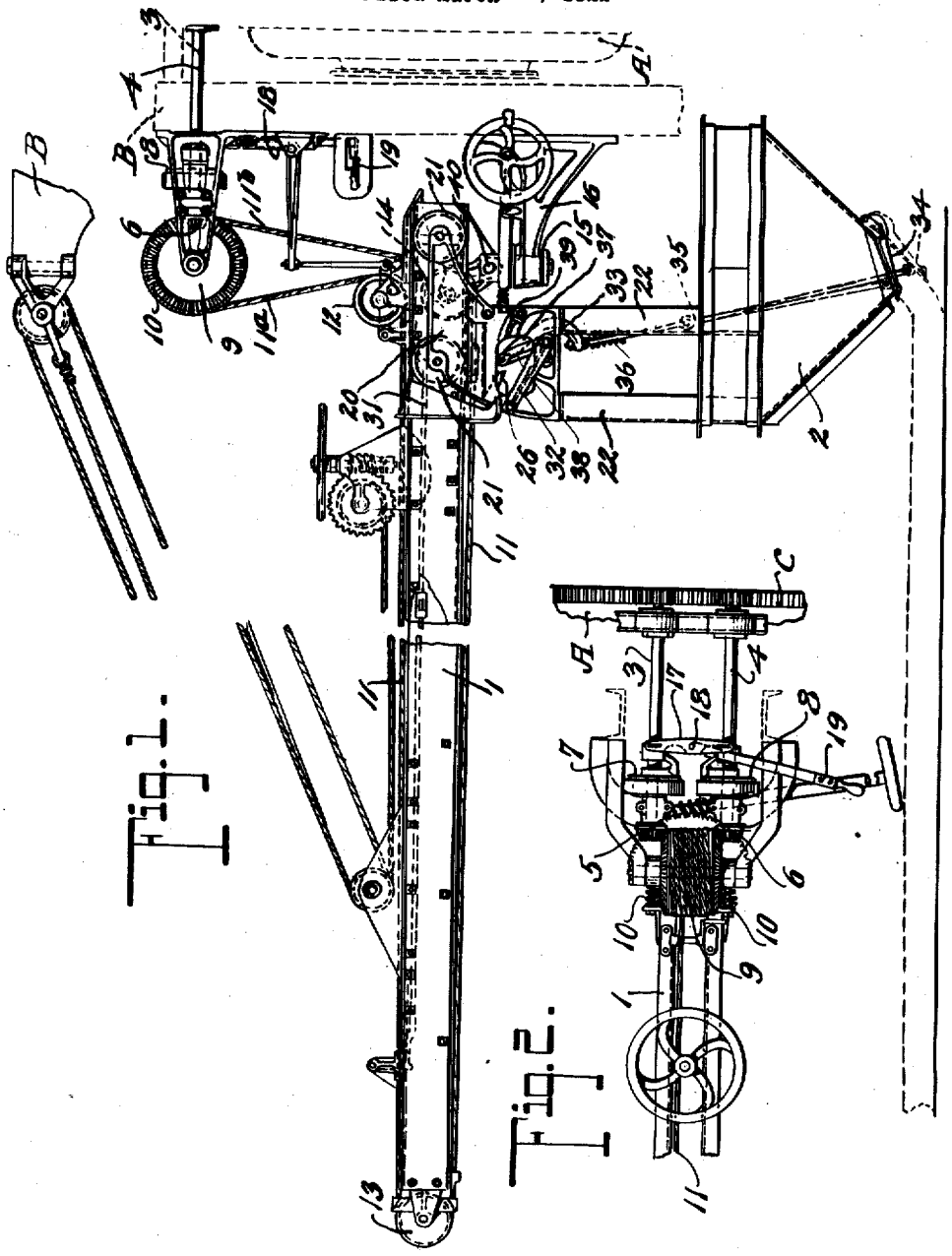


Fig. 1.

Fig. 2.

Inventor
E. H. Lichtenberg
By Robb, Robb & Hill
Attorneys

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UNITED STATES PATENT OFFICE.

ERICH H. LICHTENBERG, OF MILWAUKEE, WISCONSIN, ASSIGNOR TO KOEHRING COMPANY, OF MILWAUKEE, WISCONSIN, A CORPORATION.

METHOD OF DISTRIBUTING CONCRETE.

Application filed March 24, 1923. Serial No. 546,274.

In the art of laying concrete roads, pavements, and the like, it is a desideratum to distribute the concrete aggregates constituting the final road or pavement in as economical a manner as possible. In other words, it is obvious that the cheaper the method of getting the concrete aggregates to the subgrade, the cheaper will be the cost of the final product. With the above in view, I have devised a special method of laying concrete paving which involves as its principal feature the reduction of the aggregates to a proper mixed condition, in which they will gravitate readily even though of a relatively dry consistency, if such a term may be used. This phase of my method is necessary because under present conditions highway specifications for the building of roads are tending more and more toward what is known as a dry mix, one in which the slumpage is reduced to a minimum degree. After the mixing of the aggregates for the subgrade, as above noted, it is the aim of my method to cause said aggregates to be flowed, substantially speaking, to the sub-grade in a gravitative stream, and to retard said stream in a variable manner as it progresses or flows to the subgrade on which the concrete is to be laid, whereby to obtain a streaming of the aggregates to the sub-grade in a ribbon, or flattened out stream of predetermined thickness. The predetermined thickness of the streaming of the materials so that they will assume a layer like form and also of substantially predetermined thickness is controlled through the variable retarding of the movement of the aggregates as they gravitate to the surface on which they are extended from a bucket containing a mass thereof and are to be laid. The variable retarding action in the gravitating process may be accomplished in various ways, but I am illustrating hereinafter a machine which is particularly adapted for the purpose.

By my method the operation of depositing the aggregates upon the sub-grade in a sort of ribbon is efficiently done in such a manner that a considerable amount of the spreading of said aggregates, usually done by hand labor is avoided. In fact, one or two laborers whose special work is to spread the aggregate materials may be dispensed with in the practical use of my method.

A typical apparatus for the carrying out of my method is illustrated in the accompanying drawing in which the figure is a side view of a boom and bucket type paver, dotted lines indicating in a general way the adjacent end portion of the mixing machine which forms a part of such boom and bucket paver, as well known to those versed in the art. Dotted lines at the base of the view also show the method of streaming out the concrete aggregates according to my invention to establish a layer of substantially predetermined thickness.

Describing the construction of the machine illustrated for the purpose of setting forth my new method, I refer to my previous Patent No. 1,141,470, issued June 1, 1915, as showing a machine of the general type of that herein specifically described.

Figure 1 is a side elevation of the preferred form of apparatus utilized by me in carrying out my method of distribution; and

Figure 2 is a fragmentary top plan view showing more clearly certain details of construction.

In the drawing, A denotes the portion of the mixing drum of the mixing machine illustrated in conjunction with the boom and bucket mechanism, B the frame work of said machine, and C the toothed gear rings carried by said drum A and by which it is rotatably operated in a well known manner. The boom and bucket mechanism embodies as its primary features the boom 1 and the bucket 2, the latter spaced from the ground, power operated, and being normally non-discharging in its body construction.

The driving mechanism by means of which the bucket is caused to traverse the boom 1 comprises a pair of shafts 3 and 4 having pinions at one end meshing with the gearing C of the drum A whereby motion is transmitted constantly to the shafts while the drum A is in operation. The shafts 3 and 4 are equipped with normally idle bevel gears 5 and 6 respectively, adapted to be operatively connected to turn with said shafts by means of clutches 7 and 8 respectively. The bevel gears 5 and 6 co-operate with the winding drum 9 formed with a spirally grooved winding surface, said drum having at opposite ends large bevel gears 10 with which the gears 5 and 6 mesh. The opposite ends 11^a and 11^b of an operating cable 11 wind around the drum 9 in opposite directions, and have the extremities thereof fixedly attached to the drum. The said cable 11 extends from

the end portion 11^a down under a sheave 12 journaled on top of the boom 1 thence outwardly along the boom around a sheave 13 at the outer extremity of said boom. From the sheave 13 the cable 11 is trained inwardly along the boom adjacent to its under side, said cable passing thence upwardly over a sheave 14 located adjacent to the point of pivotal support of the boom 1. At this point the cable 11 has its end 11^b connected with the drum 9 in the manner previously suggested. The sheaves 12 and 14 are located so that the portions of the cable 11 passing over the same are substantially in vertical alinement with the axis of rotative movement of the boom 1 established by the vertical pivot 15. The pivot 15 connects the boom 1 with the bracket 16 projecting from the frame B of the machine, said bracket forming the main support intermediate the boom and the frame work of the mixer.

To operate the clutches 7 and 8 a rocker lever 17 (see Fig. 2) is employed, the same being equipped with shifting forks and being mounted upon a vertical shaft 18, seen best in Fig. 2. The shaft 18 has a main hand lever 19 connected with its lower end and this lever is operable to alternately render the clutches 7 and 8 active for effecting reverse movements of the drum 9 and cable 11 or to maintain the clutches 7 and 8 in neutral positions.

The operation of the drum 9 may be reversed to effect the outward and inward traverse of the carriage 20 on the boom. The carriage 20 has rollers 21 traveling in channels on the beams which comprise the boom. It suffices to state that any suitable mechanism like the shuttle mechanism as illustrated in my patent previously referred to, may be utilized to trip the mechanism which holds the door closed and permits of automatic opening of the same, which mechanism includes the cam 31 co-operative with the arm 32 to close the door 34 at the bottom of the bucket 2. The arm 32 is mounted on a shaft 33 connected by linkage 35 and a curved link 37 and also arms 38 with the door 34 aforesaid, all substantially similar to my previous patented construction.

The design of my bucket 2 and the openable door 34 is especially novel and important. The door 34 is of a length corresponding to the width of the bucket 2, and said door is variably limited in its opening movement by means of an adjustable stop 39 which is attached to one side of the carriage 20 and adjustable lengthwise of said carriage by means of a suitable bolt passing through the said stop. The stop co-acts with the arm 32 to limit the movement of said arm in the direction of the mixer, as the arm is shifted to throw over action of the arms 38 under the influence of the trip 26. That is to say, the door 34 can open just so far as is determined by the movement of the arm 32 in the action of tripping the door 34 to effect said opening. It is the adjustability of the stop 39 which admits of the flowing or extrusion of the concrete aggregates from the bucket 2 in a ribbon-like stream, the thickness of which depends upon the extent of opening of said door, due to retarded egress of the aggregates as they are extruded through the door opening. Necessarily the thickness of the stream of materials extruded from the bucket 2 determines the depth of the layer of concrete or aggregates dispensed, so to speak, by the bucket. The bucket opening and door 34 are advantageously arranged transversely of the boom, and of the direction of travel of the bucket 2, for the attainment of the above result of depositing the plastic aggregates in a layer or ribbon of measured thickness.

The bucket 2 is designedly a low discharge bucket; in other words, the discharge end of the bucket is very near the ground so as to admit of the laying down of the concrete in a relatively thin ribbon-like gravitating stream of a width equal to the width of the bucket and of a depth substantially as regulated by adjustment of the stop 39 controlling the operative area of the opening made by release of the door as the latter drops to its effective opening position.

From the foregoing, it will be evident that the practical and effective operation of a machine by which my method is practised, and in effect, my method itself inherently involves the forming or shaping of the concrete aggregates as they flow from the bucket into a rectangular cross section, or the ribbon like form previously referred to herein. Moreover, the said aggregates, by reason of their consistency, maintain such form, substantially, after they are extruded from the bucket through its narrow long opening and while above the subgrade, and retain substantially this form as they reach the subgrade itself. Again, it is clear that the machinery with which I practise my method, imparts to the bucket 2, and mass therein, a horizontal movement, or movement substantially parallel with the subgrade whilst the aggregates are fed out of the bucket. The actual movement of the bucket 2 on the boom 1 is, of course, coordinated with the delivery action of the bucket in feeding out the product of plastic concrete so as to enable the desired ribbon-like form thereof to be established.

Concerning the ribbon of concrete which is delivered by the bucket, it is notable that the larger dimension of the same is transverse to the line of travel or movement of the bucket itself.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. The process of making concrete roads, which consists in extruding while above the ground plastic ribbon of concrete of thoroughly mixed wet and dry aggregates, of such a consistency that it will lay on the ground in substantially the same cross-sectional shape as it proceeds from the extruding means, and extending the ribbon at a rate of movement that it will preserve substantially the thickness in which it is extruded and independently of any mechanical flattening action thereon after reaching the subgrade, as it is laid on a subgrade.

2. The process of making concrete roads, which consists in moving a thoroughly mixed mass of wet and dry aggregates of such consistency as will hold a shape imparted thereto, over a subgrade in spaced relation to the latter, causing the concrete of such mass to be extruded in a plastic ribbon which will retain substantially the form of its extrusion while above the subgrade and as it is laid on the subgrade, and utilizing the movement of the mass to extend the ribbon so that it will pass to and cover the subgrade in substantially the thickness of its extrusion.

3. The method of making pavement of plastic concrete comprising a thoroughly mixed mass of dry and wet aggregates, which consists in imparting to such a mass of concrete in plastic state, a movement substantially parallel with and above a subgrade extruding the aggregates of such mass at a point above the subgrade to form them into plastic ribbon having a rectangular cross-section whose longer dimension is transverse to the line of movement of the mass, and delivering the ribbon to a subgrade in substantially the formed cross-section aforesaid.

4. The method of making pavement of plastic concrete comprising a mixed mass of wet and dry aggregates, which consists in disposing such a mass of concrete above a subgrade in such a quantity as will provide a gravity head for extruding the mass through a restricted opening, extruding such mass through a restricted opening giving thereto a substantially ribbon-like shape as it is extruded, and moving the mass above and substantially parallel with the subgrade, during the process of extrusion, at a rate of speed such as will extend the ribbon so that it will pass to and onto the subgrade in substantially the condition in which it is extruded through the restricted opening and independently of any mechanical flattening action thereon after reaching the subgrade.

In testimony whereof I affix my signature.

ERICH H. LICHTENBERG.

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ERICH H. LICHTENBERG.

Certificate of Correction.

It is hereby certified that in Letters Patent No. 1,609,025, granted November 30, 1926, upon the application of Erich H. Lichtenberg, of Milwaukee, Wisconsin, for an improvement in "Methods of Distributing Concrete," errors appear in the printed specification requiring correction as follows: Page 1, in the heading to the printed specification, line 6, strike out the "Application filed" clause and insert instead *Original application filed July 19, 1920, Serial No. 397,431. Divided and this application filed March 24, 1922. Serial No. 546,274.;* same page, line 37, beginning with the word "gravitate", strike out all to and including the word "laid", line 41, and insert instead *are extruded from a bucket containing a mass thereof and gravitate to the surface on which they are to be laid;* page 3, line 3, claim 1, before the word "plastic" insert the article *a;* and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 28th day of December, A. D. 1926.

[SEAL.]

M. J. MOORE,
Acting Commissioner of Patents.

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