

**No. 637,713.**

Patented Nov. 21, 1899.

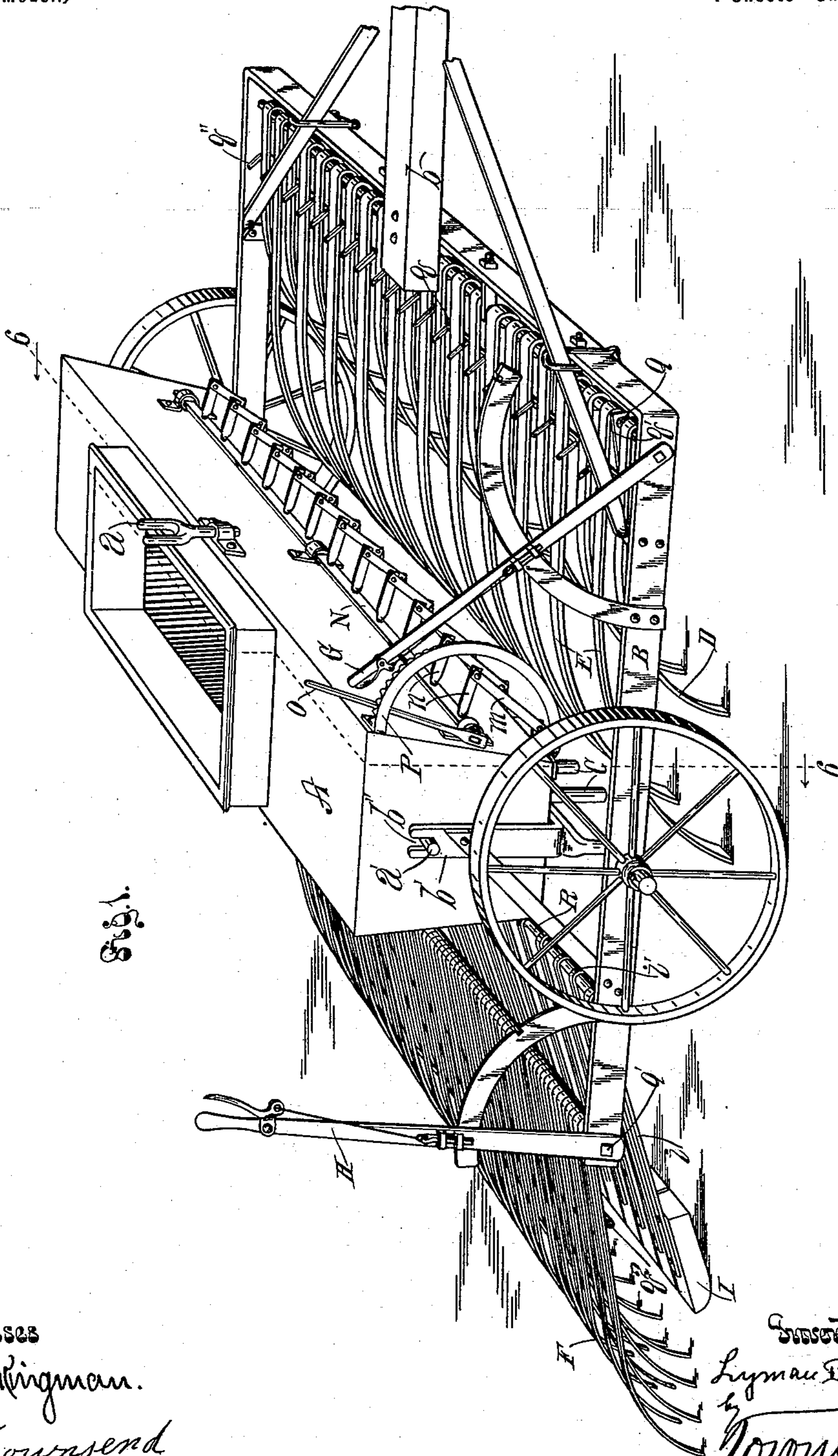
**L. B. DE CAMP.**

# COMBINATION MACHINE FOR MAKING DUSTLESS ROADS.

(Application filed Feb. 16, 1899.)

(No Model.)

4 Sheets—Sheet 1.



Witnesses  
 Perry Kingman.  
 J. Townsend

Discharge  
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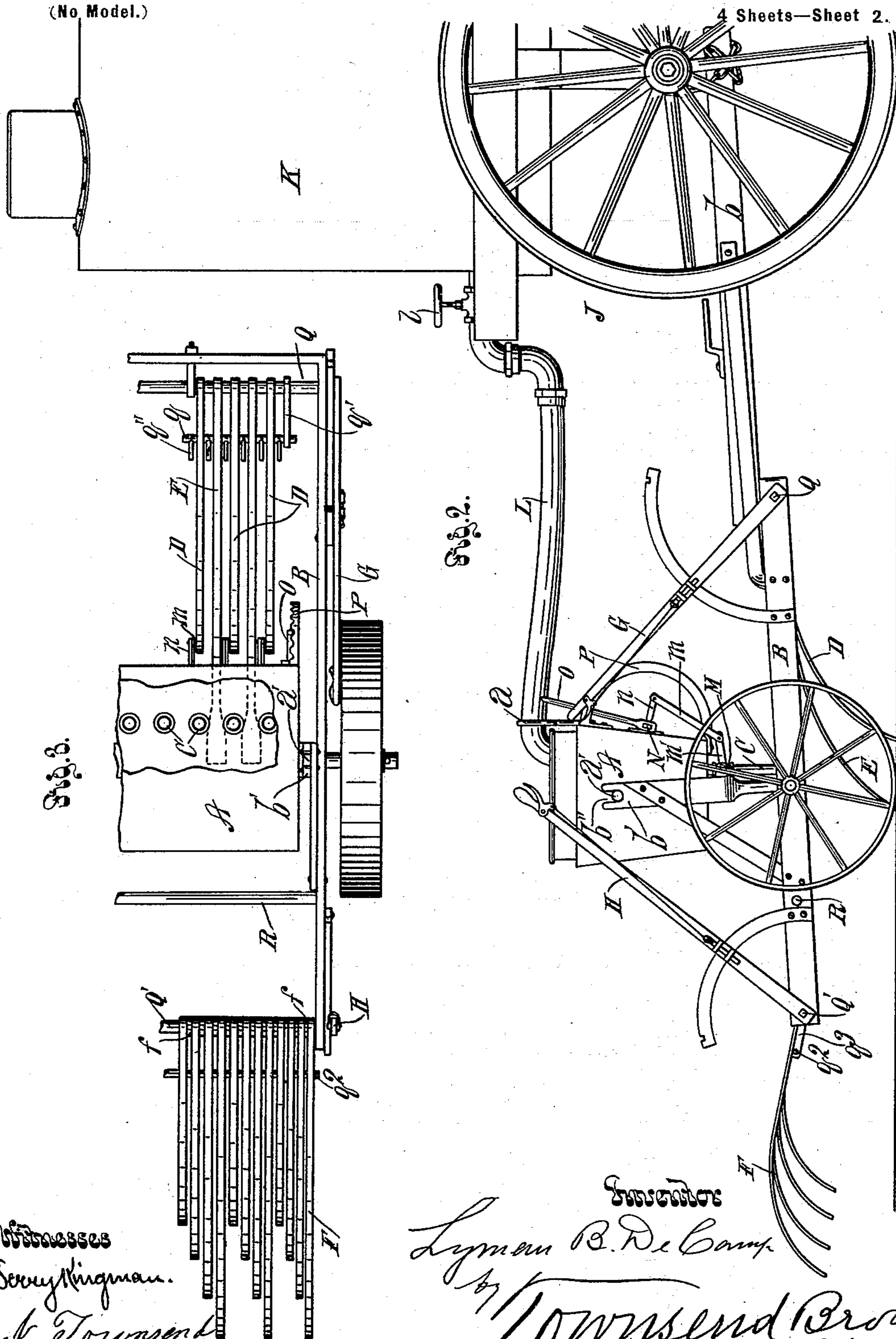
**L. B. DE CAMP.**

## COMBINATION MACHINE FOR MAKING DUSTLESS ROADS.

(Application filed Feb. 16, 1899.)

(No. Model.)

**4 Sheets—Sheet 2.**



Witnesses  
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No. 637,713.

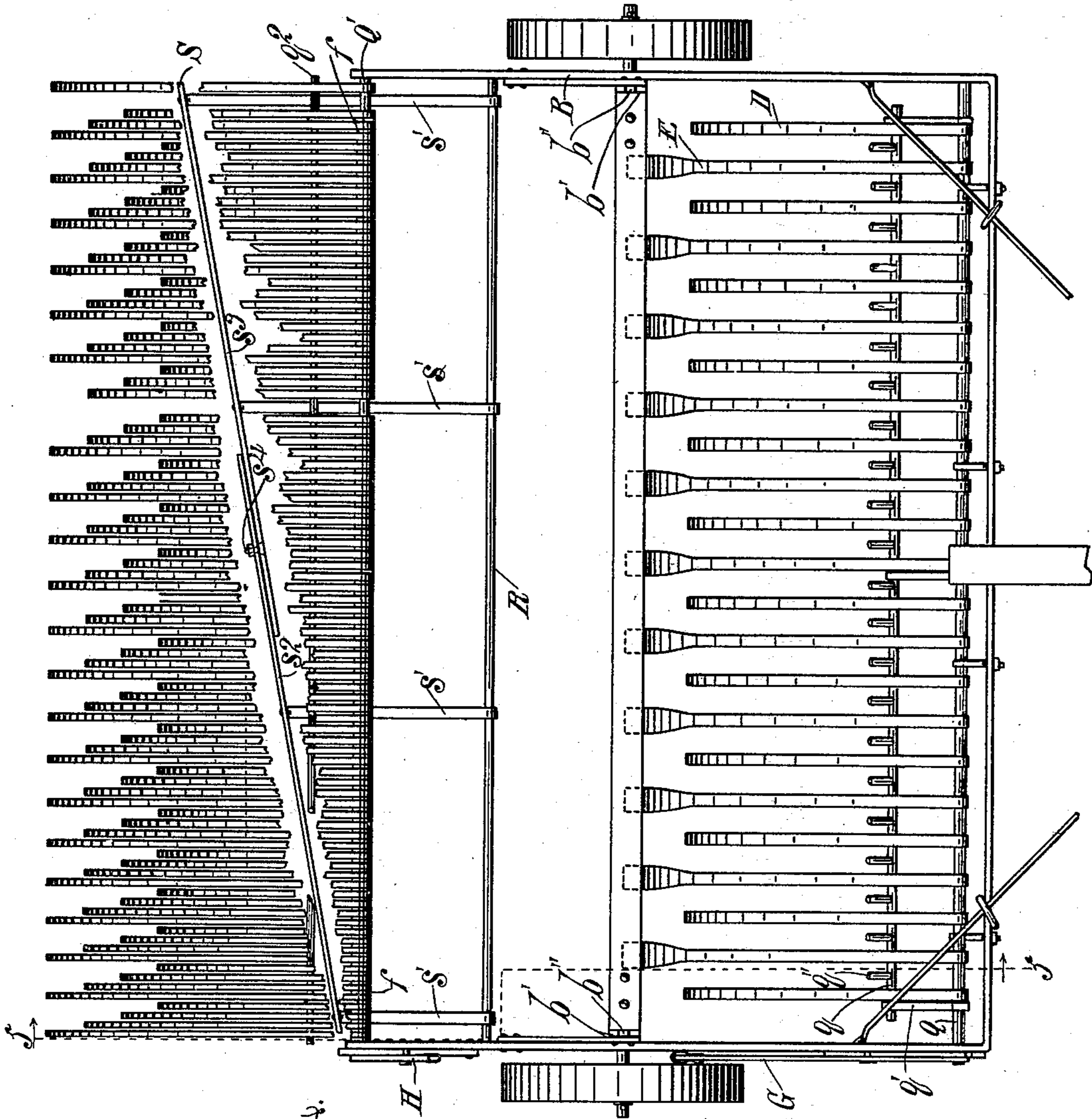
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4 Sheets—Sheet 3.



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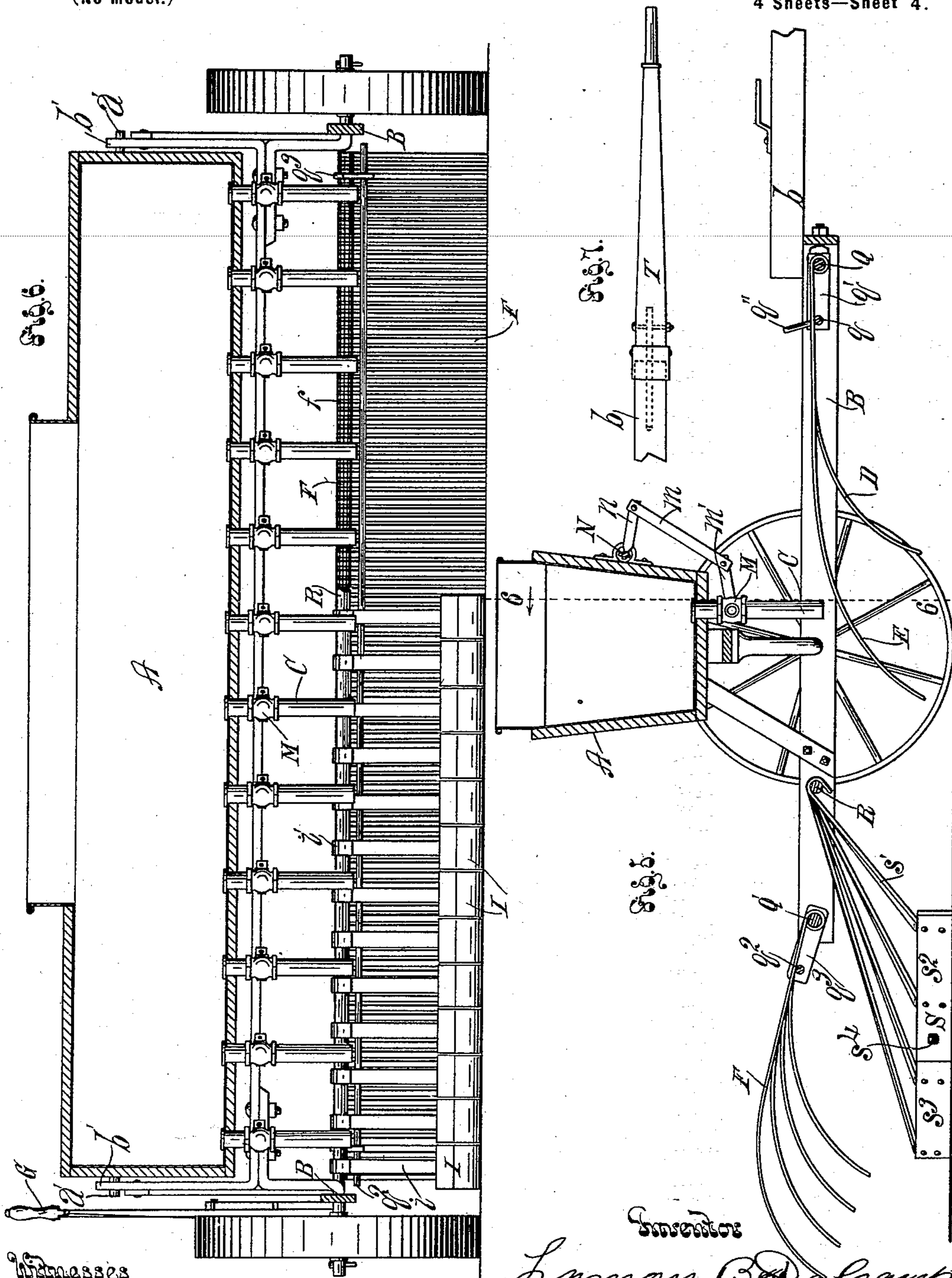
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4 Sheets—Sheet 4.



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# UNITED STATES PATENT OFFICE.

LYMAN B. DE CAMP, OF ALHAMBRA, CALIFORNIA.

## COMBINATION-MACHINE FOR MAKING DUSTLESS ROADS.

SPECIFICATION forming part of Letters Patent No. 637,713, dated November 21, 1899.

Application filed February 16, 1899. Serial No. 705,701. (No model.)

*To all whom it may concern:*

Be it known that I, LYMAN B. DE CAMP, residing at Alhambra, in the county of Los Angeles and State of California, have invented a new and useful Combination-Machine for Making Dustless Roads, of which the following is a specification.

My invention consists in a machine for making dustless roads by incorporating with the dust of an ordinary earth road oil for the purpose of holding the dust down, thus to do away with the necessity of sprinkling with water, also to prevent the road from washing during rains, to protect against wear and tear and the formation of ruts and chuck-holes, and to provide an elastic covering for the road-bed which will be easy to the horses' feet.

My newly-invented machine is adapted for performing in toto the work of making such a road and may be embodied in such a manner as to be at all times ready to perform any of the required functions, or it may have some of its parts detached in order that the machine may be lightened at the time of performing some of its functions.

In the process of constructing a road of the character above stated it is necessary to operate upon the road-bed a number of times in a number of different ways, and my machine is adapted within itself for performing all of these operations; but all of the parts of the machine are not ordinarily called into play at any one time.

The accompanying drawings illustrate my invention as applied in a machine having detachable drags.

Figure 1 is a detached view of the portion of my machine which follows the oil-wagon. The machine in this view is shown with its parts in position for the final operation upon the road. The oil-wagon, with oil-tank, is ordinarily detached at such operation, and is therefore not shown in this view. Fig. 2 is a side elevation of my machine with parts in position for distributing the oil preparatory to the final operation above referred to. In this view the oil-tank wagon is shown with the distributor attached thereto. Fig. 3 is a fragmental detail plan of the oil-distributing apparatus shown in Fig. 2. Fig. 4 is a plan view of the machine with the scraper-drag in

position for scraping a portion of the dust to the middle of the road preparatory to applying the oil. Portions are broken away to expose the sectional scraper. The oil-reservoir is omitted from this view, for the reason that in practice it is usually removed when using the scraper and also for the final operation of mixing the dust and oil. Fig. 5 is a side elevation in section on line indicated by 5 5, Fig. 4. Fig. 6 is a sectional elevation on line indicated by 6 6, Figs. 1 and 5, looking rearward in the direction of the arrow. In this view some of the drags are omitted. The parts are shown in the position shown in Fig. 1. Fig. 7 is a detached side elevation to show the slip-tongue for drawing the distributing-machine when it is detached from the oil-tank.

A indicates an oil-reservoir detachably mounted on any suitable carriage, as B, and provided with downwardly-opening pipes C.

D indicates furrowing-fingers in front of the pipes to make furrows in the dust to receive the oil.

E indicates covering-fingers extending behind the pipes to cover the oil with dust.

F indicates mixing-fingers at the rear of the machine.

The initial purpose of the furrowing-fingers D is to make a furrow in the dust in front of the oil-pipe, so that as the machine passes along each oil-pipe will deposit a stream of oil in such furrow. Then the covering-fingers E, touching the ground behind the line of pipes, throw the dust back into the furrows and on top of the oil. At a subsequent operation of the machine the fingers D and E and rearwardly-arranged fingers F are all employed to operate upon the dust to mix the same with the oil. In practice it is usually not desirable to mix the oil and dust immediately after the oil has been applied and covered, and for this reason means are provided for lifting the furrowing and covering fingers, and means are provided for lifting the rear mixing-fingers F independently thereof.

G indicates a lever for lifting the furrowing and covering fingers, and H indicates a lever for lifting the rear mixing-fingers F. The object of the furrowing and covering fingers is to provide for an even distribution of the oil, the furrows preventing the oil from

flowing sidewise and the covering of dust preventing any endwise flow along the furrows, and also causing the oil to be more readily absorbed by the dust.

5 I indicates drags to follow the covering-fingers E in the final operation to crush any globules of oil and to press the dust firmly down upon the oil which has been distributed. This is to be done, preferably, immediately  
10 in advance of the mixing by the rear mixing-fingers F.

It is necessary in order to distribute the oil evenly that the pressure of the oil passing through the oil-distributing pipes C should  
15 be practically the same at all times, and in order to treat long stretches of road properly I use a tank-wagon J, the tank K of which is of sufficient capacity for this purpose.

L indicates a valved pipe leading from the  
20 tank K into the oil-reservoir A.

M indicates valves for controlling the flow of oil through the oil-pipes C, respectively.

N indicates a rock-shaft with arms  $n$  for controlling the valves M, respectively.

25  $m$  indicates connecting-rods connecting the arms  $n$  with the valve-levers  $m'$ , respectively.

O indicates a lever for operating the rock-shaft N.

30 P indicates a rack for the lever O to hold the rock-shaft at any position to regulate the size of the outlets through the valves M.

$b'$  indicates standards extending up from the carriage-frame to hold the oil-reservoir  
35 A, which is provided with pivots  $a'$ , which rest in bearings  $b''$ , from which they can be lifted when it is desired to remove the reservoir.

For operating the fingers D and E, I provide a rock-shaft Q, operated by the lever G and provided with a finger-lifting bar  $q$ , connected therewith by arms  $q'$ . The rock-shaft is journaled to the frame of the oil-reservoir carriage, and the fingers D and E are jour-  
45 naled to the rock-shaft and extend rearward in the path of the lifting-bar  $q$ .

$q''$  indicates guards to hold the fingers at proper distances apart.

50 The fingers D, E, and F are curved to take into the dust.

The fingers F are operated by a rock-shaft  $Q'$  and a finger-lifting bar  $q^2$ , carried by the arms  $q^3$  of the rock-shaft practically the same as with the rock-shaft and bar for the fingers  
55 D and E. The lever H operates the rock-shaft  $Q'$ . The fingers F are arranged close together, being held out of contact with each other by washers  $f$  on the rock-shaft  $Q'$ , and therefore do not require the guards  $q'$ , which  
60 are shown between fingers D and E. The drags I are fastened to the drag-arms  $i$ , respectively, which are preferably made of strap-iron and bent into hooks  $i'$  at the upper end to hook over the drag-rod R, fastened to the  
65 frame of the carriage B in front of the rock-shaft  $Q'$ . The drags are between the forward fingers D E and the rearward fingers F. The

drags are required to be out of contact with the ground at some parts of the operation, and for this reason are arranged to be un-  
70 hooked from the shaft R and removed from the machine. The rod R also serves for attaching the scraper-drag S.

$s'$  indicates hooked arms fastened to the scraper-drag to hook upon the rod R to drag  
75 the scraper when the same is to be used.

I will now describe the method of using my machine in making dustless roads.

Preferably the distributing-machine will at the outset be detached from the oil-tank  
80 wagon and will be provided with a slip-tongue T. (Shown in Fig. 7.) The work is begun at a time when the traveled road is covered with dust. In the case of well-traveled roads, where the dust has been crowded from the  
85 middle to the sides of the road-bed, the machine is first provided with the scraper-drag S, as indicated in Figs. 4 and 5, the bars  $s'$  being hooked over the drag-bar R, which extends crosswise the frame of the carriage.  
90 Then, the several fingers D E F being raised from the ground, the machine, as shown in Fig. 5, will be driven along the road, with the forwardmost end of the slanting scraper-drag S at the side of the dusty portion of the road,  
95 so that the dust will be graded and thrown toward the middle of the road. When the scraper has been dragged along the full length of the strip to be treated at one time, it is driven back upon the other side of the road,  
100 and this is repeated, approaching the middle of the road each time until the dust is evenly distributed over the surface of the road. The scraper S is composed of a plurality of sections, as  $s^2 s^3$ , hinged together, as by the pivot  
105  $s^4$ , the object being to allow the scraper to adjust itself to the cross-sectional irregularities of the road. When the dust has been properly distributed over the surface of the road, the arms  $s'$  are unhooked from the drag-rod  
110 R, and the scraper is then dispensed with during the rest of the operation. Then the slip-tongue T will be detached and the distributing-machine will be attached by its tongue  $b$  to tank-wagon J, the pipe L will be  
115 placed in the swivel  $a$ , and the valve  $l$  will be opened to allow oil to flow from tank K into the reservoir A, the valves M being closed. When the reservoir A has been filled with oil to the depth desired by the operator, the  
120 tank-wagon K will be driven forward by an attendant, and the operator being seated on the reservoir A will throw the lever G to lower the fingers D and E to rest their points upon the ground, and the tank-wagon, with  
125 the distributor attachment with fingers F raised, will be driven along the road to be treated. The operator will open the valves M sufficiently to allow a required amount of oil to be distributed in the furrows formed by  
130 the furrowing-fingers D, and he will regulate the valve  $l$  so as to supply to the reservoir a quantity of oil equal to that which is flowing through the pipes C, thus maintaining a

practically even depth of oil in the reservoir A, so that the pressure of the oil in the pipes C will be uniform, thereby to distribute the oil uniformly over the road. The oil flows into the furrows made by the fingers D, and the fingers E, following behind the pipes at the sides of the furrows, throw the dust over into the furrows on top of the oil thus deposited. After the oil has been deposited and covered with dust it is allowed to remain for a period of, say, half an hour or more, depending upon the temperature, the character of the dust or soil treated, and the character of the oil applied. Ordinarily a sufficient strip of road is treated at one time to allow the oil first applied to remain covered and undisturbed for half an hour or longer before the operation of applying the oil to that strip of road has been finished. The object of allowing the covered oil to remain undisturbed is to cause the oil to become absorbed as fully as possible by the dust. When the oil has been distributed and absorbed by the dust that covers and surrounds it, the tongue b will be released from the tank-wagon, and the slip-tongue T will again be fastened to tongue b. The drags I will be hooked in place on the drag-rod R, and the stirring-fingers F, as well as the furrowing and covering fingers D and E, will be lowered to rest their points upon the ground, and, horses being attached, the machine will then be driven over the road. The fingers D and E will first turn and stir the dust. Then the drags will crush any oil globules that may be, and then the rear stirring-fingers will thoroughly mix and stir the mass, and this operation is repeated until all the oil globules are broken up and the oil is thoroughly incorporated with the dust.

The oil should be heated before being put into the oil-tank and should be applied hot. The work should be done on hot days when the dust is hot from the heat of the sun.

The drags are preferably only a few inches in width, so that irregularities in the road-bed will not lift any drag so as to cause it to miss any considerable part of the surface over which it passes.

The fingers being separately hinged or journaled, as set forth, are free to independently follow the irregularities of the road-bed. The tongues are made of strap metal and are of sufficient weight to enter the dust to stir it as desired.

Now, having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A combination-machine for making dustless roads comprising a carriage provided with oil-distributing pipes; dust-furrowing fingers in front of the oil-pipes respectively; covering-fingers extending to behind the line of oil-pipes; means for raising and lowering said fingers; means for supplying oil to the oil-distributing pipes; dust-stirring fingers; means for raising and lowering the dust-stirring fingers; a bar extending crosswise of the

machine; and detachable drags hinged to such bar.

2. A dustless-road-making machine comprising an oil-reservoir mounted on a carriage and provided with downwardly-extending oil-distributing pipes; furrowing-fingers in front of the pipes; and covering-fingers extending behind the pipes.

3. A dustless-road-making machine comprising an oil-reservoir mounted on a carriage and provided with downwardly-extending oil-distributing pipes; furrowing-fingers in front of the pipes; covering-fingers extending behind the pipes; and mixing-fingers at the rear of the machine.

4. A dustless-road-making machine comprising an oil-reservoir mounted on a carriage and having downwardly-extending oil-pipes; furrowing-fingers in front of the oil-pipes; covering-fingers behind the oil-pipes; drags behind the covering-fingers; and mixing-fingers behind the drags.

5. A dustless-road-making machine provided with a liquid-distributing device, with dust-stirring fingers and with drags.

6. A dustless-road-making machine provided with dust-stirring fingers; dust-mixing fingers; and drags between the stirring-fingers and mixing-fingers.

7. A dustless-road-making machine provided with a liquid-distributing device; dust-stirring fingers at the front; means for raising and lowering said fingers; dust-mixing fingers at the rear; and means for raising and lowering the dust-mixing fingers.

8. A dustless-road-making machine provided with a liquid-distributing device and with a cross-bar; and provided with fingers to operate upon the dust; and detachable drags attached to said cross-bar to drag behind the liquid-distributing device.

9. A dustless-road-making machine provided with furrowing-fingers; an oil-reservoir with valve-controlled downwardly-opening distributing-pipes arranged above the path of the furrowing-fingers; and covering-fingers arranged behind such pipes on each side of the path of the furrowing-fingers.

10. A dustless-road-making machine comprising an oil-tank on a carriage; an oil-reservoir mounted on the carriage behind the oil-tank; a valved pipe leading from the tank to the oil-reservoir; pipes opening downward from the oil-reservoir; valves for controlling the pipes; a rock-shaft with arms for controlling such valves; connecting-rods operatively connecting the arms with the valve-levers, respectively; and means for operating the rock-shaft.

11. A dustless-road-making machine comprising a carriage with a reservoir and distributing-pipes opening downward therefrom; a cross-bar on the frame of the carriage; drags hinged to the cross-bar and arranged to drag upon the ground; and narrow stirring-fingers arranged behind the pipes to cover the path of the drags.

12. A dustless-road-making machine comprising an oil-tank wagon with oil-tank thereon; a distributing-machine behind the wagon and hitched thereto; an oil-reservoir on the 5 distributing-machine and provided with valved oil-pipes leading downward therefrom; and a valved pipe leading from the oil-tank to the oil-reservoir.
13. An oil-distributer for dustless-road- 10 making machines comprising a carriage having dust-stirring fingers; a detachable oil-reservoir mounted on the carriage and having oil-distributing pipes; valves for controlling the pipes; a rock-shaft journaled to the reservoir and operatively connected with the 15 valves and provided with a lever; and a rack fastened to the reservoir.

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