

Sept. 29, 1925.

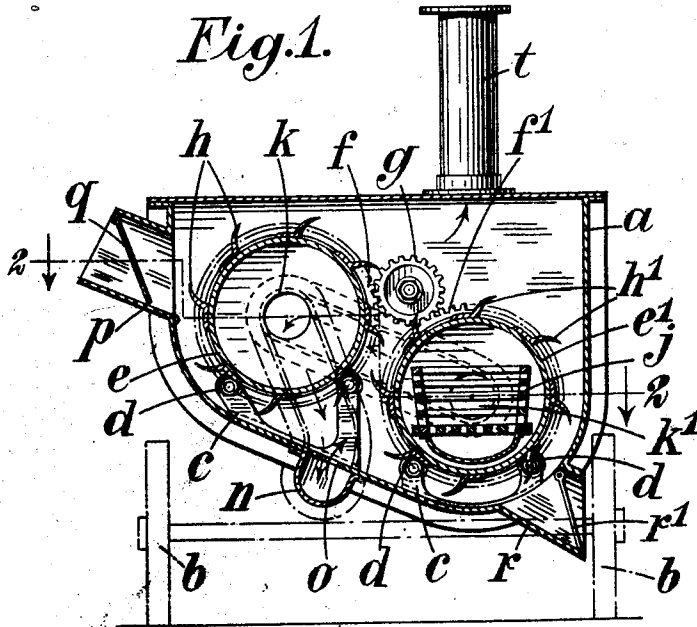
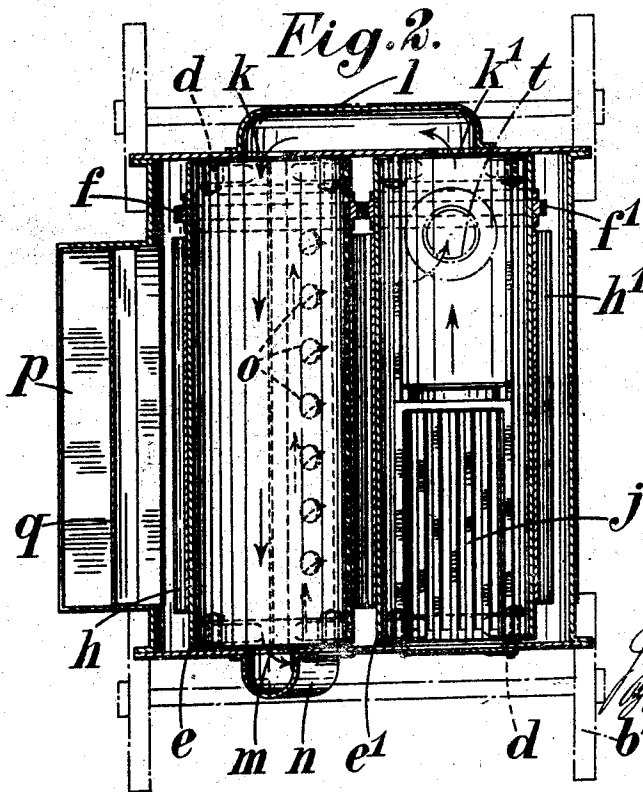
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J. M. T. JOHNSTON

APPARATUS FOR DRYING GRANULAR MATERIALS

Filed Oct. 6, 1924

2 Sheets-Sheet 1



INVENTOR

James M. T. Johnston
By *[Signature]*
His Atty

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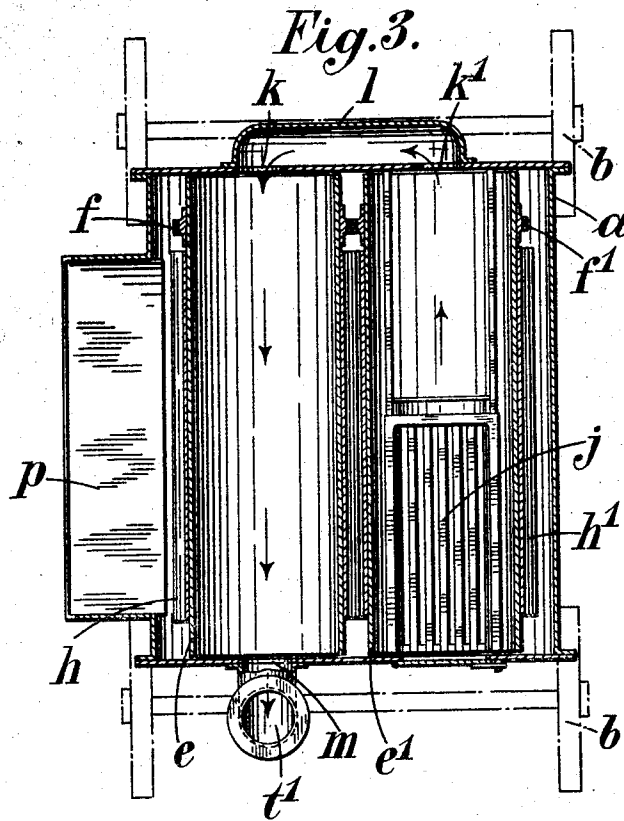
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE.

JAMES MITCHELL THOMAS JOHNSTON, OF LONDON, ENGLAND.

APPARATUS FOR DRYING GRANULAR MATERIALS.

Application filed October 6, 1924. Serial No. 741,788.

To all whom it may concern:

Be it known that I, JAMES MITCHELL THOMAS JOHNSTON, a subject of the King of England, residing at London, England, have invented certain new and useful Improvements in Apparatus for Drying Granular Materials, of which the following is a specification.

This invention relates to apparatus for drying granular material, and more particularly it relates to apparatus for drying materials such as road-metal, gravel and sand which are used in conjunction with tar, bitumen and like materials in road-making and similar operations.

According to this invention a drier for granular materials comprises in combination a drum capable of rotation or part rotation provided with one or more pockets on its outer surface so constructed as to retain material to be dried during a certain part of its movement and thereafter to permit the material to fall therefrom, and heating means situated within the drum.

Two or more drums may be arranged in such manner that material after treatment on one drum falls therefrom into the pockets of another such drum, and the drum or drums may be arranged within a casing provided with heating means, for example a furnace therein, so as to supply heat to the material otherwise than through the walls of the drum or drums, and also to create a draught to carry away the vapour from the drying material.

Furthermore, one or more of the drums, instead of being heated by a furnace placed therein, may be internally heated by furnace gases from a furnace situated within another of said drums.

In the accompanying diagrammatic drawings, which illustrate two constructions according to the invention—

Figure 1 is an end elevation in section of one construction,

Figure 2 is a plan in section along the line 2—2 of Figure 1, and

Figure 3 is a view similar to Figure 2 of the other of the two constructions, but with parts omitted for the sake of clearness.

Referring first to Figures 1 and 2, a casing *a* supported on road-wheels *b* is provided internally at each of its ends with a pair of brackets *c* in each of which is mounted to rotate a pair of rollers *d*.

Two horizontal drums *e*, *e*¹ are carried within the casing by these rollers, each end of each drum bearing upon one pair of rollers as will be apparent from Figure 1.

The drums are provided with gear-rings *f*, *f*¹ which are in mesh with a pinion *g* by means of which they may be rotated slowly in the same direction through suitable reduction gearing by means of a suitable source of power, for example an internal combustion engine (not shown) mounted upon the frame of the apparatus and geared to the shaft of the pinion *g*.

The drum *e*¹ is at a lower level than the drum *e*, the difference in level being about equal to the radius of the drums, and both drums are provided with external blades *h*, *h*¹ extending along the drums parallel with their axes and curved forwardly in such manner as to form pockets for the reception of material to be treated, and the horizontal distance between the drum axes is such that when the drums are rotated clockwise in Figure 1 material dropping from the blades *h* will fall upon the blades *h*¹.

A grate *j* is mounted within the lower drum *e*¹, being supported by the end walls of the casing *a* as indicated in Figure 2. The rear wall of the casing (as viewed in Figure 1) is provided with two apertures *k*, *k*¹ within the areas covered by the two drums, and these apertures are connected together by a flue *l*. There is a similar aperture *m* in the front wall of the casing communicating with a flue *n* which extends downwards to the lower edge of the casing and from that edge along its under side beneath the drum *e* and parallel therewith. The part of the bottom of the casing covered by the flue *n* is provided with holes *o* spaced along its length.

In use, road-metal, gravel or other material to be dried is fed through an inlet chute *p*, provided with a swinging flap *q*, on to the blades *h* of the drum *e*, upon which the material is carried round as the drum slowly rotates clockwise until, when it reaches the other side of the drum, it falls upon the blades *h*¹ of the drum *e*¹ to be carried round in the same way until it falls into the discharge chute *r*, provided with a swinging flap *r*¹.

The gases from the furnace in the grate *j* traverse the interior of the drum *e*¹, pass through the flue *l* into and through the

drum *e*, and through the flue *n* into the casing *a*, in which they pass upwards between the drums *e*, *e*¹ into the chimney *t*.

Thus the material on the blades *h*, *h*¹ heated from within the drums, and when falling from one drum to the other is exposed to the furnace gases passing between them, thus carrying away the moisture from between the individual lumps or particles of the material.

Referring now to Figure 3, the apparatus therein illustrated is similar to that above described in respect of the drums *e*, *e*¹ the blades *h*, *h*¹, the grate *j*, the means for supporting and driving the drums and the means for feeding and discharging the material to be treated; but the flue *n* is omitted, the furnace gases passing directly from the drum *e* into a chimney *t*¹. Thus the material does not come into contact with the furnace gases, but is heated only by conduction through the walls of the drums and by contact with the heated air within the casing.

The material is preferably fed to the chute *p* by means of a bucket or other elevator of known construction, not shown in the drawings.

It will be appreciated that the portion of material in each of the pockets formed by the blades *h*, *h*¹ will tend to roll round in its passage from one side of the drum to the other, thus presenting all parts thereof to the drying action.

I claim:—

1. Apparatus for drying and heating granular materials comprising in combination a casing, a drum horizontally disposed within said casing, means for rotating the drum about a horizontal axis, means on said drum for retaining on the periphery thereof material to be treated, means for feeding said material on to the drum and heating means within the drum.

2. Apparatus for drying and heating granular materials comprising in combination a casing, a drum horizontally disposed within said casing, means for rotating the drum about a horizontal axis, means on said drum for retaining on the periphery thereof material to be treated, means for feeding said material on to the drum, heating means within the drum, and means establishing communication for hot gases between the interior of the drum and the interior of the casing.

3. Apparatus for drying and heating granular materials comprising in combination a casing, a drum horizontally disposed within said casing, means for rotating the drum about a horizontal axis, means on said drum for retaining on the periphery thereof material to be treated, a second drum within said casing, disposed in such relation to the first drum as to receive upon its periphery material falling from the first

drum, means on said second drum for retaining such material on the periphery thereof, means for rotating said second drum, heating means within one of the drums and means establishing communication for hot gases between the interiors of the two drums.

4. Apparatus for drying and heating granular materials comprising in combination a casing, a drum horizontally disposed within said casing, means for rotating the drum about a horizontal axis, means on said drum for retaining on the periphery thereof material to be treated, a second drum within said casing, disposed in such relation to the first drum as to receive upon its periphery material falling from the first drum, means on said second drum for retaining such material on the periphery thereof, means for rotating said second drum, heating means within one of the drums, and means establishing communication for hot gases between the interiors of the two drums and between the interior of one of the drums and the interior of the casing.

5. Apparatus for drying and heating granular materials comprising in combination a casing, a drum horizontally disposed within said casing and extending from one wall of the casing to the opposite wall, rollers carried by said walls adapted to support the drum rotatably, means for rotating the drum, means on the periphery of the drum for retaining thereon material to be treated, and heating means within the drum.

6. Apparatus for drying and heating granular materials comprising in combination a casing, a drum horizontally disposed within said casing and extending from one wall of the casing to the opposite wall, rollers carried by said walls adapted to support the drum rotatably, means for rotating the drum, means on the periphery of the drum for retaining thereon material to be treated, and heating means carried by one of said walls of the casing and disposed within the drum.

7. Apparatus for drying and heating granular materials comprising in combination a casing, a drum horizontally disposed within said casing and extending from one wall of the casing to the opposite wall, rollers carried by said walls adapted to support the drum rotatably, means for rotating the drum, means on the periphery of the drum for retaining thereon material to be treated, and a fire-grate within the drum supported by said walls of the casing.

8. Apparatus for drying and heating granular materials comprising in combination a casing, a plurality of drums horizontally disposed within said casing and extending from one wall of the casing to the opposite wall, rollers carried by said walls adapted to support each of the drums rotatably,

means for rotating the drums, means on the periphery of each drum for retaining thereon material to be treated, heating means within one of said drums, and means
5 establishing communication for hot gases between the last-mentioned one of the drums and another of the drums.

9. Apparatus for drying and heating granular materials comprising in combination a casing, a plurality of drums horizontally disposed within said casing and extending from one wall of the casing to the opposite wall, rollers carried by said walls adapted to support each of the drums rotatably, means for rotating the drums, means
10 on the periphery of each drum for retaining thereon material to be treated, a fire-grate supported within one of said drums by the said walls of the casing, and a flue leading from the last-mentioned one of the
15 drums to another of the drums.

10. Apparatus for drying and heating granular materials comprising in combination a casing, two drums horizontally disposed within said casing and extending from one wall thereof to the opposite wall, rollers carried by said walls adapted to support the drums rotatably, means for rotating the drums, means on the periphery of each
20 drum for retaining thereon material to be treated, a fire-grate supported within one of the drums by the said walls of the casing, a flue leading from the said drum to one end of the second drum and communicating with the interiors of the drums through
25 holes in the said walls, and a second flue leading from the other end of the second drum through a hole in the other of said walls to the interior of the casing.

11. Apparatus for drying and heating granular materials comprising in combination a casing, a wheeled support therefor, two drums horizontally disposed within said casing and extending from one wall thereof
30 to the opposite wall, rollers carried by said walls adapted to support the drums rotatably, means for rotating the drums, means on the periphery of each drum for retaining thereon material to be treated, a fire-grate

supported within one of the drums by the
35 said walls of the casing, and a flue leading from the said drum to the other drum.

12. Apparatus for drying and heating granular materials comprising in combination a casing, a wheeled support therefor,
40 two drums horizontally disposed within said casing and extending from one wall thereof to the opposite wall, rollers carried by said walls adapted to support the drums rotatably, means for rotating the drums, means on the periphery of each drum for retaining
45 thereon material to be treated, a fire-grate supported within one of the drums by the said walls of the casing, a flue leading from the said drum to one end of the second drum and communicating with the interiors of the drums through holes in the said walls, and a second flue leading from the other end of the second drum through a hole in the
50 other of said walls to the interior of the casing.

13. Apparatus for drying and heating granular materials comprising in combination a drum mounted for rotational movement about its axis which axis is substantially horizontal, blades secured to the periphery of said drum substantially parallel
55 to its axis and extending uninterruptedly for a considerable proportion of the length of the drum, said blades co-operating with the drum to provide pockets for material to be treated, means for rotating the drum, and means for heating it internally.

14. Apparatus for drying and heating granular materials comprising in combination a drum mounted for rotational movement about its axis which axis is substantially horizontal, a plurality of blades each secured along one edge to the periphery of the drum substantially parallel to its axis
60 and inclined forwardly in relation to the direction in which the drum is to rotate, said blades co-operating with the drum to provide pockets for material to be treated, means for rotating the drum, and means for heating it.

In testimony whereof I affix my signature.

JAMES MITCHELL THOMAS JOHNSTON.