

July 8, 1941.

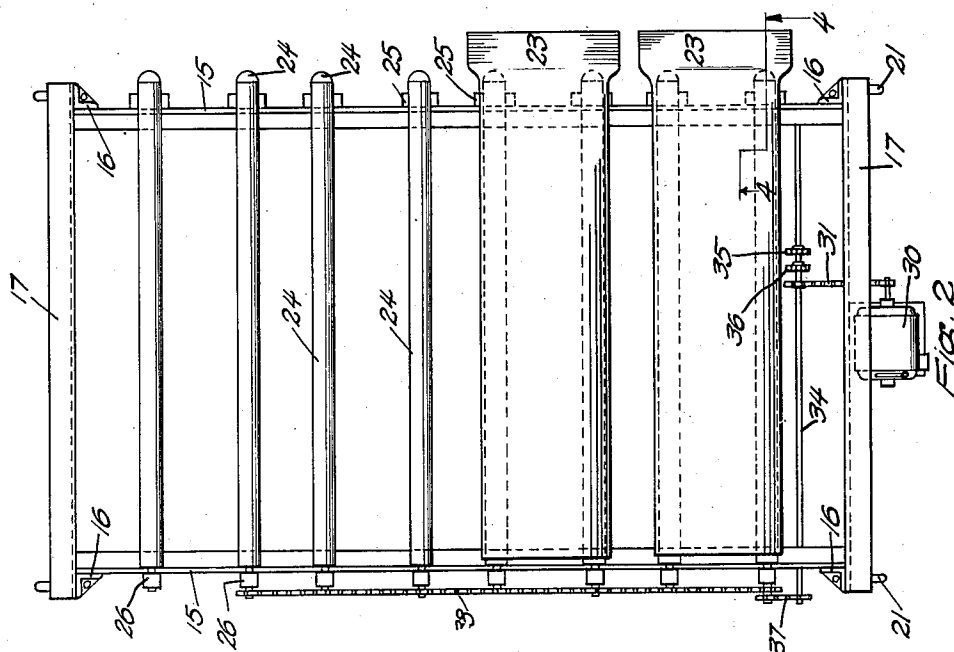
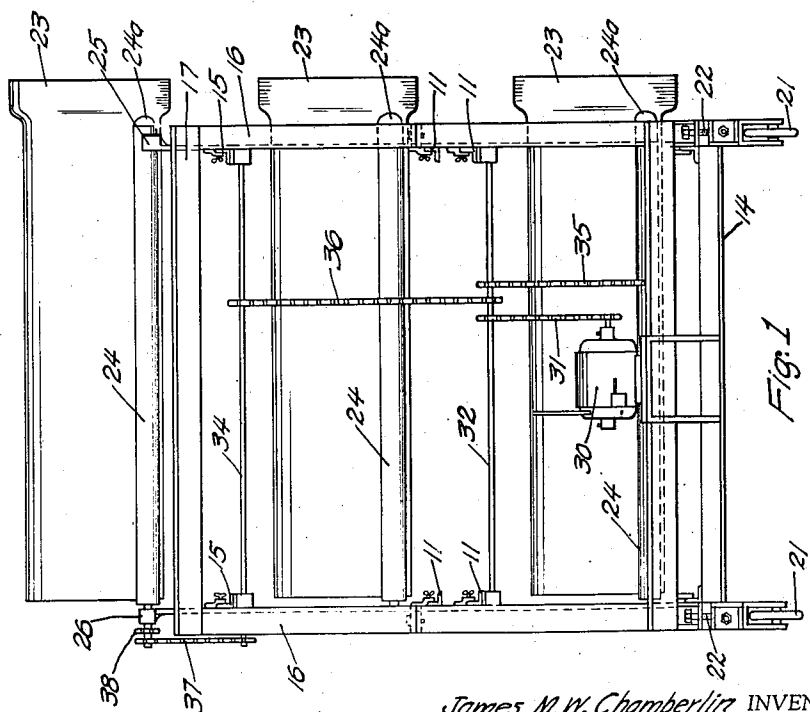
J. M. W. CHAMBERLAIN ET AL

2,248,490

METHOD AND APPARATUS FOR DRYING AND TRUING UP CERAMIC PIPE

Filed March 17, 1938

3 Sheets-Sheet 1



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3 Sheets-Sheet 2

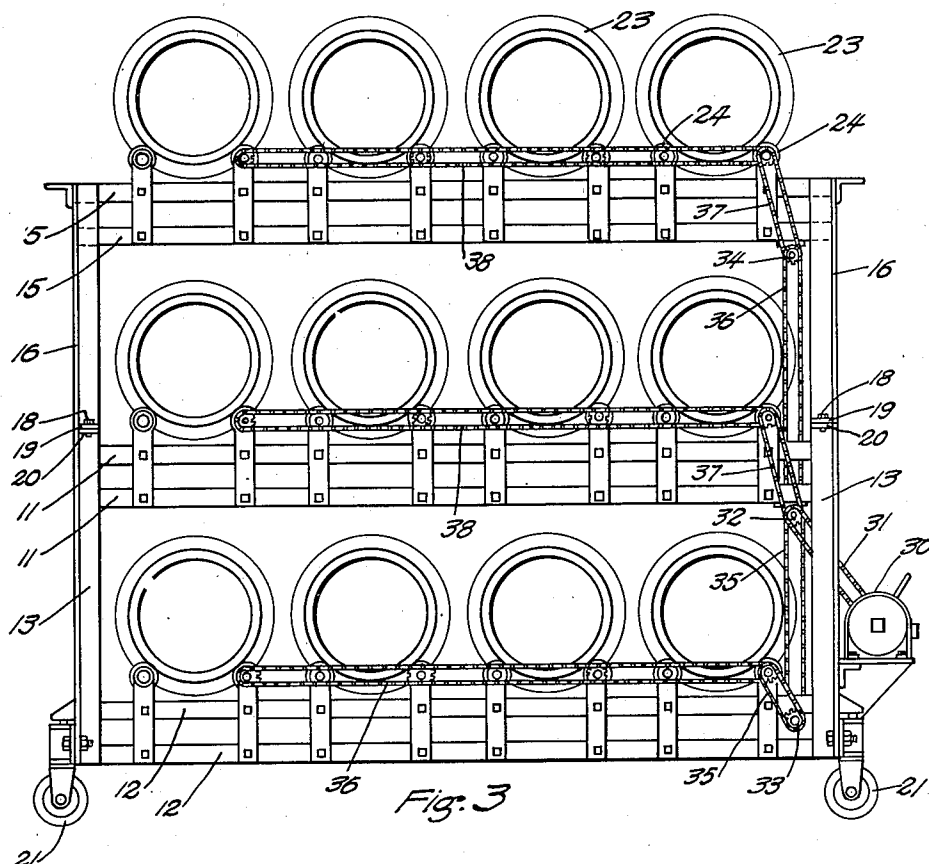


Fig. 3

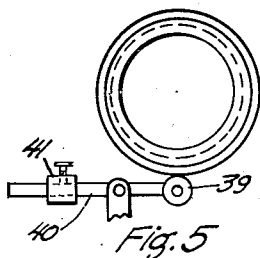


Fig. 5

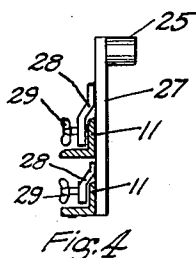


Fig. 4

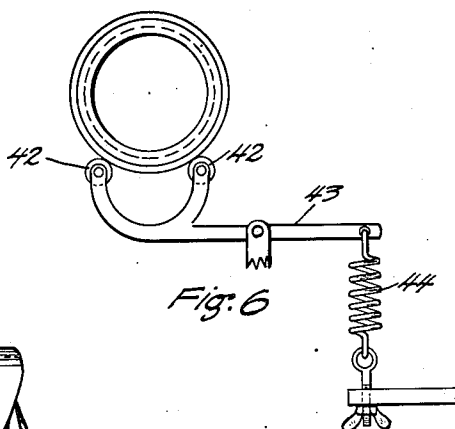


Fig. 6

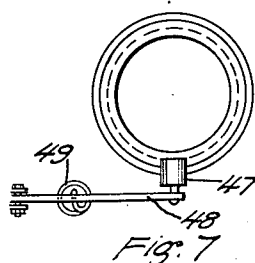


Fig. 7

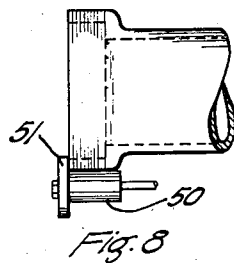


Fig. 8

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3 Sheets-Sheet 3

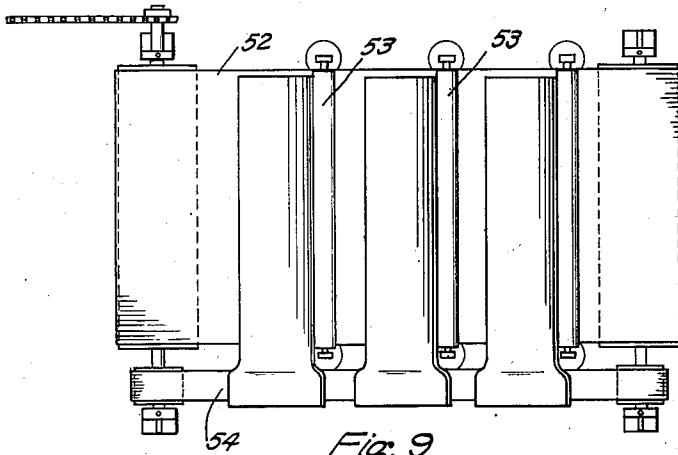


Fig. 9

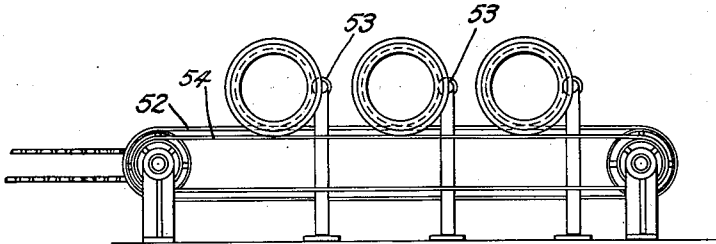


Fig. 10

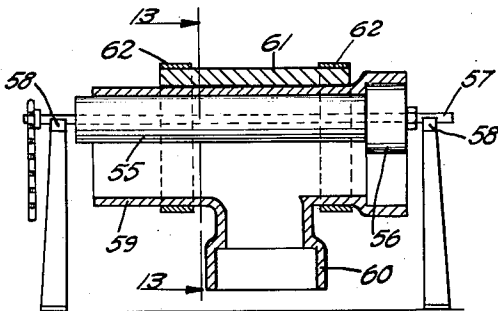


Fig. 11

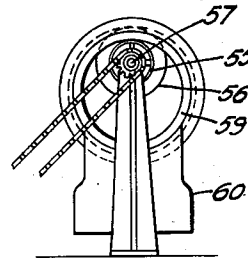


Fig. 12

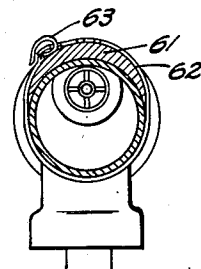


Fig. 13

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## UNITED STATES PATENT OFFICE

2,248,490

## METHOD AND APPARATUS FOR DRYING AND TRUING UP CERAMIC PIPE

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Application March 17, 1938, Serial No. 196,338

15 Claims. (Cl. 34—21)

This invention relates to methods and apparatus for drying and shaping ceramic pipe.

Because of uneven drying and sometimes because of imperfect operation of the extruding apparatus, or because of imperfect handling, such pipe often becomes warped, sagged, dented or otherwise deformed, and also as heretofore practiced the drying operation has required a long time, with resulting slow turn-over of drying space and equipment.

Our chief objects are to shorten the time required for drying and to provide for reshaping or truing-up of the pipe during the drying operation.

Of the accompanying drawings:

Fig. 1 is an end elevation of a drying and reshaping rack embodying and adapted for carrying out our invention in one of its preferred forms.

Fig. 2 is a plan view of the same.

Fig. 3 is a side elevation of the same.

Fig. 4 is a vertical section, on line 4—4 of Fig. 2, of a bearing bracket and its adjustable supporting means.

Fig. 5 is a fragmentary elevation, from the right of Fig. 2, of a bell-end pipe and means for supporting and re-shaping its bell.

Figs. 6 and 7 are similar views showing other forms of bell-supporting and re-shaping means.

Fig. 8 is a fragmentary elevation illustrating still another form of bell-supporting and shaping means.

Fig. 9 is a plan view of a modification.

Fig. 10 is a side elevation of the same.

Fig. 11 is a side elevation of another modification, especially adapted for pipes of the T or Y type, such a pipe and a counterweight being shown, in section, on the apparatus.

Fig. 12 is an end elevation, from the left of Fig. 11, of the assembly shown in Fig. 11.

Fig. 13 is a cross-section on line 13—13 of Fig. 11.

Referring to the drawings, the apparatus of Figs. 1 to 5 comprises a two-deck lower frame formed of longitudinal angle-irons 11, 11, 12, 12, vertical angle irons 13, 13, and angle-iron cross members 14, 14; and a removable upper frame formed of longitudinal angle irons 15, 15, vertical angle irons 16, 16 and angle-iron cross members 17, 17.

For removably holding the upper frame upon the lower frame the former has studs or dowels 18, 18 (Fig. 3) mounted in plates 19, 19, welded in the angles of the vertical irons of the upper frame, the studs or dowels being adapted to fit

in holes formed in plates 20, 20 welded in the angles of the vertical irons of the lower frame.

The lower frame is provided with castors 21, 21 and adjusting screws 22, 22 (Fig. 1) for leveling or so adjusting the position of the frames as to cause pipes, such as the bell-end pipes 23 mounted upon the rack, to drift slightly in one direction, preferably in the direction of their bell ends as to pipes of that type.

Supporting means for the body portions of the pipes comprises rollers 24, 24 which, to support the pipes up to, and even within, the region of curvature of their bells, are formed with rounded ends, as shown at 24<sup>a</sup>, 24<sup>a</sup> (Figs. 1 and 2) and without trunnions are journaled at the bell-ends of the pipes in half-bearings 25, 25.

It is desirable that the supporting rolls 24 be adjustably mounted for spacing them differently for pipes of different diameters, their lines of contact with the pipe preferably being a distance apart about equal to half the external diameter of the pipe, and to provide this adjustment their half-round bearings 25, 25 at the bell-ends of the pipes and their full-circle bearings 26, 26 at the opposite ends of the pipes are mounted upon brackets such as the bracket 27 (Fig. 4) which has clips 28, 28 spot-welded to it and adapted to fit over the vertical webs of the longitudinal angle irons 11 (or 12 or 15), and to secure the brackets in the positions to which they are slid upon the angle irons, for adjustment, set screws 29, 29 are mounted in the clips and are adapted to bear against the angle irons.

Suitable means is provided for driving the rolls, said means comprising a motor 30 and the sprocket chain 31, fixed-axis shafts 32, 33 and 34, suitable sprockets, and sprocket chains 35, 36, 37, 37 and 38, 38.

The construction is such that the rolls 24 serve as cradle rolls for rotating the pipes 23 and it is found not only that the drying of the pipes is quicker and more even, air being circulated in the drying chamber past the rack and hitting different sides of the pipes as they are rotated, but also that warp, out-of-round and other deformities of the pipes are corrected during the drying operation.

For similarly supporting and truing-up the bell of the pipe at the same time it has been found sufficient to employ (Fig. 5) a single supporting roll 39 mounted upon a lever 40 and held up against the bell by an adjustable counterweight 41 on the lever; or a pair of rolls 42, 42 (Fig. 6) mounted upon a lever 43 and urged upward against the bell by an adjustable pull spring 44;

or even a roll 47 (Fig. 7) mounted on a lever 48, on an axis transverse to that of the pipe, and bearing against only the edge face of the bell, under the force of a pull spring 49.

Another expedient for truing-up the bell is shown in Fig. 8 and comprises a roll 50 mounted on a horizontal axis and adapted to bear against the lower face of the bell and a disk 51 mounted on the same axis as the roll 50 but free to rotate independently of it and to bear, with its side face, against the edge face of the bell.

In the modification shown in Figs. 9 and 10 the pipes are supported on a driven belt 52 and are prevented from traveling with it by respective rolls 53, 53, an idler belt 54 being provided for supporting and truing-up the bells, and this arrangement has been found to serve quite effectively.

In the modification shown in Figs. 11 to 13 a driven roll 55 for the body of the pipe and an idler roll 56 for the bell are mounted upon the same shaft 57 and are adapted to support the pipe internally, the roll 55 driving it, the shaft 57 being mounted in half-bearings 58, 58 so that the pipe can be readily hung upon the rolls.

A T-pipe 59 having a laterally projecting bell 60 is here shown mounted upon the rolls and, to assure that the frictional contact of the pipe with the roll 55 will be sufficient to cause the pipe to rotate, a counterweight 61 for the bell 60 is secured upon the opposite side of the pipe, as by means of straps 62, 62 provided with adjustable buckles such as the buckle 63 (Fig. 13).

Preferably the counterweight is of lead so as to be sufficiently heavy although of crescent shape for large area of contact with the pipe and for short leverage, both the large area and the short leverage being desirable for avoidance of deformation of the pipe by a prying action.

Preferably variable speed driving means is employed, as to all of the embodiments described, as a faster speed is desirable for preventing excessive deformation of the pipe by gravity in the earlier part of the drying operation, while the pipe is still relatively soft.

Further modifications are possible within the scope of the appended claims.

We claim:

1. A method of truing up and drying ceramic pipe which comprises rotating it on a longitudinal axis while supporting it by at least one longitudinally disposed zone of contact substantially coextensive with the length of the pipe and subjecting it to a drying atmosphere, the pipe being rotated more rapidly in an early stage than in a later stage of the drying.

2. A method of truing up ceramic pipe which comprises rotating it on a longitudinal axis while supporting it by at least one longitudinally disposed zone of contact substantially coextensive with the length of the pipe, the speed of rotation being correlated to the degree of softness of the pipe by reduction of the speed during the truing-up operation.

3. A method of drying ceramic pipe which comprises rotating it on a longitudinal axis while supporting it by at least one longitudinally disposed zone of contact substantially coextensive with the length of the pipe and subjecting it to a drying atmosphere, the pipe being rotated more rapidly in an early stage than in a later stage of the drying.

4. A method of truing up ceramic pipe which comprises rotating it on a longitudinal axis while supporting it by two external longitudinally dis-

posed zones of contact substantially coextensive with the length of the pipe, the speed of rotation being correlated to the degree of softness of the pipe by reduction of the speed during the truing-up operation.

5. A method of truing up ceramic pipe which comprises rotating it on a longitudinal axis while supporting it by at least one internal longitudinally disposed zone of contact substantially coextensive with the length of the pipe, the speed of rotation being correlated to the degree of softness of the pipe.

6. A method of drying ceramic pipe which comprises rotating it on a longitudinal axis while supporting it by at least one longitudinally disposed zone of contact substantially coextensive with the length of the pipe, the pipe being rotated by the said contact and the speed of rotation being correlated to the degree of softness of the pipe by reduction of the speed during the truing-up operation.

7. A method of drying ceramic pipe of the bell type which comprises rotating it on a longitudinal axis while supporting it by at least one longitudinally disposed zone of contact substantially coextensive with the length of the pipe, the pipe being rotated by the said contact in its body region but not in its bell region.

8. A method of drying ceramic pipe having a laterally-projecting fluid-conducting portion which comprises rotating it on a longitudinal axis while supporting it by at least one longitudinally disposed zone of internal contact substantially coextensive with the length of the pipe, the pipe having a laterally projecting fluid-conducting portion and being internally supported as defined.

9. Apparatus of the character described comprising rotary means for supporting a pipe by at least one longitudinally disposed zone of contact and means for driving at least a part of the rotary supporting means, the supporting means comprising driven means for the body portion of a bell pipe and idler means for the bell portion.

10. Apparatus of the character described comprising rotary means for supporting a pipe by two external longitudinally disposed zones of contact and means for driving at least a part of the rotary supporting means, the supporting means comprising driven means for the body portion of a bell pipe and idler means for the bell portion.

11. Apparatus of the character described comprising rotary means for supporting a pipe by at least one internal longitudinally disposed zone of contact and means for driving at least a part of the rotary supporting means, the supporting means comprising driven means for the body portion of a bell pipe and idler means for the bell portion.

12. Apparatus of the character described comprising rotary means for internally supporting by at least one longitudinally disposed zone of contact a pipe having a laterally-projecting fluid-conducting portion, means for driving said rotary supporting means, and means for at least partially counter-balancing the said laterally-projecting portion.

13. Apparatus of the character described comprising rotary means for internally supporting by at least one longitudinally disposed zone of contact a pipe having a laterally-projecting fluid-conducting portion, means for driving said rotary supporting means, and means for at least partially counterbalancing the said laterally-

projecting portion, the last said means comprising a heavy member of substantially crescent shaped cross-section for large contact area and short leverage and means for securing the said member upon the pipe.

14. Apparatus of the character described comprising an endless belt adapted to support a plurality of tubular articles to be dried, means for driving the belt, and roller means adapted to bear against the tubular articles in rolling con-

tact therewith to prevent conveyance of the respective articles and thereby to cause them to be rotated by the movement of the belt.

15. A method of treating ceramic pipe which comprises rotating it on a longitudinal axis while supporting it by at least one internal, longitudinally disposed zone of contact substantially coextensive with the length of the pipe.

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