Jan. 20, 1931. C. C. HALKYARD 1,789,742

MANUFACTURE OR LINING OF PIPES BY CENTRIFUGAL ACTION

Filed Sept. 10, 1929

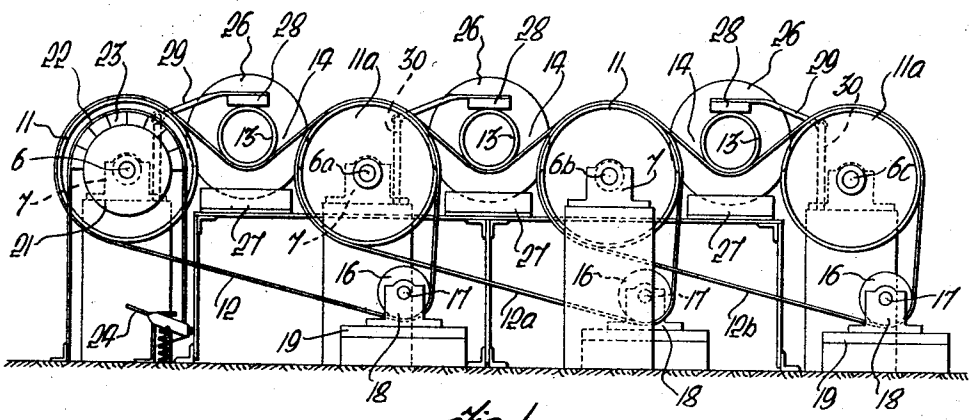


Fig. 1.

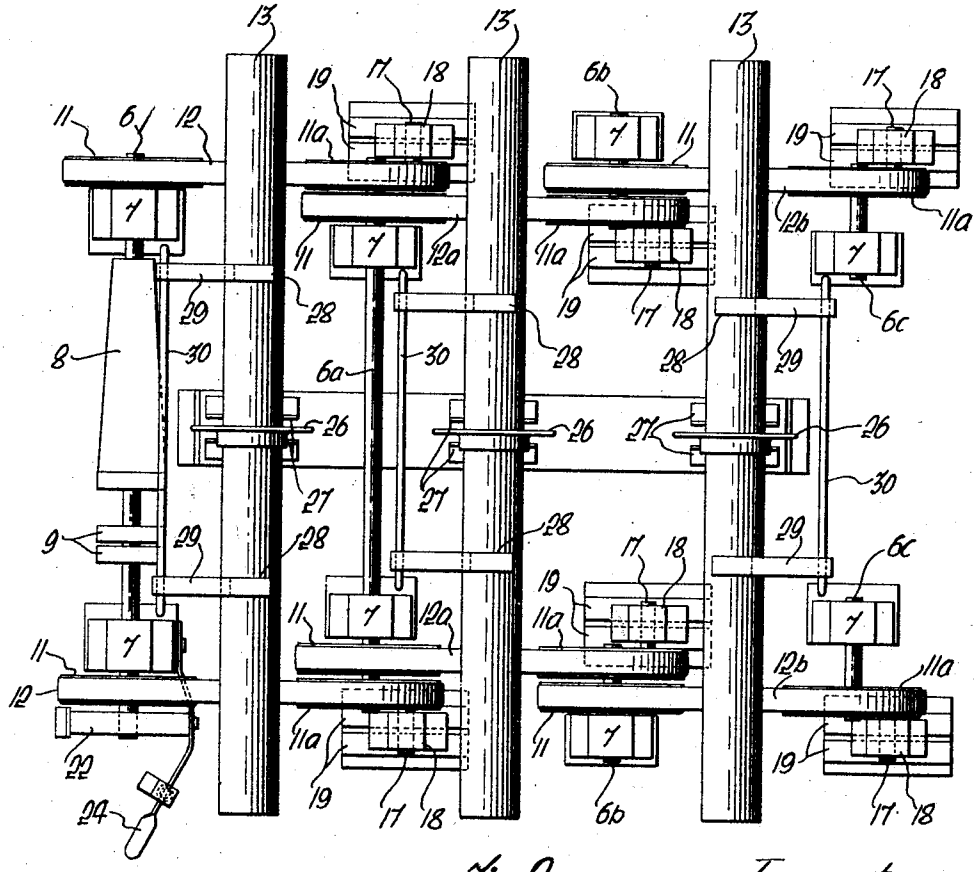


Fig. 2.

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Patented Jan. 20, 1931 1,789,742

# UNITED STATES PATENT OFFICE

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## MANUFACTURE OR LINING OF PIPES BY CENTRIFUGAL ACTION

Application filed September 10, 1929, Serial No. 391,683, and in Australia May 10, 1929.

This invention relates to the lining or moulding of pipes and like hollow bodies by centrifugal action and refers more particularly to the lining of metal pipes with cementitious, bituminous or such like material and to the manufacture of concrete or cementitious pipes, poles, columns and the like by the centrifugal process.

Copending United States patent specification Serial No. 320,697 discloses a method and means whereby a series of pipes or moulds may be simultaneously supported and rotated by resting the pipes or moulds upon the upper stretches of endless supporting and driving bands so that the moulds or pipes, by their weight, form open topped bights or sags in said bands between the pulleys over which the bands pass. The endless bands are thus placed in tension and are capable of simultaneously rotating the pipes or moulds whilst they are supported within the open topped bights of the bands. Provision is also made for adjusting the sags of said bands made necessary by the stretching or difference in length of the bands. This is effected by means of adjustable bearings carrying certain of the pulleys over which the bands pass.

An objection to the foregoing arrangement is the difficulty of maintaining a uniform or equalized sag upon the endless bands and of keeping the various moulds or pipes in proper horizontal position on the bands owing to the uneven stretch which is liable to occur in the relatively long bands employed and to variations in the weight and other conditions of the pipes or moulds. Furthermore it is not possible in the foregoing installation, without adjustments to the length of the bands, to operate on only one mould or pipe at a time in cases where this may be desirable.

The object of the present invention is to provide an improved arrangement of the abovementioned type which will overcome the disadvantages referred to and enable two or more pipes or moulds to be simultaneously supported and rotated in such a manner as to ensure effective operation and obviate the necessity of using unduly long bands which are subject to excessive stretching and other disadvantages.

In accordance with the invention instead of employing only one pair or set of laterally spaced endless bands passing over longitudinally aligned pulleys as disclosed in the aforesaid prior specification, we employ at least two pairs or sets of laterally spaced endless bands passing over pulleys which are so arranged that, when viewed in plan, the endless bands of certain pairs or sets are arranged in staggered relationship or out of longitudinal alignment with those of other pairs or sets. By this means two or more pairs or sets of relatively short belts or bands may be arranged in battery formation so that a mould or pipe may be rested upon the upper stretches of each pair or set of endless supporting and driving bands whereby the whole series of pipes or moulds may be simultaneously supported and rotated, or through the medium of suitable clutch or like mechanism, only a single pipe or mould may be operated upon at one time.

The term "sets" as above used is intended to apply where three or more laterally spaced bands are employed in lieu of a pair as, for example, in the case of particularly long pipes or moulds.

Means are also provided for individually adjusting the degree of sag in each endless belt or band so that the various pairs or sets of bands may properly maintain the pipe or mould thereon in correct horizontal position during rotation.

Referring to the drawings which form part of this specification:—

Figure 1 is a front view of apparatus according to the invention.

Figure 2 is a plan of Figure 1.

Three or more shafts 6, 6*a*, 6*b*, 6*c* are supported in parallel side by side formation by suitable bearings 7, the shafts carrying pulleys for the driving and supporting bands as hereinafter referred to.

The shaft 6 at one end of the series or battery may constitute a driver and be fitted with a change speed cone pulley 8 and fast and loose pulleys 9. This driving shaft 6 may be provided adjacent each end with a single

pulley 11 for driving two pipe or mould supporting and rotating bands 12. The shaft 6*c* at the other end of the battery may be provided at each of its ends with a single pulley 11*a*, while the intermediate shafts 6*a* and 6*b* are provided with two pairs or axially spaced pulleys 11 and 11*a*. Shafts 6*b* and 6*c* are each shown in two separate short sections but they may each be in one length extending completely across the machine.

The arrangement is such that the pairs of bands 12, 12*a*, 12*b* passing around the associated pairs of pulleys 11, 11*a* project longitudinally one beyond the other and are staggered out of longitudinal alignment when viewed in plan. Preferably the second pair of bands 12*a* are disaligned longitudinally from the first and third pairs 12 and 12*b* which are in longitudinal alignment as shown in Figure 2. It will be evident that a plurality of pipes or moulds 13 may be supported within the sags 14 in the upper stretches of the respective bands and simultaneously rotated thereby. To operate a fourth mould or pipe a fourth pair of bands with pulleys may be arranged in longitudinal alignment with the second pair of bands and so on.

Each band may also pass around a third or adjusting pulley 16 carried by a shaft 17 supported by a bearing 18 which is adjustable along guide members or rails 19 extending at right angles to the axes of the pulleys, whereby the depths of the sags or depressions 14 in the various bands may be independently adjusted to suit varying conditions, such for instance as to enable different pairs or sets of the endless bands to support and rotate pipes or moulds of different sizes or weights.

The leading pulleys 11 on the shafts 6*a* and 6*b* may be fixed thereto or they may be loosely mounted and adapted to be made fast to their shafts by suitable clutch devices (not shown) controllable by an operator so that one or more of the bands may be idle while the other band or bands may be operating.

It will be obvious that instead of the pairs of pulleys 11, 11*a* on the shafts 6*a*, 6*b* wider faced pulleys may be fitted to receive the adjacent portions of the respective bands.

A braking device for the apparatus may comprise a drum 21 fixed to the shaft 6 and a brake band consisting of a strip 22 of spring steel of U form having blocks 23 attached to its semi-circular portion and adapted to be pressed into contact with the periphery of the drum by depression of a spring returned pedal 24.

Excessive end movement of the pipes or moulds 13 may be prevented by flanged collars 26 removably applied to the moulds or pipes so as to extend between stop members 27.

Furthermore to impart vibratory motion to the pipe or moulds 13 while they are being rotated by the bands so that the combined centrifugal and vibratory actions will cause cementitious or like material to be effectively consolidated within the pipes or moulds one or more contact members 28 may be arranged to engage or rest upon each pipe or mould or a part rotating therewith. Each contact member may consist of a block of wood or other material carried at the outer end of an arm 29 hingeably supported by a suitable frame 30.

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

1. Improvements in and relating to the supporting and rotating of moulds or pipes to be centrifugally lined with plastic material; comprising laterally spaced pairs or sets of guide members and longitudinally extending endless bands passing around same arranged in battery formation with alternate bands longitudinally staggered so that moulds or pipes rested at longitudinally spaced intervals upon the upper stretches of the bands independently place them in tension and form a sag in the upper stretch of each band, whereby the moulds or pipes may be simultaneously rotated by linear motion of said bands without the tension or depth of the sag in any band or laterally spaced set of associated bands affecting the tension or the depth of sag in another band or set of bands.

2. In apparatus for supporting and rotating moulds or pipes to be centrifugally lined with plastic material, at least two pairs of laterally spaced endless bands, and at least three longitudinally spaced pairs of pulleys for said bands, said pulleys being so arranged that each pair of bands project longitudinally beyond an adjacent pair and are staggered or out of longitudinal alignment therewith, whereby a plurality of pipes or moulds may rest within laterally aligned sags in the upper stretches of said pairs of bands and be simultaneously rotated.

3. Improvements as claimed in claim 1, in combination with separate devices for independently varying the depth of the sags in the upper stretches of the bands.

4. In apparatus for supporting and rotating moulds or pipes to be centrifugally lined with plastic material; a series of at least three shafts arranged horizontally in side by side formation, each end shaft of the series having a pair of pulleys and each intermediate shaft having two pairs of pulleys, at least two pairs or sets of laterally spaced longitudinally extending endless bands arranged on said pulleys, the bands of alternate pairs or sets projecting longitudinally beyond the other and being staggered when viewed in plan.

5. In apparatus for supporting and rotating moulds or pipes to be centrifugally lined with plastic material a series of at least three shafts arranged horizontally in side by side formation, a pulley mounted adjacent each

end of each end shaft of the series, a pair of pulleys mounted adjacent each end of each intermediate shaft of the series, endless bands extending loosely around the pulleys in laterally spaced pairs, and means for connecting one of the pulleys with a source of power so that each pair of bands may rotate a mould or pipe while it is resting upon the upper stretches of the bands.

In testimony whereof I affix my signature.

C. C. HALKYARD.