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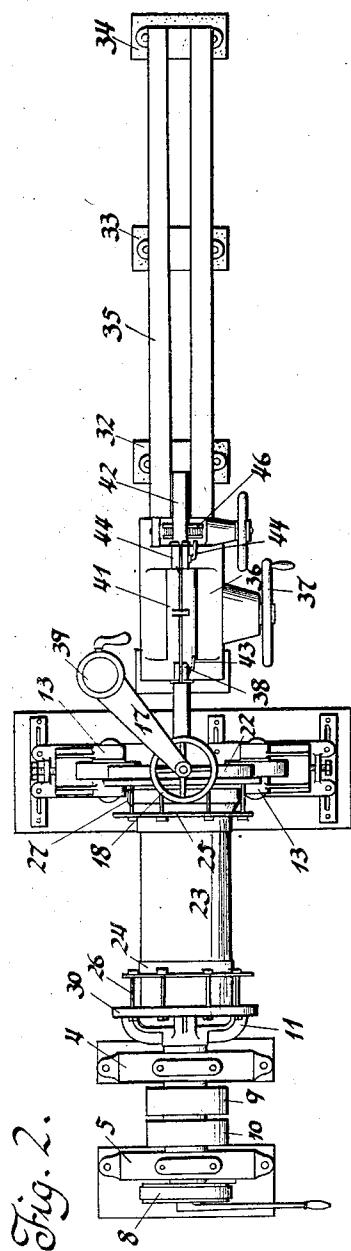
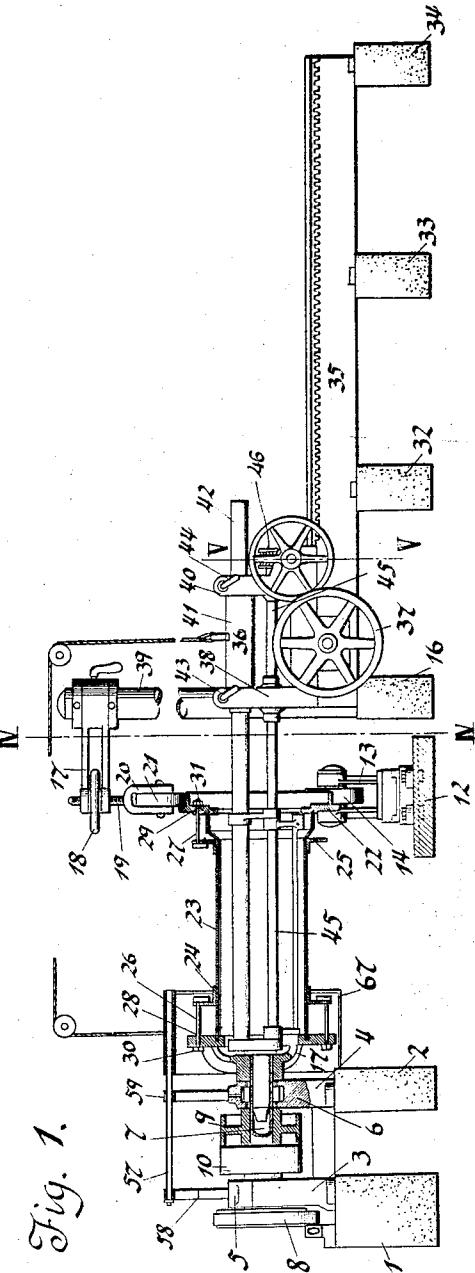
S. KUROYANAGI

1,854,046

APPARATUS FOR MANUFACTURING CONCRETE PIPES

Filed Oct. 21, 1929

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Fig. 3.

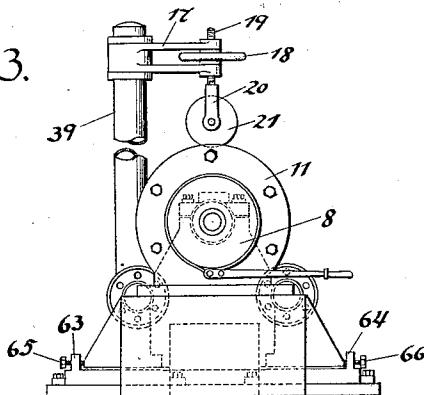


Fig. 6.

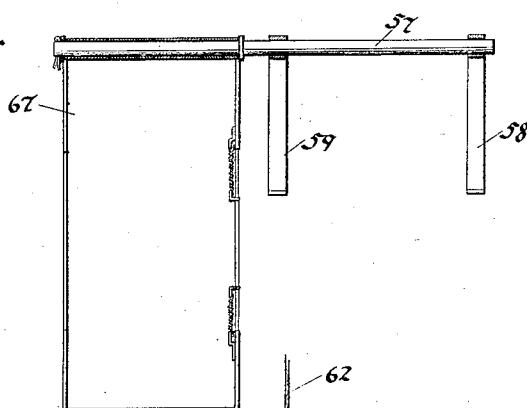
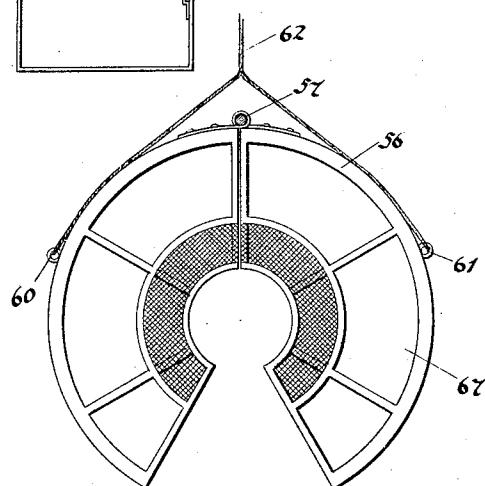


Fig. 7.



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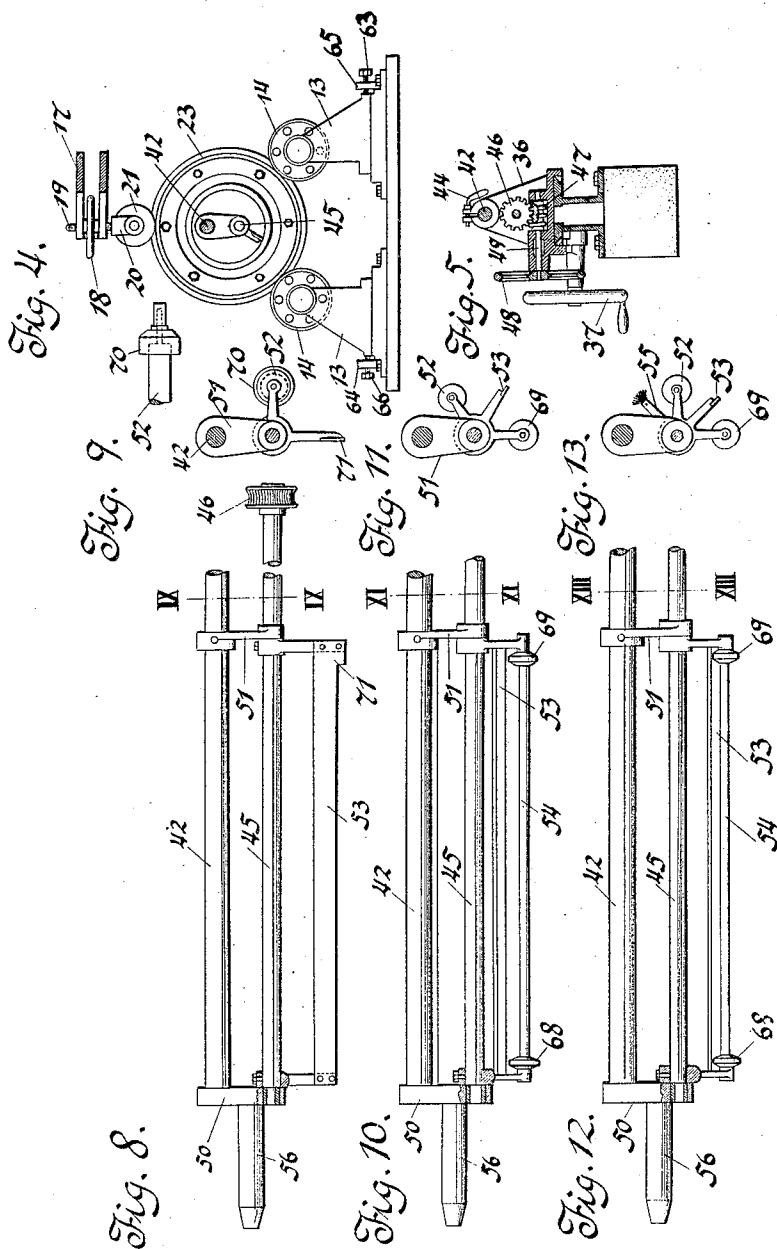
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3 Sheets-Sheet 3



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APPARATUS FOR MANUFACTURING CONCRETE PIPES

Application filed October 21, 1929. Serial No. 401,227.

This invention relates to improvements in apparatus for manufacturing concrete pipes and particularly to such an apparatus employing a centrifugal mould supported between two supporting plates and including a smoothing and compacting mechanism movable into said mould for compacting and smoothing the inner surface of the pipes.

The objects of the present invention are firstly, to complete, within the mould, the finishing processes, from crude, to the last finish by utilizing the centrifugal force of the revolutions of the mould, secondly, to enhance the strength of the pipes coming out of the mould by giving a strong pressure to the end-part near the mouth of such a pipe, and lastly, to produce quickly concrete pipes of high, uniform and accurate qualities.

In the hitherto known apparatuses for concrete pipe manufacture, the utilization of centrifugal force is not unknown but the means of its application is of such a simple nature that with the proportion of water recognized as suitable for a good concrete, the material is found too hard to adhere sufficiently and solidly to the inner wall of the mould which makes unavoidable in general practice the use of more water than the recognized proportion resulting in excess water oozing out during the work so that such excess is often pumped out of the mould causing a temporary suspension of work. Consequently in the finished concrete pipes, the "returns" are found isolated due to the fact that the centrifugal force utilized is not distributed evenly along the whole length of the inside of pipes so that the concrete cast, collects and sets unevenly, with the consequence that the inner wall of pipes presents a rough and uneven surface and the desired uniformity of thickness and of density are not obtained. To remedy the above defects and to increase the strength of pipes the present apparatus has been devised by which concrete cast into the mould is given almost an equal pressure against its entire inner wall, and after being roughly finished by the scraper the last finish is given to the cast pipe so that uniform thickness with a smooth surface can be obtained.

Besides, the device is of such a construction

that it requires no particular skill for a working man to handle it.

In the annexed drawings, Fig. 1 is a side elevation of the apparatus, partly in section to show the internal construction thereof, Fig. 2 is a top plan view of the same, Fig. 3 is an end view, Fig. 4 is a sectional view taken along the line IV and IV of the Fig. 1, Fig. 5 is a section taken on the line V—V of Fig. 1, Fig. 6 is vertical sectional view of the frame of a splash-guard, Fig. 7 is a hand view thereof, Fig. 8 the pressing device, Fig. 9 is a sectional view taken on the line IX and IX of Fig. 8, Fig. 10 is a side elevation of a modified form of the said pressing device, Fig. 11 is a sectional view of the modified device taken on the line XI and XI of the Fig. 10, Fig. 12 is a side elevation of another modification of the pressing device, and Fig. 13 shows the section of Fig. 12 taken on the line XIII and XIII thereof.

To describe the apparatus in detail by the drawings, upon the foundation-blocks (1) and (2) are fixed a pair of bearing blocks (3) and (4) the upper parts of which are formed as bearings (5) and (6). A hollow shaft (7) to which is fitted a brake-wheel (8) is supported by the said bearings and has pulleys (9) and (10) connected therewith at certain points between the bearings. The hollow shaft (7) carries a brake-wheel (8) at its outer end, and, also carries a mould supporting plate (11) which is fixed on its inner end and which supports one end of the mould. To the right of the said plate, a pair of frame-blocks (13) and (13) are fixed on the foundation-block (12). The blocks 13 support two lower supporting rollers (14) and (15) respectively positioned opposite to each other. Upon the foundation-block (16) which is close to the block (12) is erected a column (39) onto the upper part of which an arm (17) is fitted in such a manner that it can be freely moved horizontally. The end of the said arm has a vertical screw threaded bar (19) which extends through the threaded hub of the hand wheel 18 carried by said arm so that by turning of the hand wheel (18), the said bar rises

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and falls. The lower part of the bar has a bifurcated portion (20) which supports the upper roller (21), which together with the lower supporting rollers (14) and (15) sustains the mould supporting plate (22). Between the mould supporting plates (11) and (22) is inserted the mould (23), which has formed adjacent the end thereof flanges (24) and (25) provided with binding-screws (26) and (27) which are loosely fitted through the holes (28) and (29) in the mould supporting plates and are provided with threaded securing nuts 30 and 31 to rigidly fix the mould to the supporting plates. A slide-frame (35) is mounted horizontally on the blocks (16), (32), (33), and (34) at the right-hand side of the above-mentioned foundation block (12) so that a saddle shaped frame can be moved right and left upon the said slider by means of turning the handle (37). The saddle-shaped frame (36), consists of a pair of spaced upstanding frames (38) and (40) which mount the open mouthed sleeve pipe (41) embracing the right-hand end of the horizontal shaft (42) of the scraping device. The upper end of the frames 38 and 40 are split and are provided with binding screws 43 and 44. The binders (43) and (44) are tightened and the mouth of the said sleeve-pipe is closed tightly by which means the horizontal shaft 42 is supported on level. At a certain distance under the said horizontal shaft a revolving shaft (45) is provided, and has one end supported by the said frames 38 and 40. A small toothed-wheel (46) is fixed to the right-hand end of shaft 45 and engages with a worm-gear (47) the spindle (49) of which protrudes outwardly and has a handle (48) fitted thereto, by turning of which the revolving shaft rotates. Two hangers (50) and (51), at a distance of nearly the whole length of the mould, support the revolving shaft from the shaft 42 in a horizontal line. The said shaft is provided with the outer-pressing roller (52) and scraper (53) which are fixed thereto. A bearing shaft 56 extending from the hanger 50 into the hollow shaft 7 serves to support and steady the left end of the horizontal shaft 42.

The splash-guarding frame (67) is so disposed as to cover the left-side mouth of the mould above mentioned and its head is hinged to the bar (57) which extends to the left of the mould and is supported by the supporting uprights (58) and (59) erected on the blocks (3) and (4). The said guarding frame has hooks (60) and (61) on either hinged half to which a drawing cord (62) is tied on one end, and on the other, to the saddle-shaped frame (36) through suitable pulleys, so that when the saddle-frame is moved to the right, the splash-guard frame is automatically opened by action of the cord. The frame-blocks (13) of the lower supporting-rollers

(14) and (15) are positioned between upstanding flanges (63) and (64) which stand fixed to the block (12) and by manipulating the pushing screws (65) and (66) which are threaded through said flanges the position of the frame-blocks (13) may be regulated. One end of the scraper (53) of the outer pressing device shown in Figs. 8 and 9 is formed with a projection (68) at one end and a large finishing roller (70) of various sizes adaptable to the sockets, is carried at the opposite end of the pressing roller (52). As for the concrete pipes provided with no sockets, they tend to break down after being moulded so that to remedy this defect, the edge pressing rollers (68) and (69) are provided at both ends of the supplementary roller (54) and by this means the mouth-end parts of pipes are strongly pressed before their inner faces are levelled by the scraper (53) to a semi-finished condition. Figs. 12 and 13 show the brush-scraper (55) by which the smoothing operation of the inner face is brought to the finish.

To describe the operation, the mould is first fixed between the mould supporting plates (11) and (12) after which the pulley (9) is set to motion by means of a belt stretched between the said pulley and another pulley fixed to a driving shaft (the latter pulley and the shaft not shown in the drawings), when the material is thrown into the mould from the right hand side of its mouth. The centrifugal force developed by the rotation of the mould, forces the material outward to the inner surface of the mould. Then by turning the handle (48), the revolving shaft (45) is made to rotate through the worm-gear (47) and small toothed wheel (46) and by means of the scraper (53) attached to the said shaft, the inner face of the moulded pipe is smoothed and brought to a rough finish. The next operation is to so turn the revolving shaft so as to bring under it the outer-pressing roll (52), which by pressing the semi-finished inner face of the molded pipe and at the same time sufficiently pounding the material completes the condensing and smoothing of the inner face; the refuse or excess material being discharged from the left-hand end of the mould into the splash-guarding frame (67) through a space into mould-supporting plate (11). It is to be remarked in this connection that the reinforced concrete pipes can be made in the same manner by preparing and introducing iron bars into the mould before the commencement of moulding operations. When the moulding of a pipe is thus finished, the handle (37) is turned which moves the saddle shaped frame (36) to the right hand end of the slide frame (35), when the mould (23) is taken off. A new mould is then fitted to the mould supporting plates (11) and (12) and the saddle shaped frame is moved towards the left side.

The bar (56) fixed to the hanger (50) is inserted into the hollow shaft (7). Thus arranged, the operation above described is repeated. The mouth of the splash-guarding frame opens when the said saddle shaped frame moves towards right and closes when it goes to the opposite direction thus forming a splash-guarding chamber. To meet the changes in axial centre of a mould which is supported by the lower and upper supporting rollers (14), (15) and (21) due to the sizes of moulds required, the relative position of the lower rollers to the mould is made adjustable by adjusting the pushing screws (65) and (66) against the frame blocks (13), and that of the upper roller, by raising or lowering of the threaded bar (19) by means of the handle wheel (18).

It is to be noted that the revolutions of the mould is not limited to one direction only but is made reversible by which means the density of concrete may be enhanced, and further that a speed-regulating device may be attached to the device by which the revolutions of mould may, instead of being kept uniform, be altered according to requirements.

Claims:

1. In a device of the character described, an open ended centrifugal mould, a sliding carriage mounted adjacent one end thereof, a supporting shaft carried by said carriage and adapted to extend into said mould, a pair of hangers carried by said shaft, a rotatable shaft journalled in said hangers and a finishing element carried by said rotatable shaft.

2. In a device of the character described, an open ended centrifugal mould, a sliding carriage mounted adjacent one end thereof, a supporting shaft carried by said carriage and adapted to extend into said mould, a pair of hangers carried by said shaft, a rotatable shaft journalled in said hangers, a finishing element carried by said rotatable shaft, and means for rotating said rotatable shaft whereby to adjust the position of said finishing element with respect to the walls of said mould.

3. In a device of the character described, a pair of mould supporting plates having a central opening therein and adapted to engage the ends of a tubular centrifugal mould, a horizontally supported rotatable hollow shaft, means for mounting one of said plates on one end of said shaft, means for rotatably supporting the other of said plates so as to dispose said mould in a horizontal position, a reciprocal carriage mounted adjacent one end of said mould, a horizontal shaft supported by and extending forwardly of said carriage and adapted to extend into said mould, a bearing portion formed at the forward end of said shaft and adapted to fit within the open end of said hollow shaft, a pair of hangers carried by said shaft, a rotatable shaft journalled in said hangers, and a finishing element carried by said rotatable shaft, and means for rotating said rotatable shaft whereby to adjust the position of said finishing element with respect to the sides of the mould.

and a finishing element supported by said shaft.

4. In a device of the character described, a pair of mould supporting plates having a central opening therein and adapted to engage the ends of a tubular centrifugal mould, a horizontally supported rotatable hollow shaft, means for mounting one of said plates on one end of said shaft, means for rotatably supporting the other of said plates so as to dispose said mould in a horizontal position, a reciprocal carriage mounted adjacent one end of said mould, a horizontal shaft supported by and extending forwardly of said carriage and adapted to extend into said mould, a bearing portion formed at the forward end of said shaft and adapted to fit within the open end of said hollow shaft, a pair of hangers carried by said shaft, a rotatable shaft journalled in said hangers, and a finishing element carried by said rotatable shaft.

5. In a device of the character described, a pair of mould supporting plates having a central opening therein, and adapted to engage the ends of a tubular centrifugal mould, a horizontally supported rotatable hollow shaft, means for mounting one of said plates on one end of said shaft, means for rotatably supporting the other of said plates so as to dispose said mould in a horizontal position, a reciprocal carriage mounted adjacent one end of said mould, a horizontal shaft supported by and extending forwardly of said carriage and adapted to extend into said mould, a bearing portion formed at the forward end of said shaft and adapted to fit within the open end of said hollow shaft, a pair of hangers carried by said shaft, a rotatable shaft journalled in said hangers, and a finishing element carried by said rotatable shaft.

6. In an apparatus for centrifugally moulding concrete pipe, an elongated scraper blade supported in alinement with the side of said mould and having a laterally projecting portion at one end for forming the pipe socket, an elongated finishing roller supported in alinement with the side of said mould and a radially enlarged finishing roller carried at the end of said elongated roller for finishing the pipe socket.

7. In an apparatus for centrifugally moulding concrete pipe, an elongated scraper blade supported in alinement with the side of said mould and having a laterally projecting portion at one end for forming the pipe socket, an elongated finishing roller supported in alinement with the side of said mould and a radially enlarged finishing roller carried at the end of said elongated roller for finishing the pipe socket, and means for

adjustably mounting said scraper blade and finishing rollers within said mould whereby to successively bring them into operative relation with the material being moulded.

5 8. An apparatus for centrifugally moulding concrete pipe, an elongated scraper blade supported in alinement with the side of said mould, an elongated finishing roller supported in alinement with the side of said mould, 10 and a pair of end finishing rollers supported one adjacent each end of said mould whereby to compress the concrete adjacent the ends of said mould and means for adjustably mounting said blade, finishing roller and end 15 finishing rollers whereby to selectively position them in operative relation with the material being moulded.

In testimony whereof I have signed my name to this specification.

20 SUGAJIRO KUROYANAGI.

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