

Oct. 8, 1946.

C. I. BOHMER ET AL

2,409,014

MIX-CONSISTENCY INDICATOR FOR CONCRETE MIXERS

Filed May 25, 1944

2 Sheets-Sheet 1

Fig. 1.

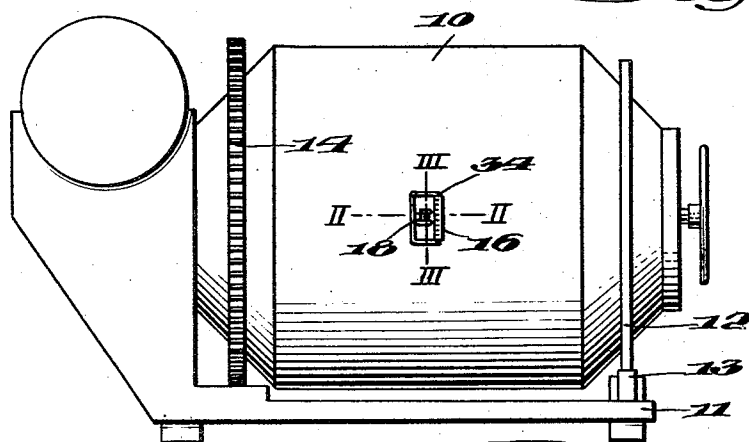


Fig. 4.

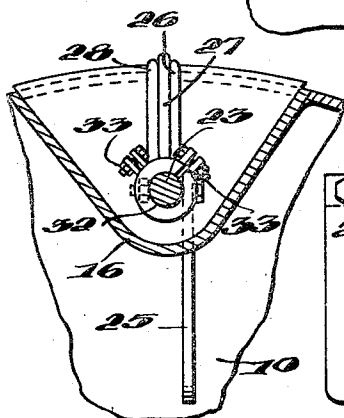
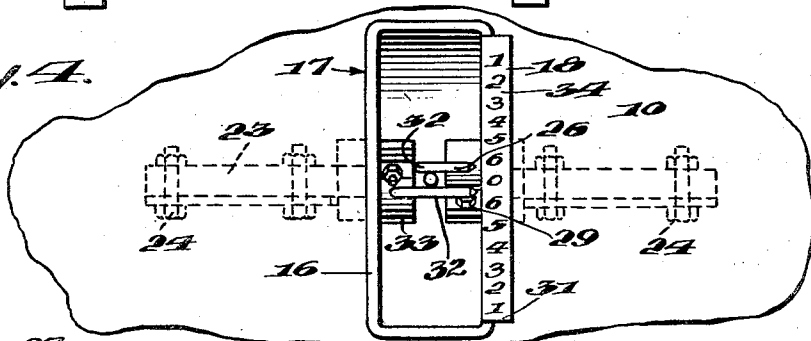


Fig. 3.

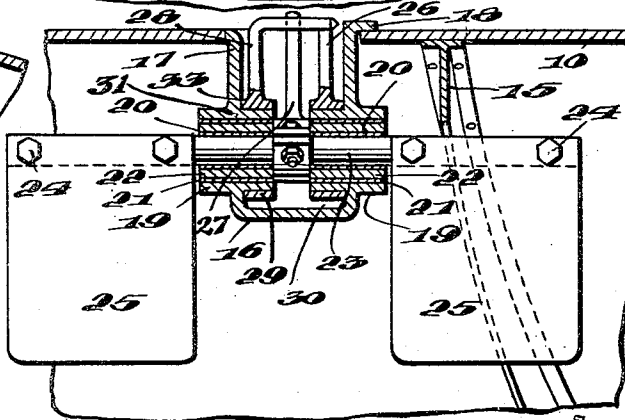


Fig. 2.

Inventors
Clarence I. Bohmer,
Arnold S. Millikin,

By *W. S. McLowell*

Attorney

Oct. 8, 1946.

C. I. BOHMER ET AL

2,409,014

MIX-CONSISTENCY INDICATOR FOR CONCRETE MIXERS

Filed May 25, 1944

2 Sheets-Sheet 2

Fig. 5.

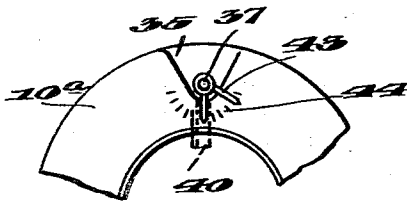
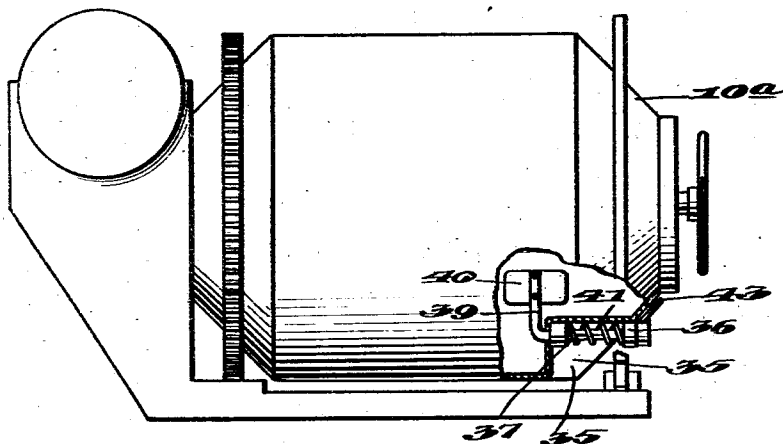


Fig. 7.

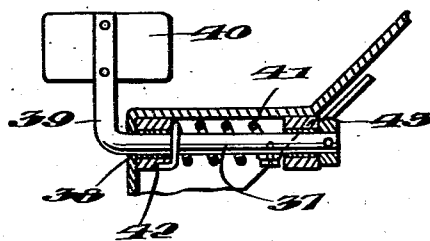


Fig. 6.

Inventors
Clarence I. Bohmer,
Arnold S. Millikin,
By *H. J. McLowell*
Attorney

UNITED STATES PATENT OFFICE

2,409,014

MIX-CONSISTENCY INDICATOR FOR
CONCRETE MIXERS

Clarence I. Bohmer and Arnold S. Millikin, Co-
lumbus, Ohio, assignors to The Jaeger Machine
Company, Columbus, Ohio, a corporation of
Ohio

Application May 25, 1944, Serial No. 537,333

9 Claims. (Cl. 73-54)

1

This invention relates to an improved consistency or slump indicator for determining the degree of plasticity or the mixed condition of a body of concrete-forming materials contained in a rotary drum of a concrete mixer during operation thereof.

In the active use of concrete mixers, it is important that the operator should be definitely and reliably informed when the mixing of the materials has been carried out to the desired extent. While the prior art has proposed certain apparatus for accomplishing this general purpose, such prior apparatus has not, for various reasons, been used commercially to any considerable degree. In the main, it is believed that prior proposals have been unduly complex in their structural design, insufficiently rugged to withstand the rough usage to which concrete mixer appliances are subjected and also to the fact that they may have been considered too costly to justify their practical use and adoption.

It is, therefore, a primary object of the invention to provide a strong, simple and reliable indicator formed to be carried by the revolving drum of a concrete mixer, and so constructed as to disclose externally of the drum the consistency of the plastic mix after a given period of agitation.

It is another object to provide a slump indicator for concrete mixers comprising an open-sided housing provided in the outer peripheral wall of the mixer drum, the said housing being provided with bearings for the reception of a rotatable shaft, the ends of the shaft projecting into the interior of the drum and being equipped with paddles adapted for engagement with the concrete-forming mix as the latter is moved and agitated by the operation of the drum, yieldable means being provided to resist rotation of the shaft as turning forces are applied to the latter by the drum-contained mix, the shaft being provided with indicating devices, readable from the exterior of the drum, for disclosing the degree of deflection of the shaft from its normal position, whereby the mixer operator, by visually noting the operating positions of the indicating devices with reference to a graduated scale, may determine with facility and accuracy the condition of the materials undergoing mixing.

For a further understanding of the invention, reference may be had to the following description and the accompanying drawings, wherein:

Fig. 1 is a side elevational view of a concrete mixer provided with a slump or consistency indicating means constituting the present invention;

2

Fig. 2 is a horizontal sectional view taken on the plane indicated by the line II-II of Fig. 1;

Fig. 3 is a vertical sectional view on the plane indicated by the line III-III of Fig. 1;

Fig. 4 is an enlarged front elevational view of the indicating means;

Fig. 5 is a side elevational view, partly in section, of a concrete mixer provided with a modified type of indicator;

Fig. 6 is a detail sectional view taken through the drum and its bearings for the support of the indicator;

Fig. 7 is a fragmentary end elevational view of the drum of the mixer and the indicator.

Referring more particularly to the drawings, the numeral 10 designates the reversibly rotatable drum of a power driven concrete mixer. The drum is suitably supported in connection with the base frame 11 for rotation about its longitudinal axis and, in this connection, is provided at one end with a ring 12 adapted for engagement with a cradle in the form of a plurality of frame-carried rollers 13. The opposite end of the drum may be equipped with the usual gear ring 14 by means of which power may be applied to the drum to effect its rotation in the customary manner. The interior of the drum is equipped with the usual spiral blades 15 by means of which the mix, consisting of the mineral aggregate, cement and water, is agitated by being cascaded within the drum and advanced generally from one end to the other thereof and then reversed to move in the opposite direction. It will be understood that the mixer as thus far described is of standard design and operation and, therefore, a more extended explanation relative thereto is deemed unnecessary.

The present invention consists in the application to the drum of such a mixer of an improved consistency or slump indicator by which the mixed state of the concrete-forming materials within the drum may be exteriorly denoted while the mixer is in active operation. In this regard, our improved indicating mechanism comprises an open-sided housing 16 which is mounted in an opening 17 formed in the peripheral wall of the drum 10. The body of the housing projects into the interior of the drum at a position where it does not interfere with the spiral agitating blades 15, and the outer portion of the housing is marginally flanged as at 18 and welded or otherwise fastened to the outer surfaces of the drum wall, whereby to produce a rigid fluid-tight union between the housing and the drum.

The housing is provided with longitudinally aligned bearing extensions 19 which receive, in a

preferred form of our invention, rubber bushings of the Torflex type, each bushing consisting of inner and outer concentrically arranged metallic bands 20 and 21, respectively, which are permanently joined to an interposed collar 22 of rubber or other resilient pressure-deformable materials. The outer band 21 of each bushing has a tight or press fit with the inner wall surfaces of the bearing extensions 19, while the inner bands 20 are correspondingly fitted upon the outer surfaces of a paddle shaft 23. The fit and construction of the bushings is such as to normally restrain the shaft 23 against rotation from its normal position. However, as rotating forces are applied to the shaft, the rubber collars 22 of said bushings admit of limited rotation on the part of the shaft and against progressively increasing yielding resistance.

The ends of the shaft 23 project beyond the bushings into the interior of the mixer drum and have bolted or otherwise fastened thereto, as at 24, a pair of paddle members 25. These members are arranged in the paths of mix movement within the interior of the drum, and as the mix increases in consistency or plasticity, due to the agitation afforded by the drum, the mix exerts greater and greater pressure on said paddle members, such pressures being used to cause rotation of the shaft 23 against the resistance exerted thereon by the Torflex bearings. This movement of the shaft 23 is used to operate an externally viewable indicator mechanism.

Preferably, this mechanism consists of a plurality of arms indicated at 26, 27 and 28. The outer arms 26 and 28 are provided with split hubs 29 and 30, which have frictional clamping engagement with bearing extensions 31 projecting inwardly from the wall regions 19. The outer ends of the arms 26 and 28 are laterally bent as at 32 for movement relative to a fixed graduated scale 34. The arm 27 has its hub secured directly to the shaft 23 for movement in unison with the paddle members 25, the outer end of the arm 27 being disposed between the laterally bent outer ends of the arms 26 and 28.

In practice, the arms 26 and 28 are rotatable on the bearing extensions 31 in unison with the movement of the indicator 27, the arms 26 and 28 being so movable in accordance with the direction of rotation of the mixing drum 10. Following maximum deflection of the indicator 27 and its subsequent return to its normal or neutral position, under the influence of the rubberized torsion bearings, the arm 26 or 28 which has been deflected remains in its position of maximum deflection, so that when the rotation of the drum is stopped, the position of the deflected arm 26 or 28 with reference to the scale graduations 34 may be duly noted by the operator. Thereafter, the deflected arm is manually restored to contact with the neutrally positioned indicator for a succeeding operation. Thus, the arms 26 and 28 are moved in one direction automatically by the indicator and are returned to a starting position through a manually executed operation, there being enough friction between the hubs of the arms 26 and 28 and the bearing extensions to hold said arms in their positions of maximum deflection.

It will be seen that as the shaft 23 rotates, the arm 27 will move in unison therewith and will engage one or the other of the arms 26 or 28, depending upon the direction of rotation of the mixer drum 10. Since the arms 26 and 28 have a tight fitting engagement with the bearing exten-

sions 31, these arms will remain in the positions to which they were advanced by the oscillation of the arm 27, thereby providing for an accurate reading of the indicator irrespective of the oscillations imparted to the shaft 23 during rotation of the drum in different directions.

Also, it will be seen that as the mix is cascaded within the drum of the mixer and by the operation of the baffles 15 advanced toward one end of the drum and then toward its opposite end, the paddle members will be deflected thereby, causing the shaft 23 to rotate against the resistance offered by the bushings indicated at 20, 21 and 22, thus causing the indicator arm to move over the scale 34 in one direction or the other from a central position. By virtue of its external mounting, the indicator may be readily viewed by the mixer operator, and when the indicator arms reach a predetermined position with reference to said scale, the operator will thereby be apprised of the fact that the mix has reached a condition suitable for pouring or discharge from the mixer.

While the structure herein disclosed is preferred because of its relative simplicity, it is, of course, subject to certain variation or modification without departing from its essential features. For example, the paddle shaft may be biased by a metallic spring rather than by employing the torsional bushings or a single indicator arm may be used instead of the plurality of arms here disclosed.

As shown in Figs. 5, 6 and 7, the shell of the drum 10a is provided at one end with a recess 35, in which is positioned stationary bearings 36 for the reception of an indicator shaft 37. One end of this shaft projects through an opening 38 into the interior of the drum, and is laterally bent as at 39 to receive a paddle member 40. The coil spring 41 has one end thereof secured to the shaft 37 and its other end engaged with a notch 42 provided in one of the bearings 36. The outer end of the shaft has fastened thereto the hub of an indicator arm 43 which is movable over the graduated surface 44. As the consistency of the mix increases, the latter exerts greater pressures on the paddle member 40, turning the shaft 37 against the resistance of the spring 41 and moving the indicator 43 relative to the graduated surface 44. It will be observed that in this form of our invention, as well as in the preceding form, the indicating mechanism is carried solely by the revolving drum and is viewable exteriorly of the latter to obtain desired readings. However, in the modified form, the indicating mechanism is disposed in one end of the mixer drum instead of at one side thereof. The paddle member 40 is disposed so that regardless of the direction of rotation of the drum 10a, and the flow of the materials undergoing mixing in said drum, the indicator will function to disclose the consistency of the mix, the spring 41 serving to maintain the indicator arm 43 in a given or neutral position when relieved of the pressures of moving materials within the drum. However, during a mixing operation, the pressure impact of the moving batch of material on the paddle member will rock the shaft 37 against an increasing yielding resistance in actuating the indicator arm.

We claim:

1. A consistency indicator for concrete mixers having a mix-receiving drum, said indicator comprising an open-sided housing provided in the wall and extending into the interior of said drum, a shaft turnable in bearings provided in the walls of said housing, the ends of said shaft

5

projecting into said drum, mix-engaging paddle means disposed in and fixed to the ends of said shaft, said paddle means being arranged in the paths of mix travel within said drum, yieldable means resisting turning movement of said shaft from a normal position, and an indicator element fixed to turn with said shaft, said indicator element being positioned in said housing and having its outer end disposed for movement relative to a graduated surface provided on the exterior of said drum.

2. A slump indicator for concrete mixers having a mix-receiving drum, said indicator comprising a housing provided in the wall and extending into the interior of said drum, said housing having an open front, aligned torsion bushings fixed to the walls of said housing, a paddle shaft carried by said bearings to cause flexure of the latter when rotated, mix-engaging paddle means received in said drum and fixed to said shaft, and an indicator element mounted to turn with said shaft, said indicator element being positioned in said housing and having its outer end disposed for movement relative to a graduated surface viewable from the exterior of said drum.

3. A slump indicator for concrete mixers having a rotatable mix-receiving drum and agitating means disposed within said drum for causing movement of the concrete mix contained therein longitudinally in both directions of said drum, said indicator comprising a rotatable element supported by the walls of said drum, paddle members connected with said rotatable element arranged in the paths of mix flow within said drum, means yieldingly resisting rotation of said element in either direction from a normal position, and an indicator element movable in unison with said rotatable element, said indicator element terminating exteriorly of said drum for movement relative to a dual graduated surface provided on the exterior of said drum.

4. In a concrete mixer of the type having a rotatable mix-receiving drum and agitating and conveying blades provided internally of said drum for causing the mix to travel longitudinally in both directions through said drum while being agitated, a slump indicator carried solely by said drum, said indicator embodying a rotatable element disposed both inside and outside of said drum, means yieldingly resisting rotation of said element in either direction from a normal position, mix-engaging paddles carried by said element, said paddles being disposed in the paths of movement of the mix within said drum, and an externally viewable indicator mounted for rocking movement in unison with said element.

5. A slump indicator for concrete mixers having a rotatable mix-receiving drum, said indicator comprising an open-sided housing provided in the outer wall of said drum, a rotatable element supported by said housing, a paddle member secured to said rotatable element and disposed in the path of mix travel in said drum, resilient means resisting rocking movement on the part of said element in response to mix pressures applied to said paddle member, and an indicator element fixed to rock with said rotatable element, said indicator element being positioned in said housing and having its outer end disposed for movement relative to a graduated surface viewable from the exterior of said drum.

6. A slump indicator for concrete mixers comprising an open-sided housing adapted to be se-

6

cured to the outer wall of a mixer drum, a rockable element carried by said housing, resilient means resisting rocking movement of said element in either direction from a normal position, a paddle member secured to said element and disposed in the paths of mix flow in the associated mixer drum, and an indicator element movable in unison with said element, said indicator element having its outer end disposed for movement relative to a stationary graduated surface disposed exteriorly of the housing.

7. Consistency indicating mechanism for concrete mixers comprising a supporting housing adapted to be mounted in a fixed position in the outer wall of a mixer drum, spaced aligned bearings provided in the walls of said housing, a shaft extending through said bearings, bushings disposed in said bearings, each of said bushings embodying an outer band fixed to its bearing and an inner band fixed upon said shaft and a collar of resilient material interposed between said bands and secured thereto, a paddle member fixed to said shaft and adapted to be disposed in the path of movement of a concrete mix agitated in the associated drum, and an indicator arm fixed to said shaft for rotation in unison therewith, the outer end of said arm being movable relative to a graduated surface provided exteriorly on said housing.

8. Mix consistency indicating mechanism for a concrete mixer of the type having a reversibly rotatable mix-receiving drum with agitating means disposed within said drum, said mechanism comprising a rockable member supported in bearings carried by said drum, yieldable means normally maintaining said member in a fixed position of operation, paddle means carried by said member and arranged in the path of movement of the mix within said drum to effect rocking movement of said member against a progressively increasing resistance offered by said yieldable means, and an indicator element mounted to oscillate in unison with said member, said element being viewable exteriorly of said drum and movable to indicate mix consistency irrespective of the direction of rotation of said drum.

9. Mix consistency indicating mechanism for a concrete mixer of the type having a reversibly rotatable mix-receiving drum with agitating means disposed within said drum, said mechanism comprising a rockable member supported in bearings carried by said drum, yieldable means normally maintaining said member in a fixed position of operation, paddle means carried by said member and arranged in the path of movement of the mix within said drum to effect rocking movement of said member against a progressively increasing resistance offered by said yieldable means, an indicator element mounted to oscillate in unison with said member, said element being viewable exteriorly of said drum and movable to indicate mix consistency irrespective of the direction of rotation of said drum, and a pair of arms frictionally rotatable on said bearings, said arms being arranged on opposite sides of said indicator element in order to be movable in unison with said element when the latter is deflected by the actuation of said paddle means and to be restored manually into engagement with said element when the latter occupies its normal undeflected position.

CLARENCE I. BOHMER.
ARNOLD S. MILLIKIN.