March 14, 1933. A. KNOWLES 1,901,305

CONCRETE MIXER BLADE

Filed Dec. 28, 1929

FIG. 1.

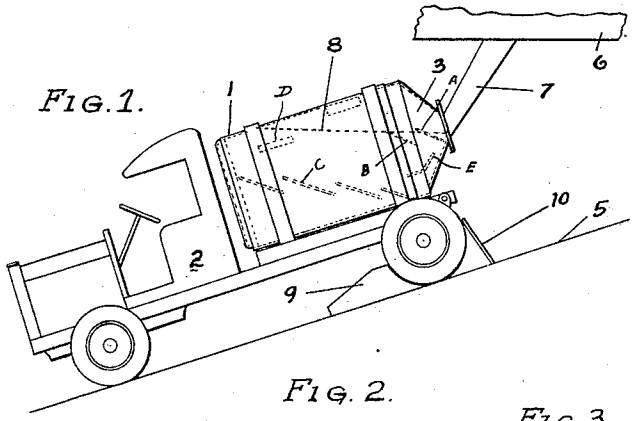


FIG. 2.

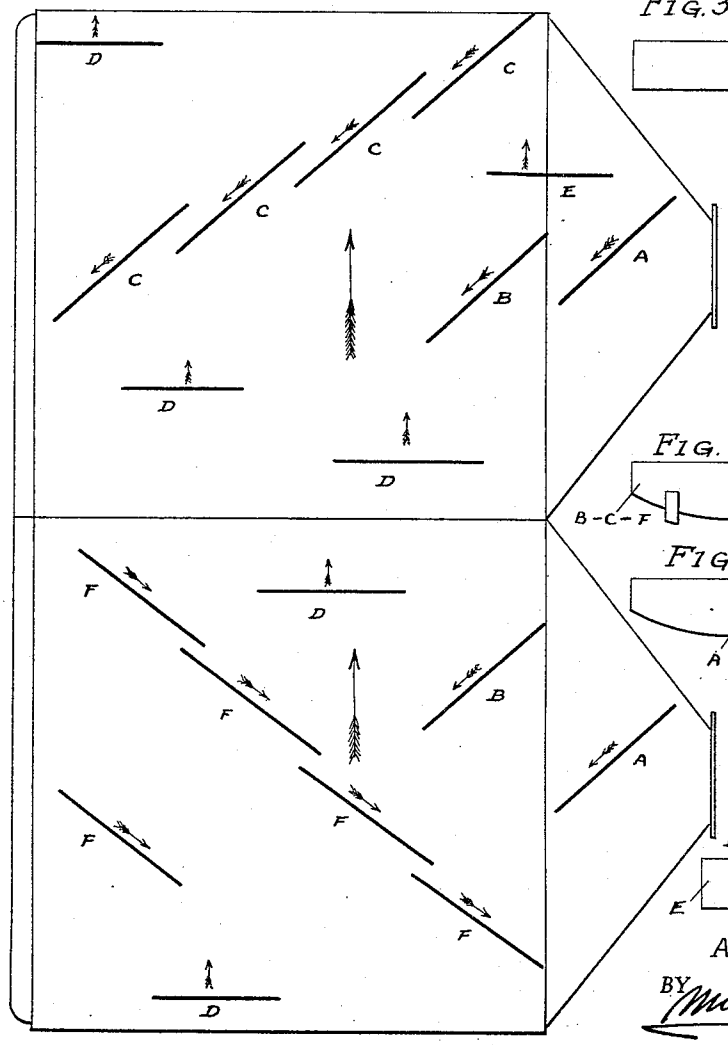


FIG. 3.

FIG. 4.

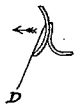


FIG. 5.

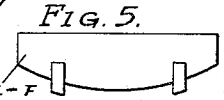


FIG. 6.



FIG. 7.

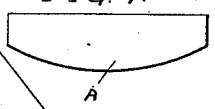


FIG. 8.

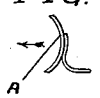


FIG. 10.

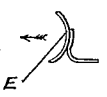
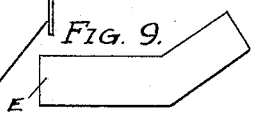


FIG. 9.



INVENTOR.
ALBERT KNOWLES.

BY Miller Boykan & Brieel

ATTORNEYS.

Patented Mar. 14, 1933 1,901,305

UNITED STATES PATENT OFFICE

ALBERT KNOWLES, OF SAN FRANCISCO, CALIFORNIA

CONCRETE MIXER BLADE

Application filed December 28, 1929. Serial No. 417,109.

This invention relates to portable concrete mixers of the type shown in my copending patent application filed under Serial No. 406,359 and has for its object a special arrangement of mixing blades for the revolvable mixing drum found after long experimentation to produce a more perfect mix with a large load in a given length of time than formerly possible in a drum of the kind and in which the drum is of dimensions making it longer than its diameter.

In the drawing hereto annexed, Fig. 1 is a side view of a motor truck concrete mixer with a revolvable drum of the kind mentioned mounted thereon and backed up at an angle to receive its load of material through an opening in the rear conical end of the drum.

Fig. 2 is an enlarged development plan of the drum with the drum cut and unrolled flat to show the arrangement of mixing blades therein.

Figs. 3, 5, 7 and 9 are enlarged side elevations of the various blades used in the drum, while Figs. 4, 6, 8 and 10 are respectively end elevations of the blades.

With respect to Fig. 1 the revolvable drum 1 mounted on motor truck 2, is closed at the front end, and provided with a short conical end 3 at its rear end with a round opening fitted with a removable door which is locked in place over the opening during transportation and mixing of the load, and removed for filling and discharging, or the door is sometimes hinged to the drum.

Transit mixing trucks of this kind are arranged for revolving of the drum in either direction by the truck engine and to tilt the drum upwardly at its forward end to discharge the load by gravity from the conical end all by means of well known construction not shown.

As the cost of such truck mixers is very great it has been found that they cannot be made to pay a proper return on the investment unless the load carried is large relative to the cost of the mixer and accordingly attempts have been made to utilize as long a drum as the truck would accommodate. However, when this is done we run into the difficulty of getting an even mix from end to end of the drum, a difficulty long recognized and which is the reason why all large mixers of the nonportable type are always short relative to their diameters, or so formed as by having the drum double-conical in shape so as to constantly throw the material to the center of the drum.

Heretofore it has been customary to load the drums of truck or transit mixers about half full, and sometimes less in order to secure a good mix, but as stated, this at once reduced the returns on the investment.

In the present invention I am able to use a long drum, carry an extra large load, and yet secure a perfect mix from end to end of the drum in minimum length of time. This is due to the arrangement of blades within the drum as well as the method of loading to take advantage of the arrangement of blades in building up a large load in the drum.

By my improvements there is provided a series (A, B, C) of blades within the drum arranged at an angle to screw the material from the receiving or rear end toward the front end, other blades (D, E) to bodily lift the material, and another series (F) to screw the material back towards the receiving end.

In Fig. 2 the arrangement of the blades on the development plan of the drum is shown, while Figs. 3 to 10 show the side and end views of the blades.

Blades B, C and F are spaced outward from the wall of the drum to leave a space of about a couple of inches, while the other blades are in contact with the drum wall.

Blade E is in a special position extending partly along the cylindrical wall of the drum and partly along the conical wall in an angular manner as shown in Fig. 9. The function of this blade is to constantly throw some of the material out of the cylindrical portion into the conical portion of the drum, for as it rises out of the material the portion on the cone assumes a downward slant to cause the material to flow outwardly to the cone. More than one E blade may be used.

The drum is revolved in direction indicat-

ed by the large arrows while loading or mixing, and the small arrows indicate the action of each blade on the material.

When loading the drum, and in order to minimize the action of the return blades F so that a heavy load will be banked up in the drum, I back the truck 2 up at an angle 5 under the hopper 6, open the conical end of the drum, run a spout 7 into it, and then slowly rotate the drum by the truck engine so as to screw the material along and bank it up as at 8, after which the wheel blocks 9 are moved forward a little, revolutions of drum stopped, the door or cover plate 10 clamped in place over the opening in the conical end of the drum, and the truck sent to its destination while again revolving the drum.

When discharging the load the drum is tilted and revolved in the opposite direction so that blades A and B particularly will screw out or eject every bit of material, the drum usually being rinsed out with a little water before returning for the next load.

The invention is equally valuable whether used on ready mixed wet concrete material from a central plant, or upon dry materials with water added just before leaving, or if used with water-carrying mixers in which the water is added at the job or just before reaching it.

In considering Fig. 2 it will be seen that I provide two reverse series of blades C and F running the full length of the cylindrical portion of the drum and that the individual blades of these series are in overlapping relation. Also that the straight lifting blades D are scattered through the drum in a manner so that the end of each is overlapped at some point in the diameter of the drum by another D blade, and further that the extreme conical end of the drum is fitted with "screwing in" or A blades only.

The value of blade or blades E would not be clearly seen by the layman, but it is of considerable importance in preventing segregation of the stones at the end of the load into the cone.

Attention is also called to the fact that blade E as well as all of the other blades are transversely curved with concave side facing the direction of travel when mixing.

The general arrangement of blades described has been worked out after a long series of experiments for while at first thought it would seem that a mass of concrete materials revolved in a drum with blades lifting the material from beneath to fall on top would result in an even mix, practice has shown that this is not so as the constant motion will gradually separate the heavier stones from the other material, and the difficulty of securing an even mix increases greatly with longer drums so that tests from various parts of a mix made in prior long drum mixers showed a great difference in distribution of the cement and rock, so as to affect the strength all the way from 10 to 20% even after long mixing, whereas with my arrangement of blades tests recently made in highway work showed a substantially even mix and strength from end to end of the drum, and since I have closely followed the development of the art and built many such mixers I feel that the arrangement of blades in an elongated drum type mixer as disclosed represents an important advance in the art.

In thus presenting my invention I wish to say that I am fully aware of the fact that many patents have been issued for various arrangements of blades in a concrete or other mixing drum, but most of them relate to the short type of drum only, and I am not aware that any successful arrangement of blades has heretofore been purposed which would operate successfully with the long type of drum having one closed end and both receiving and discharging its load from a single conical end, nor am I aware of any system of loading in which the directional action of the blades is made to cooperate with the angular position of the truck and direction of rotation of the drum so as to build up a large pay load as shown and described herein.

I claim:

1. In combination with a revolvable cylindrical concrete mixer drum which is relatively long to its diameter, a series of angularly arranged blades secured to the inner surface thereof extending substantially from end to end of the drum, and a similar series of opposite angular arrangement and a plurality of non-angularly disposed lifting blades placed at various places throughout the drum in a manner to successively exert a lifting action on material from end to end of the cylinder.

2. In a construction as specified in claim 1, the lifting blades being in contact with the side wall of the drum and the angularly arranged blades being spaced away therefrom.

3. In a revolvable cylindrical concrete mixer drum provided with a relatively short cone at one end through which material to be mixed is received and discharged, a plurality of blades secured to the inner wall of the drum arranged at opposite angles of inclination for screwing the material back and forth in the cylindrical portion of the drum as the same is revolved, and blades in the cone portion of the drum inclined to screw the material one way only upon one way revolution of the drum.

4. In a revolvable cylindrical concrete mixer drum provided with a relatively short

cone at one end through which material to be mixed is received and discharged, a plurality of blades secured to the inner wall of the drum, angularly disposed blades on the inside of the cone arranged to screw material from the cone into the cylindrical portion of the drum upon one way revolution of the drum and a blade extending from the cylindrical portion of the drum into the cone arranged for leading material from the cylindrical portion to said cone as the drum revolves.

ALBERT KNOWLES.