No. 764,557. PATENTED JULY 12, 1904.

H. CAMPBELL.

CONCRETE MIXER.

APPLICATION FILED JUNE 1, 1903.

NO MODEL. 4 SHEETS—SHEET 1.

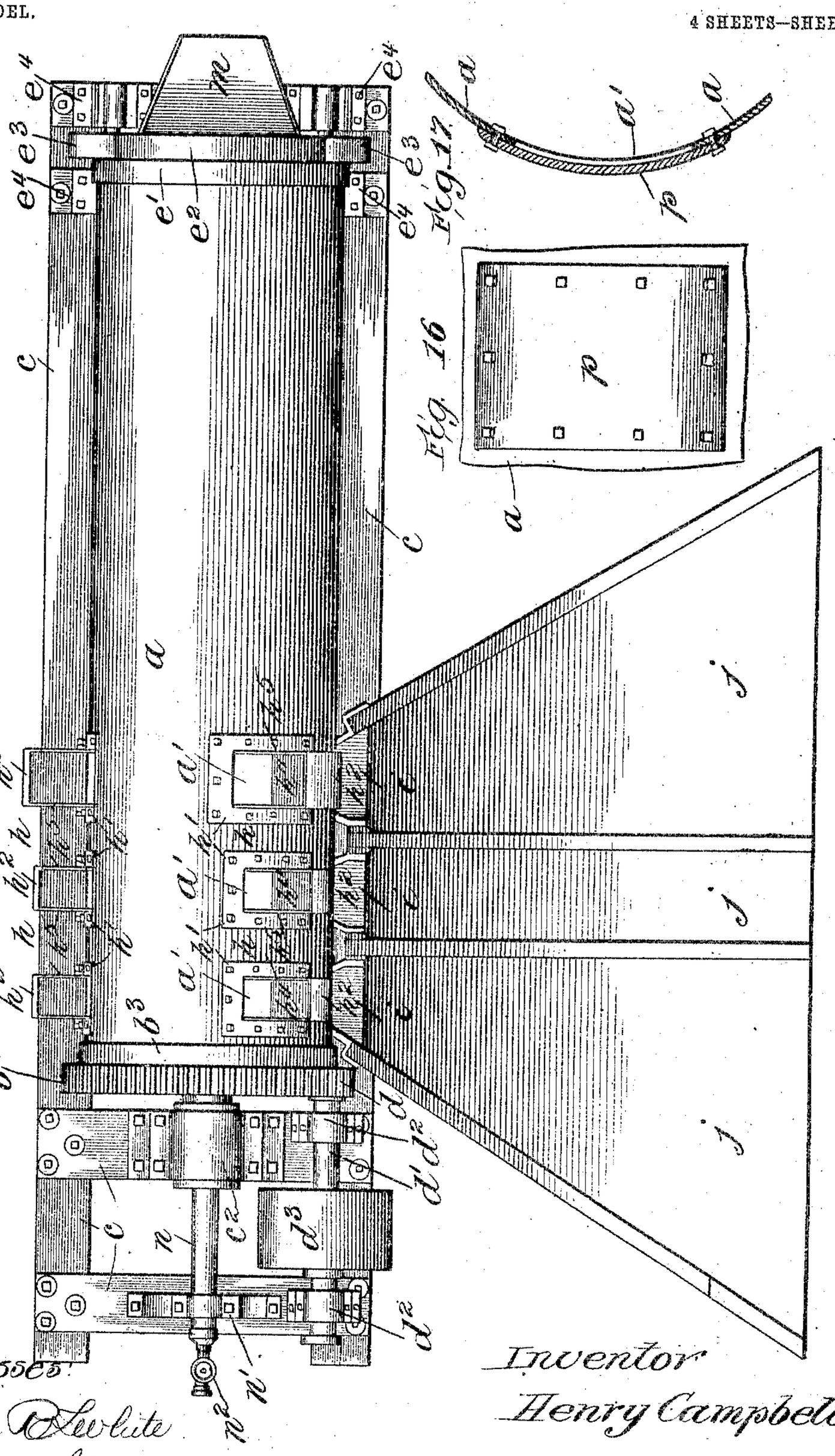

Fig. 1.

Fig. 17.

Fig. 16

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By Howard M. Cox Atty.

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NO MODEL. 4 SHEETS—SHEET 2.

Fig. 2.

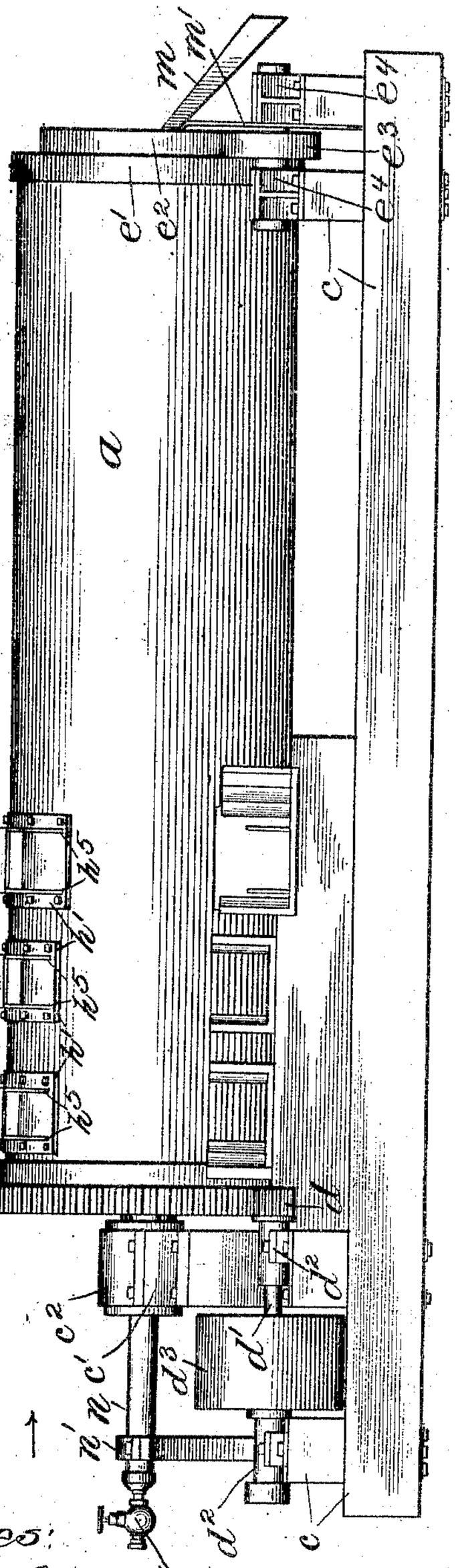


Fig. 14.

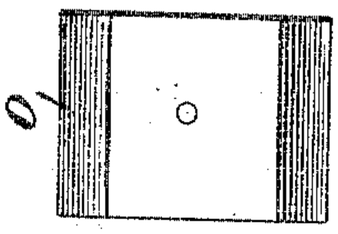


Fig. 15.

Fig. 13.

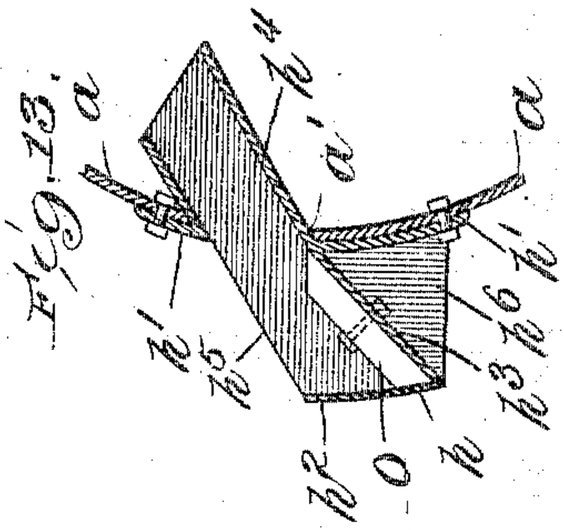
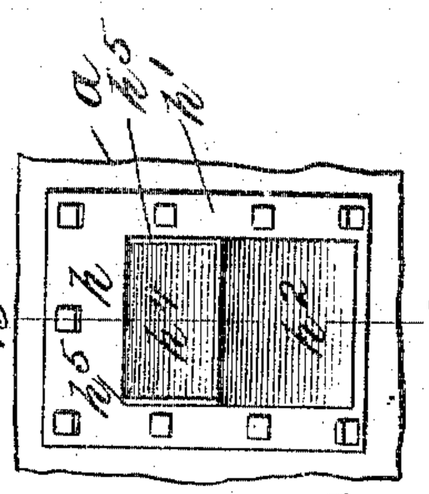


Fig. 12.



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NO MODEL. 4 SHEETS—SHEET 3

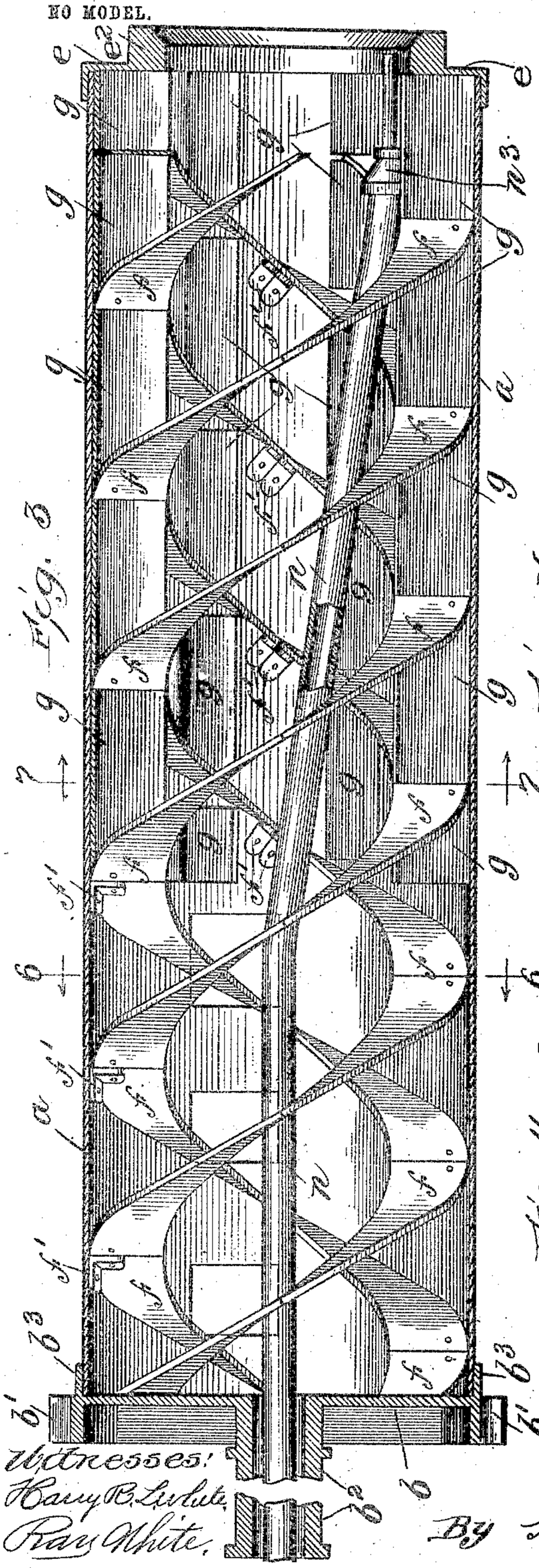

Fig. 3.

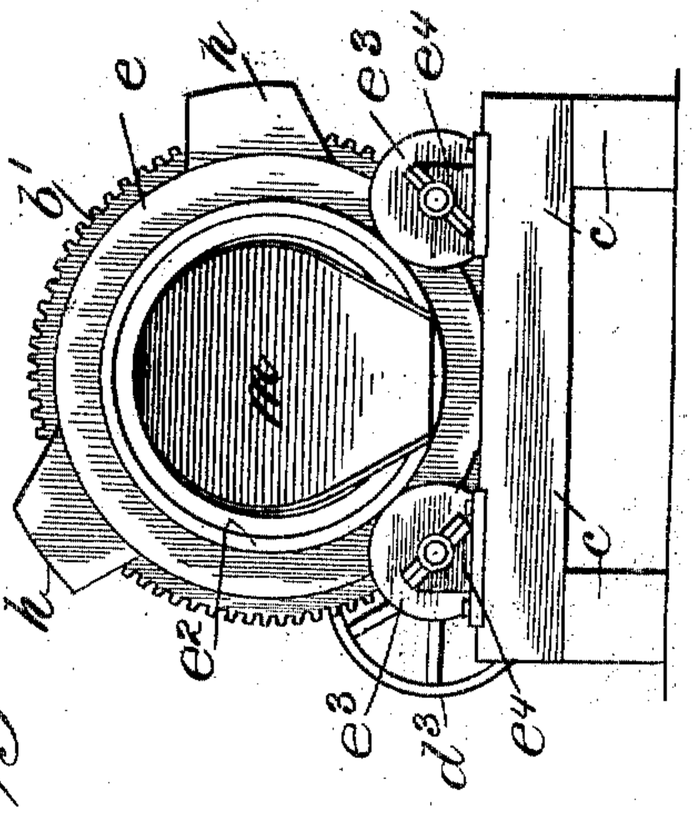

Fig. 5.

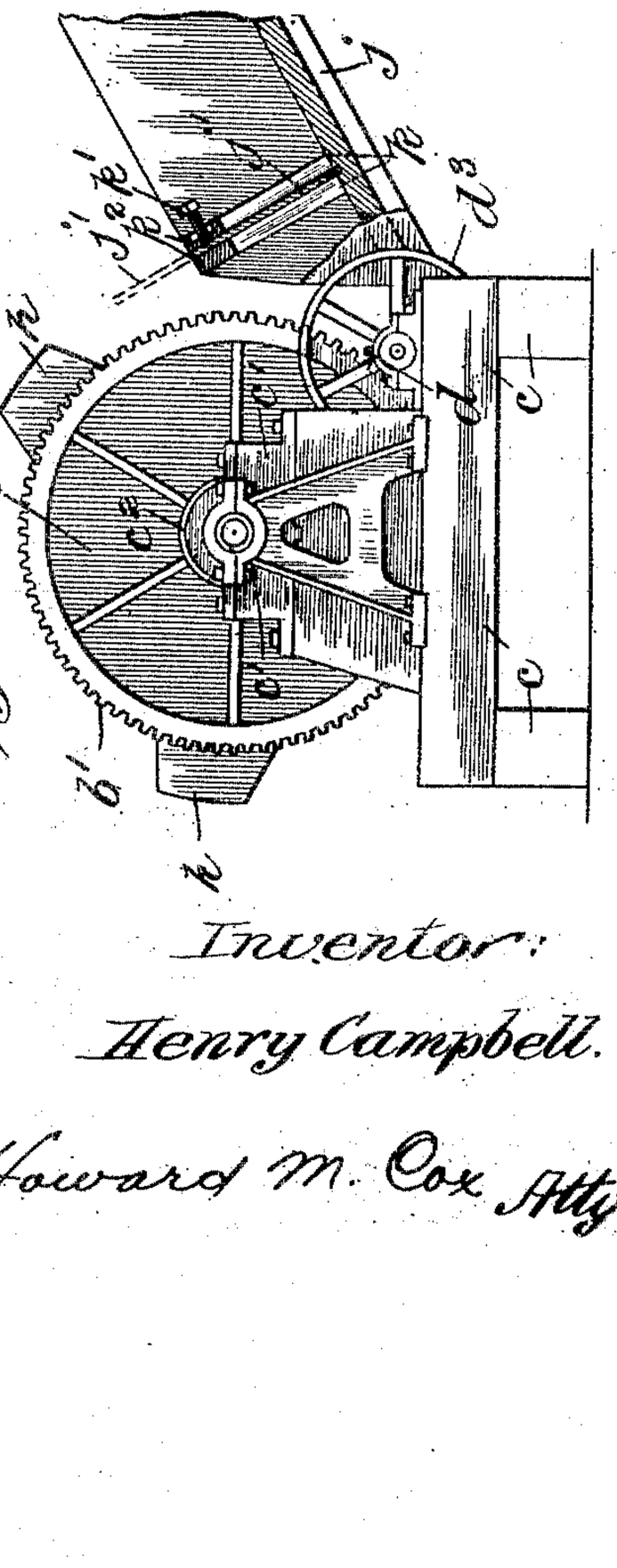

Fig. 4.

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APPLICATION FILED JUNE 1, 1903.

NO MODEL. 4 SHEETS—SHEET 4.

Fig. 6.

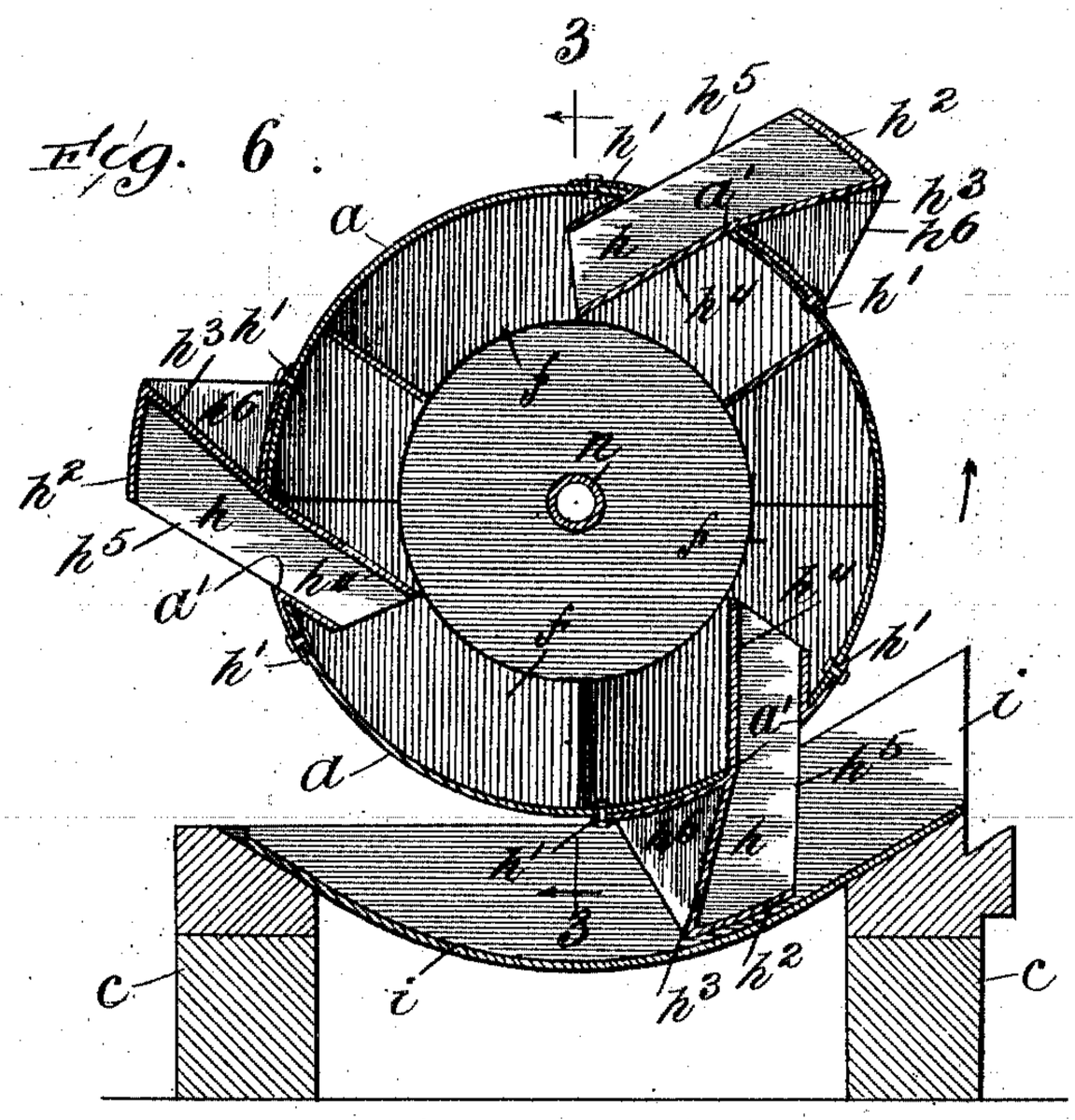


Fig. 8.

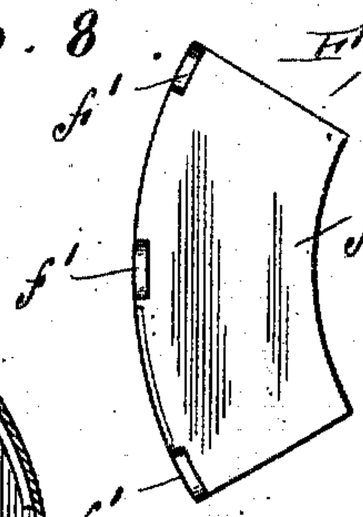


Fig. 9.

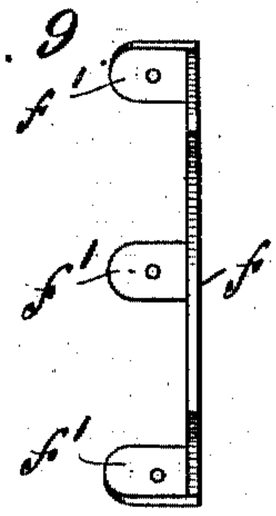


Fig. 7.

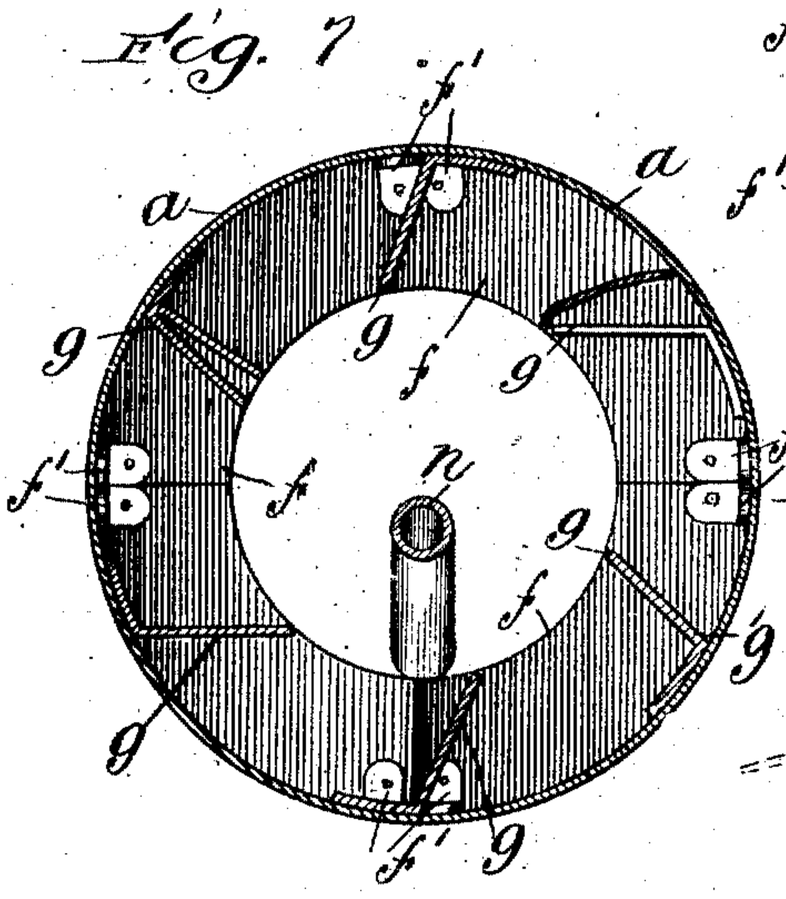


Fig. 10.

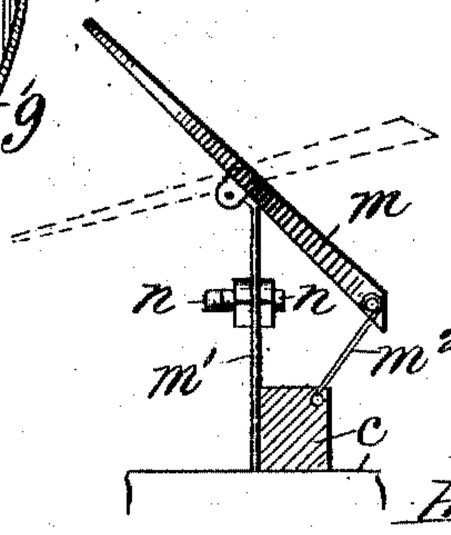
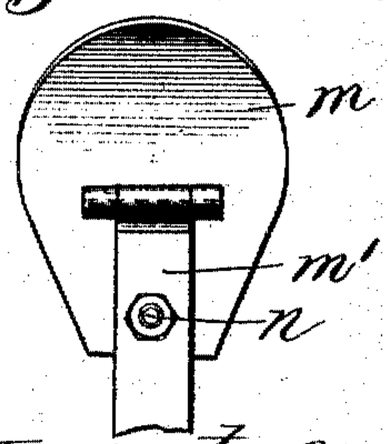


Fig. 11.



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No. 764,557. Patented July 12, 1904.

UNITED STATES PATENT OFFICE.

HENRY CAMPBELL, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO EDWARD O. MARSH, OF JACKSON, MICHIGAN.

CONCRETE-MIXER.

SPECIFICATION forming part of Letters Patent No. 764,557, dated July 12, 1904.

Application filed June 1, 1903. Serial No. 159,619. (No model.)

To all whom it may concern:

Be it known that I, HENRY CAMPBELL, a citizen of the United States, residing in the city of Chicago, county of Cook, and State of Illinois, have invented a new and useful Improvement in Concrete-Mixers, of which the following is a specification.

My invention relates to concrete-mixers wherein cement, crushed stone, and sand are commingled and moistened for the production of concrete; and the objects of my invention are, first, to provide convenient and efficient means for introducing the ingredients into the drum; second, to provide means for controlling the proportion of the different ingredients entering into the drum; third, to provide means for obtaining an intimate mixture and afford moistening of the materials within the drum; fourth, to provide suitable means for discharging the mixed materials from the drum, and, fifth, to provide the other details of construction hereinafter more fully set forth. I obtain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a plan view of the complete machine. Fig. 2 is a side view thereof with the exception of the storage-bins. Fig. 3 is a vertical longitudinal section of the drum, showing the helical conveyer-flights and the pick-ups. The view is taken looking in the direction of the arrows on the line 3 3, Fig. 6. Fig. 4 is an end view of the drum and gearing looking in the direction of the arrow, Fig. 2. The lower extremity of the storage-bins is also shown. Fig. 5 is an end view of the drum looking in the direction opposite to the arrow, Fig. 2. Fig. 6 is a sectional view of the drum, taken on the line 6 6, Fig. 3. This figure shows the trough and the buckets whereby material is transferred from the trough to the interior of the drum. Fig. 7 is a transverse sectional view of the drum, taken on the line 7 7, Fig. 3, so as to illustrate the construction of the pick-ups. Figs. 8 and 9 are face and edge views, respectively, of a section of conveyer-flight. In said Fig. 9 the flight is shown in the flat—that is to say, the condition prior to being bent into helical form. Fig. 10 is a detail view from the side, showing the discharge-chute at the discharge end of the drum. Fig. 11 is a view of said discharge-chute looking in the direction of the arrow, Fig. 10. Fig. 12 is a face view of the outer extremity of one of the buckets. Fig. 13 is a view of the bucket, taken on the line 13 13, Fig. 12. Figs. 14 and 15 are edge and face views, respectively, of a reducer for the buckets to be placed at the receiving-apertures of the drum to regulate the amount of material entering thereinto. Figs. 16 and 17 are face and sectional views, respectively, showing a modified form of reducer.

Similar letters refer to similar parts throughout the several views.

The drum *a* consists of a cylinder, preferably of sheet metal and arranged so that its central axis is approximately horizontal. The drumhead *b* forms a closure for the receiving end of the drum and by preference is cast of a piece with the spur-gear b' and hollow journal-bearing b^2. The flange b^3 is provided for riveting the head to the shell of the drum. The framework *c* carries a pillow-block c' and pillow-block cap c^2, wherein the journal b^2 has a bearing. Said spur-gear is driven by means of the spur-pinion *d*, mounted on the short shaft d', said shaft being journaled in the bearings d^2 d^2, driven by means of the pulley d^3. The discharge end of the drum is closed by means of the head *e*, which has a flange e' for riveting to the shell of the drum and also a circular track e^2, which is supported by the rollers e^3 e^3. Said rollers are supported on suitable jack-shafts mounted in the bearings e^4 on the framework of the machine. The conveyer-flights *f* are for convenience made in section, as illustrated in Figs. 3, 8, 9, and are secured within the drum *a* by means of the knees or lugs f'. Said flights are helical in form and by preference there are three complete sets of flights in the drum, so that said flights will have a pitch three times as great as the distance between any two adjacent flights—that is to say, the flights will correspond to a triple-threaded screw. Said flights preferably extend the entire length of the drum with the exception of a short space—

for example, ten inches—at the discharge end of the drum.

In addition to the conveyer-flights the drum is provided with a series of angle pick-ups g, pitched at an angle of approximately sixty degrees with a line tangent to the shell of the drum. Said pick-ups are riveted to the shell and extend lengthwise thereof and are located between the discharge end of the shell and the point of location of the receiving-buckets.

Near the receiving end of the drum are three sets of buckets $h\,h$, there being, by preference, three buckets in each set, with each bucket in the set circumferentially equidistant from the other two. The peculiar configuration of said buckets is best shown in Figs. 6, 12, 13, wherein h' represents the flange whereby they are secured in position upon the drum at the apertures a' in said drum. h^2 represents scrapers which are located outside of the drum and serve to gather up and carry material from the trough i, hereinafter referred to. Said scrapers are approximately cylindrical and concentric with the axis of the drum. Leading from said scrapers h^2 to the drum and extending at an oblique angle to a tangent drawn to the drum at the point of location of the buckets is the bucket-bottom h^3, which connects with and is preferably integral with the chute portion h^4 of said buckets. Said chute portion h^4 extends to a point inside of the shell of the drum a, preferably a distance equal to one-quarter to one-half of the drum radius. The object of the chute portion h^4 of the bucket is not only to guide the material into the drum, but to act as a guard or trap to prevent the unwarranted escape of material from the drum when any given bucket is at or near a temporarily low portion of the drum. This fact will be apparent by referring to Fig. 6 of the drawings, wherein it is obvious that material entering into the bucket temporarily at the top of the drum is prevented from escaping through the bucket temporarily at the left of the drum and is similarly prevented from escaping through the bucket at the bottom of the drum. The buckets are provided with sides h^5 for preventing material from escaping laterally.

In order to strengthen the construction, the webs h^6 are provided, which extend from the flange h' to the bottom h^3 of the bucket.

Another purpose served by the inwardly-extending portions of the buckets is to prevent material lying at the bottom of the drum from overflowing into the bucket-openings, and thus escaping from the drum. To insure the retention of the material, it is only necessary that the inner chute extensions exceed the depth of material at the drum-bottom.

Beneath each set of buckets is located a trough i, which is concentric with the drum a and located in such position as to lie close to but not interfere with the scrapers h^2 of the buckets h. Said troughs are supported on the framework of c and connect with and receive material from the storage-bins $j\,j\,j$. At the chutes formed at the lower extremity of said bins are bin-gates j'' for the purpose of shutting off or otherwise controlling the supply of material. In the preferred construction said bins pitch downward toward said troughs i, so as to deliver material thereinto, and a separate trough is provided for each bin. In the form of machine here shown the central bin is the smallest and adapted to contain cement, while of the two outer bins the one nearest the drumhead b is adapted to contain sand and the one farthest from the said drumhead b is adapted to contain stone. It is desirable that the buckets at the bottom of the stone-bin have a capacity approximately twice as great as the capacity of the other buckets. By preference said bin-gates j'' are constructed to slide in the guides k, located at the side of the bin-chutes. In order to set the gates in an open or closed position, a set-screw k' is provided, which is mounted in the cross-beam k^2 in the manner best shown in Fig. 4.

At the discharge end of the drum is located a discharge-chute m, carried on the bracket m', bolted to a suitable cross-timber of the framework. The upper end of said chute normally lies within the drum, while the lower edge thereof lies outside of said drum in position to discharge into a barrow or other suitable receptacle. In order that material may not be discharged from said chute at times when there is no receptacle in readiness, said chute is in its best form pivotally hung upon its bracket, so that the outer extremity may be thrown upward. By making the inner end heavier there is a tendency for the chute to rotate to a position in which it will not discharge the contents of the drum. In order to hold the chute in operative position, a hook m^2 is provided, as shown in Fig. 10.

The necessary water for mixing the concrete is introduced within the drum through the pipe n, which is supported at one end upon the bracket n'. Said pipe is connected with any suitable source of supply and is preferably provided with a valve n^2 for controlling the flow of water. Said pipe passes into the drum through the hollow journal b^2, and preferably terminates at its further extremity with an eccentric reducer n^3, which is screwed into the pipe n^4, supported in the bracket n^5. Said pipe n^5 is plugged in a suitable manner, and the bottom of the pipe n is perforated to discharge water onto the material under treatment. The perforations in said pipe are preferably located one-third of the distance from the innermost bucket toward the discharge end of the drum.

In operation the sand, cement, and stone are introduced in their respective bins and the bin-gates j'' are opened up such an amount as will supply the requisite quantity of mate-

rial in the respective troughs *i*. The drum is rotated in the direction located by the circular arrow, Fig. 6, and the buckets *h* will consequently gather the material in said troughs. As a bucket rises, due to the rotation of the drum, the material will at first rest upon the scraper h^2; but gradually, as the bucket rises, the material will slide along the chute h^4 and be dropped into the drum. This dropping action continues throughout a considerable arc at the top of the drum, thus assisting in effecting thorough mixture. Inasmuch as the sand and cement are nearest the drumhead *b*, they will be well mixed before coming into contact with the stone. As the drum continues to revolve the flights *f* will force the material toward the discharge end of the drum, and as soon as said material has passed beyond the buckets *h* said material will be engaged by the pick-ups *g*, and thereby lifted to the upper portion of the drum. The material will thus again be dropped into the flights and pick-ups, and this action of lifting and dropping the material will be repeated over and over until the discharge end of the drum is reached, when the mixture will be thorough and complete. It will be evident that during the process of picking up there is a gathering together of the material into small masses, and as these masses are dropped they are distributed over a considerable area at the bottom of the drum, thus bringing particles into contact with other particles previously remote, and thereby producing a thoroughly mixed and homogeneous product. At the discharge end of the drum the material instead of dropping into the flights below will drop into the discharge-chute *m* and be by it delivered into a barrow or other receptacle. Inasmuch as the flights do not extend completely to the discharge end of the drum, and inasmuch as the head *e* forms a partial closure for the discharge end of the drum, material will collect in said drum at the discharge end thereof when the chute *m* is not in operative position. Consequently by releasing said chute and permitting the inner end thereof to drop downward material is not discharged, but is collected just inside of the head *e*. As soon, however, as the chute *m* is again thrown to operative position the material will be discharged in the usual manner.

The advantage in this construction is that it is not necessary to stop the drum in order to stop the discharge of material therefrom. Consequently the drum may be continuous in its mixing action; but the discharge of material may be discontinued for short intervals of time without detriment.

The best method for regulating the amount of material which will be introduced into the drum from any one bin is to regulate the amounts of material which the buckets will pick up and retain. This I accomplish by means of the reducers *o*. (Shown separately in Figs. 14 and 15.) These are preferably dish-shaped, as shown, and when bolted in position upon the bottom of the buckets in the manner illustrated in Fig. 13 constitute a false bottom, which reduces the amount which the buckets will retain. By thus reducing the capacity of one or more of the buckets of any set the proportion of material entering through that set of buckets may be regulated.

In Figs. 16 and 17 shut-off blanks *p* are shown. In using these one or more of the buckets *h* are removed from the drum and the blanks substituted. By substituting a shut-off blank for all of the buckets of any circumferential set no material will enter there, and the machine may thus be made to operate upon two kinds of material only. It is obvious also that four or more sets of buckets side by side may be employed without exceeding the spirit of my invention.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a concrete-mixer, the combination of a rotating drum and a plurality of sets of buckets along said drum for introducing material thereinto, there being a plurality of buckets in each of said sets, and the buckets of each set being arranged at different points on the circumference of said drum.

2. In a concrete-mixer, the combination of a rotating drum; a plurality of sets of buckets on said drum for introducing material thereinto, there being a plurality of buckets in each of said sets and the buckets of each set being arranged at different points on the circumference of said drum; and a separate trough for each of said sets of buckets for supplying material thereto.

3. In a mixing-machine, the combination of a drum having an aperture in the side thereof and a bucket secured to said drum at said aperture, said bucket having a scraper located outside of the drum for gathering material, and means for conveying material from the scraper into the drum.

4. In a mixing-machine, the combination of a drum having a plurality of apertures at different points in the circumference thereof, and a bucket at each of said apertures, said buckets having chutes which extend into the drum, thereby forming a trap or guard for preventing the unwarranted escape of the material from the drum.

5. In a mixing-machine, the combination of an apertured revolving drum, and a bucket for introducing material thereinto, said bucket comprising means outside of the drum for introducing material into the drum and a chute within the said drum for preventing the escape of material through said bucket, when the same is revolved to a low point.

6. In a mixing-machine, the combination of an apertured revolving drum, and a bucket for introducing material thereinto, said bucket comprising a scraper for gathering material,

a bottom at the back of said scraper for retaining material when at a low revolved position, and a chute inside of the drum and connecting with said bucket-bottom for the purpose described.

7. In a concrete-mixer, the combination of a rotating drum having an aperture in the side thereof, a bucket secured to the drum at said aperture, a scraper forming a part of said bucket and located outside of the drum for gathering material, a bottom, as h^3, also forming a part of said bucket, and means for conveying material from said scraper and bucket-bottom into said drum.

8. In a concrete-mixer, the combination of a rotating mixing-drum adapted to receive material at one end and discharge it at the other end thereof; means in said drum for conveying the material lengthwise therein; pick-ups at the discharge portion of the drum; said drum having apertures at the receiving portion thereof; and a plurality of sets of projecting buckets on said drum at the said apertures therein, the buckets of each set being arranged at different points on the circumference of said drum.

9. In a concrete-mixer, the combination of a rotating mixing-drum, having apertures in the sides thereof, helical flights within said drum for dividing and separating the material as it falls to the bottom of the drum; and buckets secured to the sides of the drum at the apertures therein, said buckets projecting outwardly from the sides of the drum and having scrapers and chutes whereby the material is introduced into said drum from the top thereof when said drum is rotated.

10. In a mixing-machine, the combination of a rotating drum having an aperture in the side thereof, means therein for moving material toward the discharge end of the drum, a discharge-chute at the discharge end of said drum, means in said drum for elevating material onto said discharge-chute, and a bucket secured to the drum at the said aperture therein, said bucket having a scraper located outside of the drum for gathering material and said bucket also having means for conveying material from the scraper thereof into the drum.

11. In a concrete-mixer, the combination of a rotating drum; a plurality of sets of buckets arranged along said drum for introducing material thereinto, there being a plurality of buckets in each of said sets, and the buckets of each set being arranged at different points on the circumference of said drum, and each of said buckets having a bottom and sides for retaining the material to be introduced into said drum; and reducers forming false bottoms to said buckets to thereby reduce the capacity thereof, substantially as described.

12. In a concrete-mixer, the combination of a rotating drum having apertures therein; a plurality of sets of removable buckets arranged on said drum for introducing material thereinto, there being a plurality of buckets in each of said sets, and the buckets of each set being arranged at different points on the circumference of said drum, and each of said buckets having a bottom and sides for retaining the material to be introduced into said drum; and shut-off blanks, as p, adapted to be secured upon the drum at any of the apertures therein, when the respective bucket is removed.

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