No. 793,059. PATENTED JUNE 27, 1905.

H. D. CONWAY.

MIXING MACHINE FOR CONCRETE OR LIKE MATERIALS.

APPLICATION FILED APR. 30, 1903.

5 SHEETS—SHEET 1.

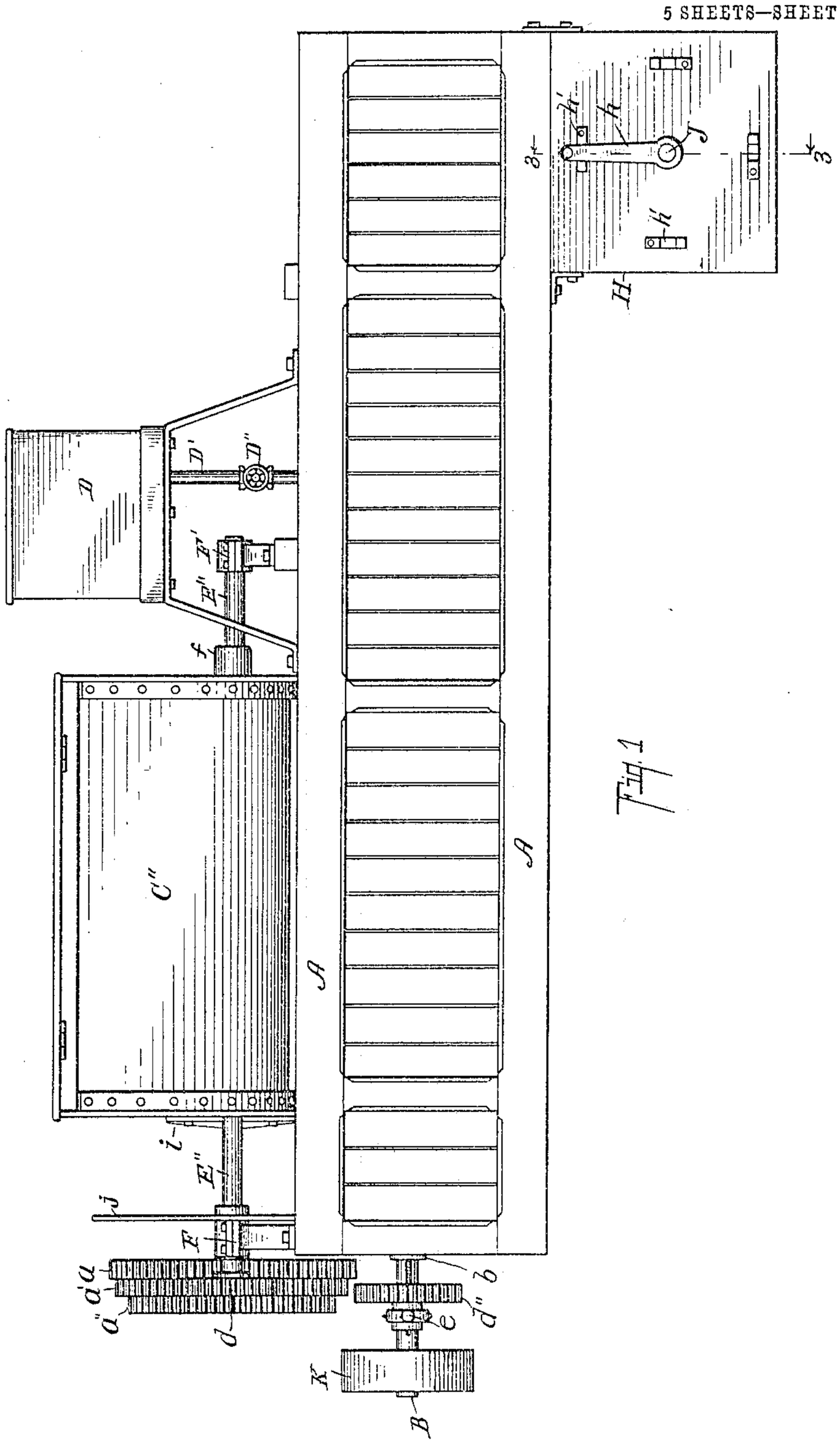

Fig. 1

Witnesses:
Otis A. Earl
A. Jno. Adams

Inventor,
Henry D. Conway
By Fred L. Chapsell
Att'y.

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5 SHEETS—SHEET 2.

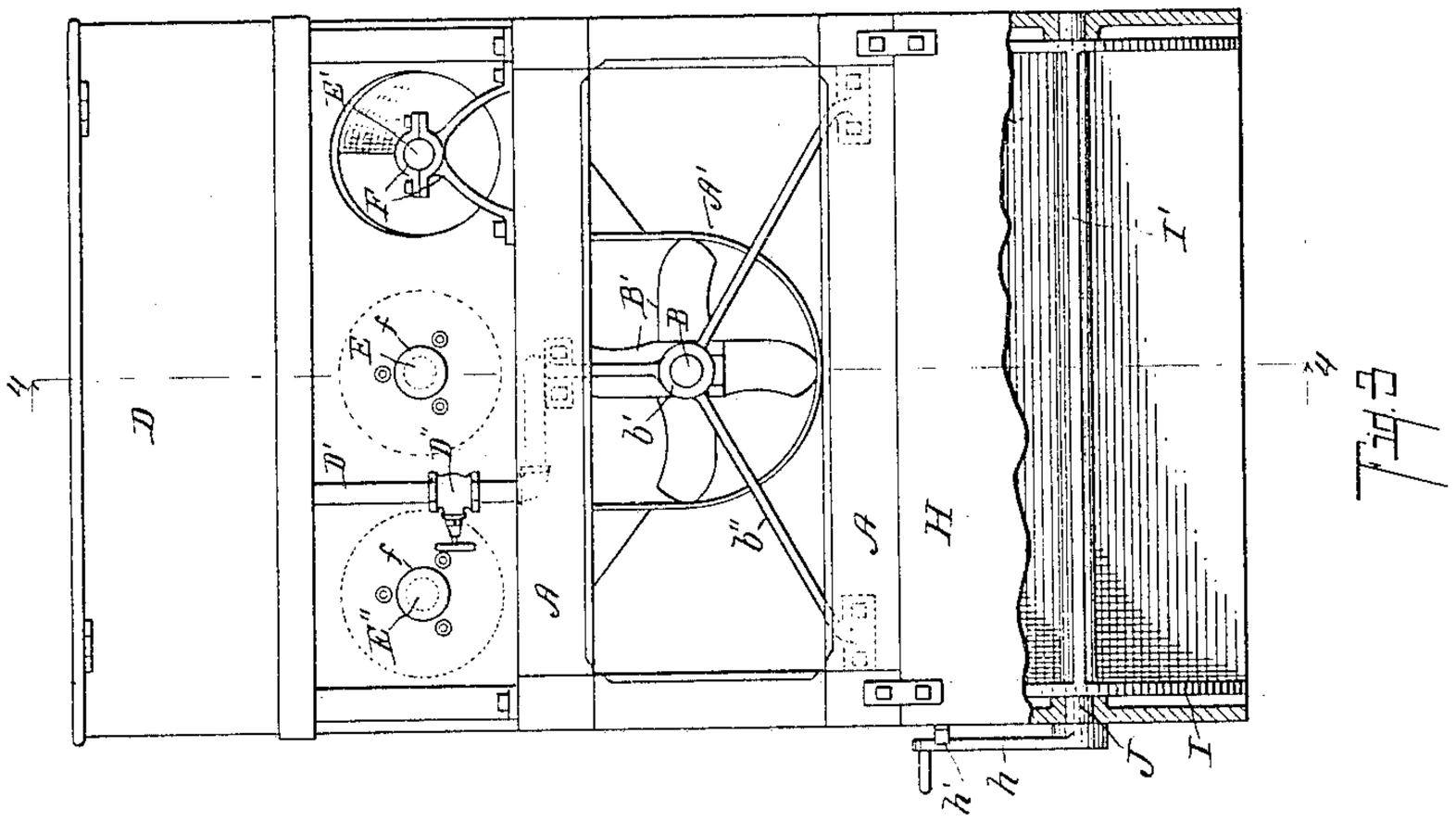

Fig. 1

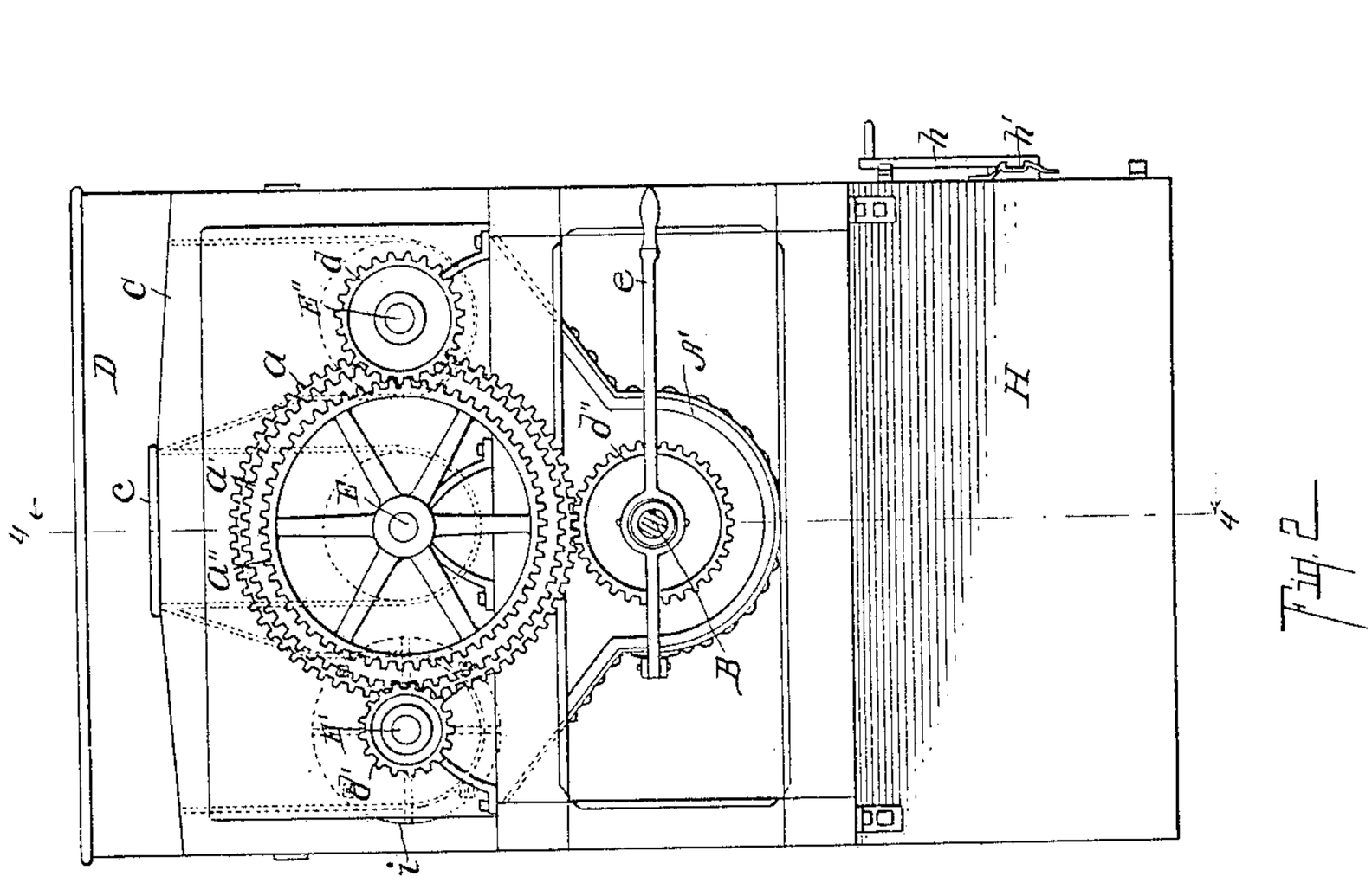

Fig. 2

Witnesses:
Otis A. Earl
A. Ives Adams

Inventor,
Henry D. Conway
By Fred L. Chapman
Att'y.

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6 SHEETS—SHEET 3.

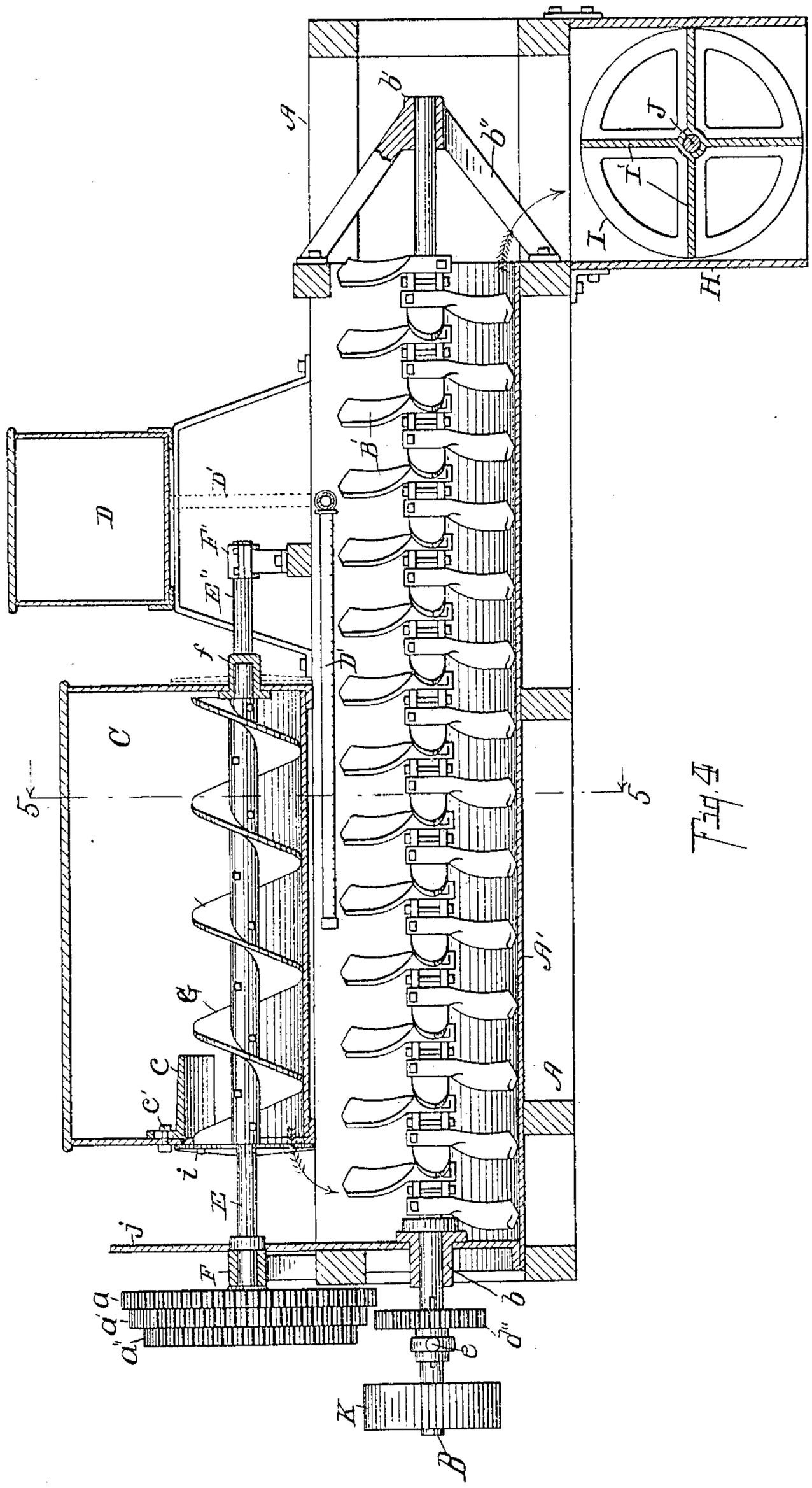

Fig. 4

Witnesses:
Otto A. Earl
A. Wm. Adams

Inventor,
Henry D. Conway
By Fred L. Campbell
Att'y.

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5 SHEETS—SHEET 4.

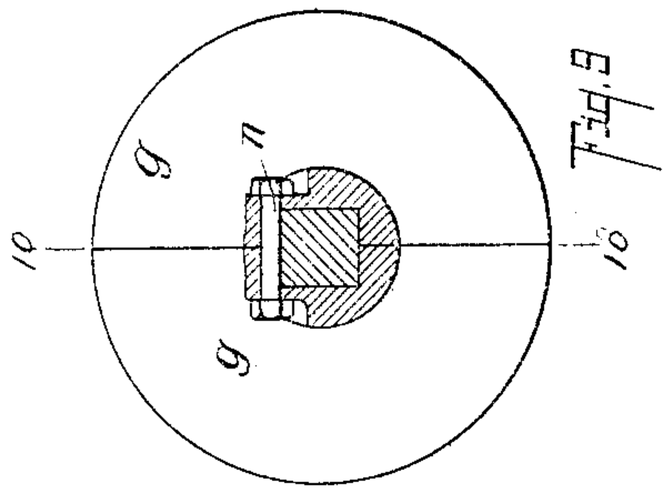

Fig. 9

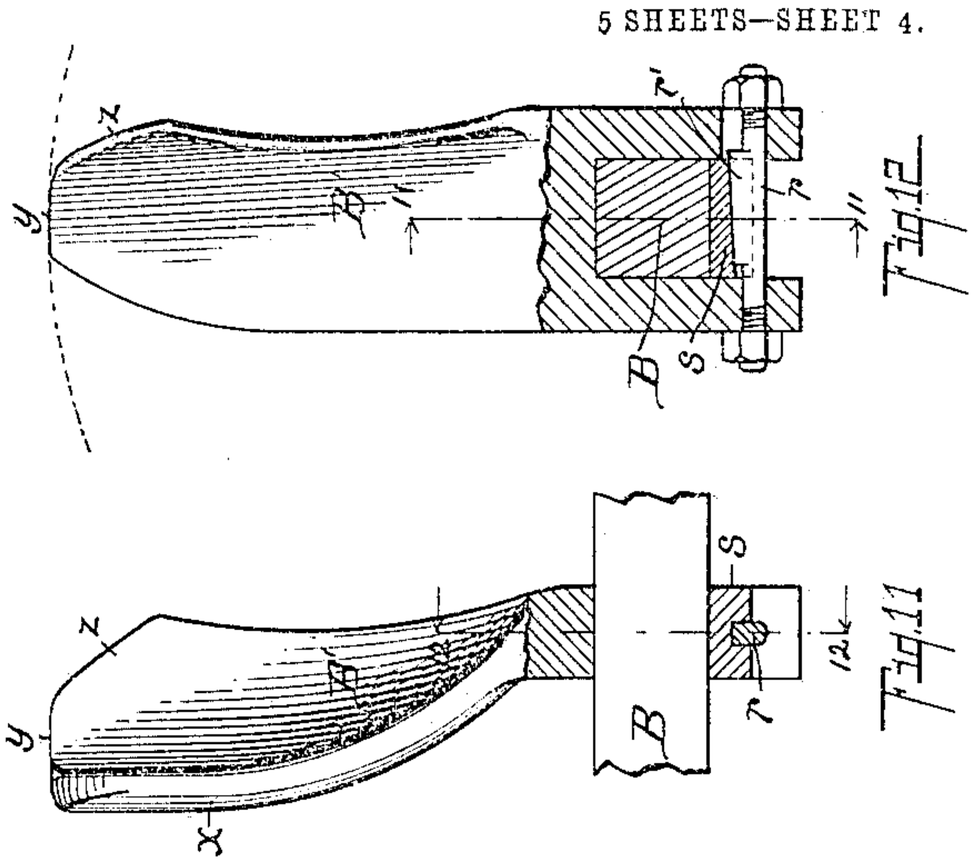

Fig. 12

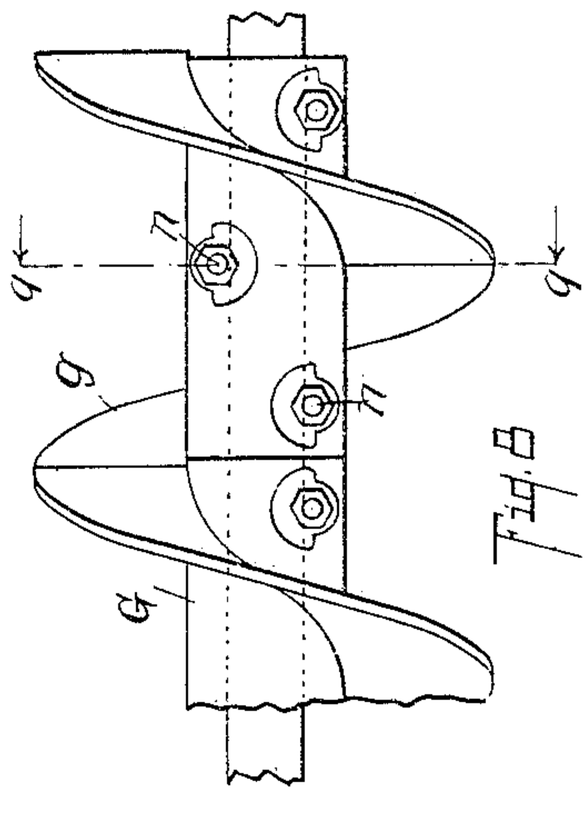

Fig. 8

Fig. 11

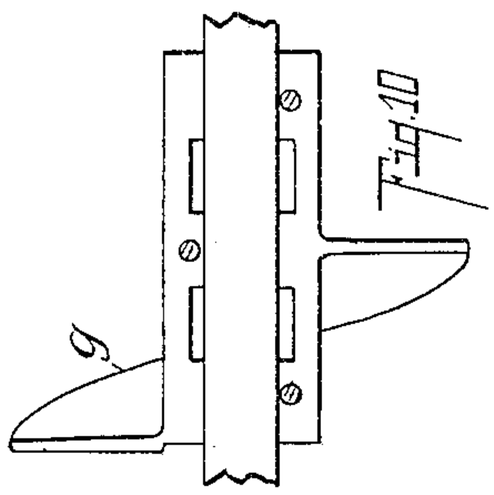

Fig. 10

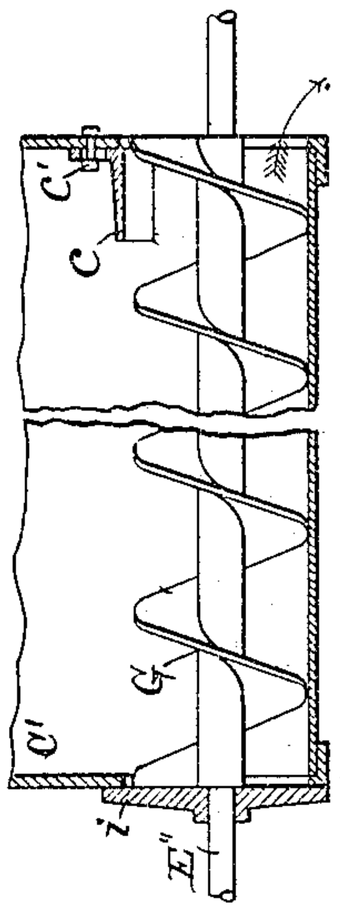

Fig. 6

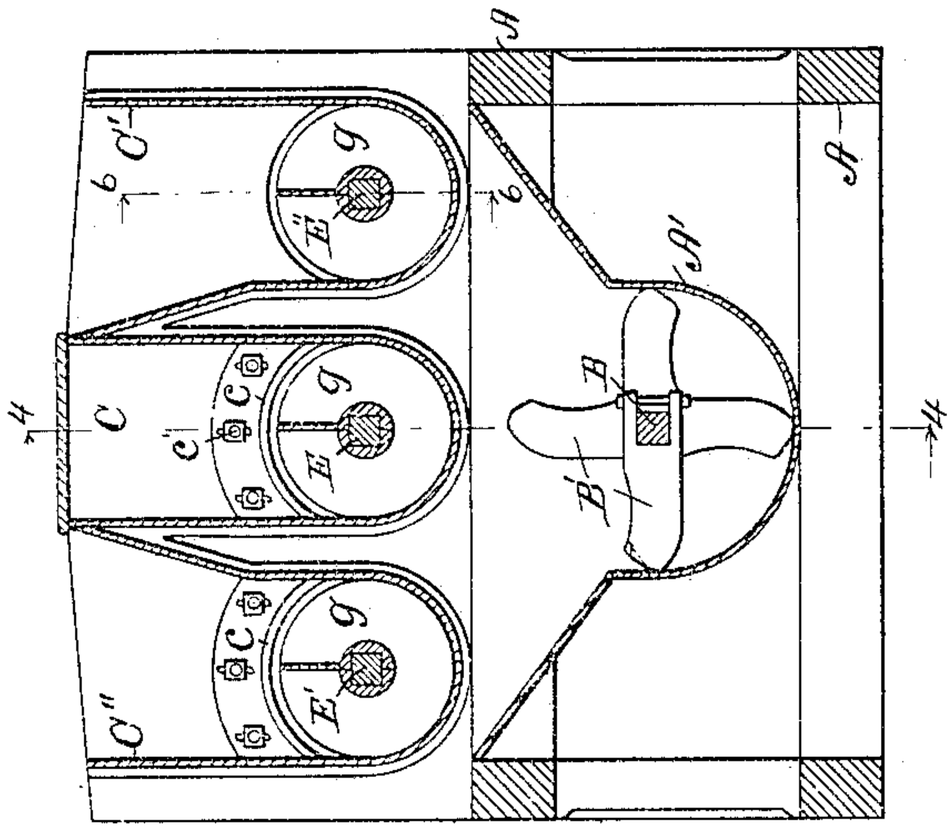

Fig. 5

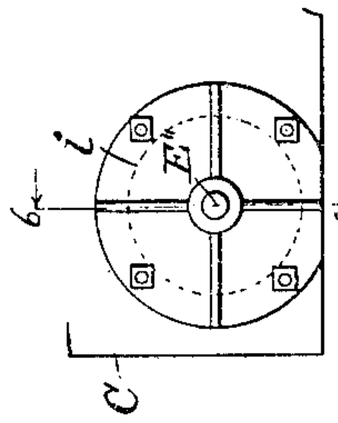

Fig. 7

Witnesses:
Otis A. Earl
A. Davis Adams

Inventor,
Henry D. Conway
By Fred L. Chappell
Att'y.

No. 793,059. PATENTED JUNE 27, 1905.

H. D. CONWAY.

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APPLICATION FILED APR. 30, 1903.

6 SHEETS—SHEET 6.

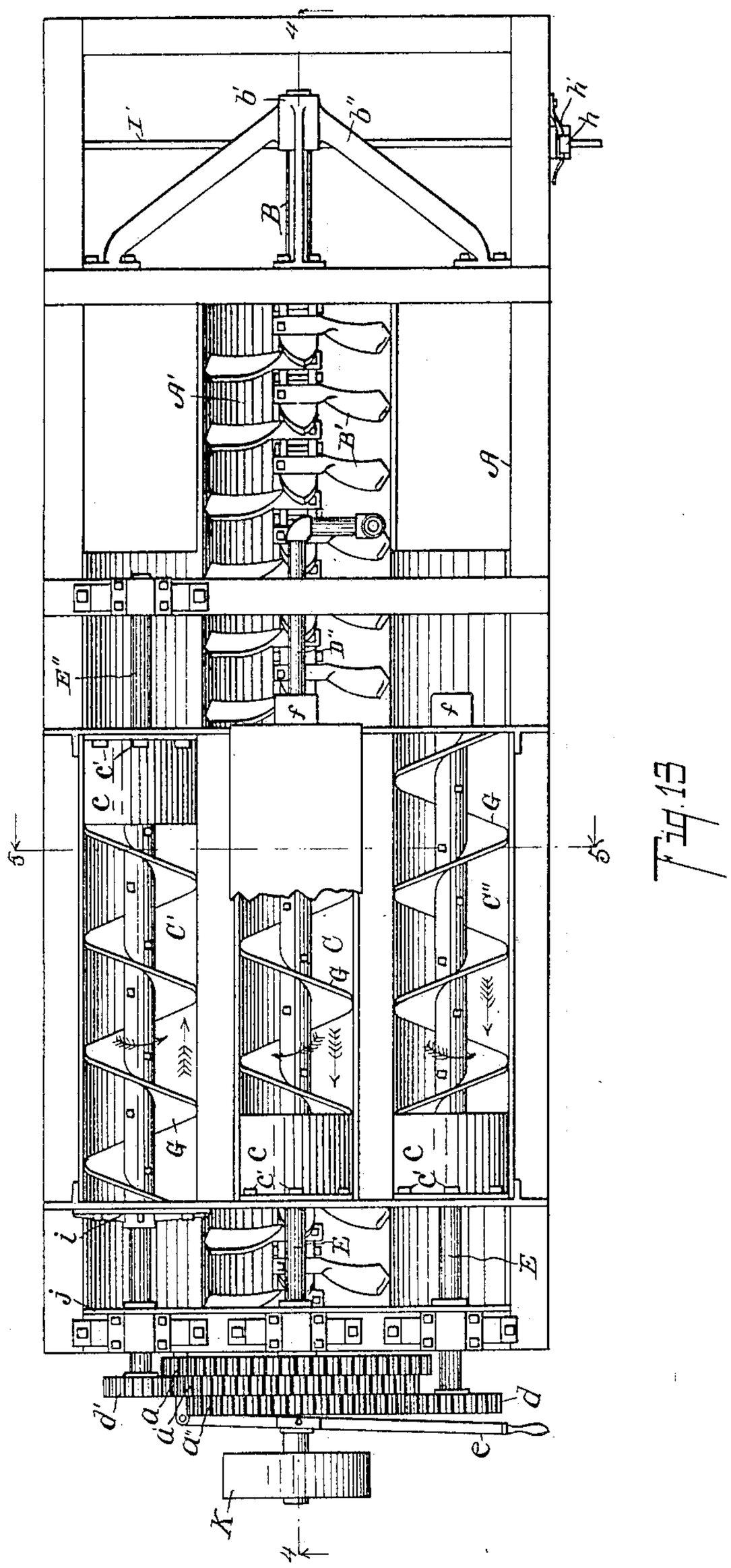

FIG. 13.

Witnesses:

Otis A. Earl

Ethel A. Teller

Inventor,

Henry D. Conway

By Fred L. Chappell

Att'y.

No. 793,059. Patented June 27, 1905.

UNITED STATES PATENT OFFICE.

HENRY D. CONWAY, OF JACKSON, MICHIGAN.

MIXING-MACHINE FOR CONCRETE OR LIKE MATERIALS.

SPECIFICATION forming part of Letters Patent No. 793,059, dated June 27, 1905.

Application filed April 30, 1903. Serial No. 154,949.

To all whom it may concern:

Be it known that I, HENRY D. CONWAY, a citizen of the United States, residing in the city of Jackson, in the county of Jackson and State of Michigan, have invented certain new and useful Improvements in Mixing-Machines for Concrete or Like Materials, of which the following is a specification.

This invention relates to improvements in mixing-machines for concrete and like materials.

The objects of the invention are, first, to provide an improved machine for mixing concrete and like materials in which the ingredients are introduced and mixed in a manner to produce the most desirable results; second, to provide an improved machine for mixing concrete and like materials by which the proportions of the ingredients used are accurately gaged and the ingredients introduced into the mixture at the proper time to produce the most satisfactory results; third, to provide an improved machine for mixing concrete and like substances which is comparatively simple and compact in its structure, economical to produce, durable in use, and easy to operate; fourth, to provide in a machine for mixing concrete and like materials an improved mixing apparatus by which the ingredients are thoroughly and evenly mixed.

Further objects and objects relating to structural details will definitely appear in the detailed description to follow.

I accomplish the objects of my invention by the devices and means described in the following specification.

The invention is clearly defined and pointed out in the claims.

A structure embodying the features of my invention is clearly illustrated in the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a side elevation view of a structure embodying the features of my invention. Fig. 2 is a front elevation view of the structure appearing in Fig. 1. Fig. 3 is a rear elevation view of the structure appearing in Fig. 1. Fig. 4 is a longitudinal sectional view taken on lines 4 4 of Figs. 2, 3, and 5. Fig. 5 is a detail transverse sectional view taken on line 5 5 of Fig. 4. Fig. 6 is a detail longitudinal sectional view taken on a line corresponding to lines 6 6 of Figs. 5 and 7, showing the arrangement of one of the feed devices. Fig. 7 is an end elevation view looking from the left of Fig. 6. Fig. 8 is an enlarged detail sectional view showing the structural details of the feed devices and the means of securing the same to the shaft. Fig. 9 is a detail transverse sectional view taken on a line corresponding to line 9 9 of Fig. 8. Fig. 10 is a detail view taken on a line corresponding to line 10 10 of Fig. 9. Fig. 11 is an enlarged detail view taken on a line corresponding to line 11 11 of Fig. 12, showing the structural details of the mixer arms or flights B′ and the means of securing the same to the operating-shaft. Fig. 12 is an enlarged detail view taken on a line corresponding to line 12 12 of Fig. 11. Fig. 13 is a plan view showing the relation of the hoppers to each other and to the mixing apparatus, portions of the casing being broken away.

In the drawings the sectional views are taken looking in the direction of the little arrows at the ends of the section-lines, and similar letters of reference refer to similar parts throughout the several views.

Referring to the lettered parts of the drawings, the frame A is of any desired form to properly support the operative parts of the machine. Within the frame A is a mixing-trough A′, which is preferably formed of heavy sheet metal. The rear end of the mixing-trough is open, and the front end is closed by an end plate or head *j*. Arranged longitudinally through the mixing-trough is a shaft B, which is provided with suitable bearings, as *b b′*. The bearing *b* is supported by the head *j* of the trough, and the bearing *b′* is supported by a spider *b″* at the rear end, which permits a free delivery of the material from the mixing-trough. On the forwardly-projecting end of the shaft B is a driving-wheel K therefor. The shaft B is provided with mixing arms or flights B′. The mixing-

arms B′ are formed with a rectangular notch on their inner ends adapted to engage the shaft B, which is rectangular in cross-section. The arms or flights are retained upon the shaft by bolts *r*, which are provided with a cam *r′*, formed thereon, the said cam extending longitudinally of the bolt, as shown in Fig. 12. Wedge-blocks *s* are interposed between the bolts and the shaft, so that in drawing the bolts into place the arms are forced down tight upon the shaft. These arms B′ are spirally arranged upon the shaft, the succeeding arms being preferably separated about ninety degrees—that is, each series of four completely encircle the shaft. The face of each arm B′ is somewhat concave and its back convex, and the arms are arranged at an angle to the shaft. Their outer ends are somewhat pointed, owing to the fact that the rear portion of the arm is cut away, leaving a narrow cutting edge at *z*. The effect of this formation is that each arm is like the moldboard of a plow, terminating in a narrow cutting edge at its outer end. The action of the arms in operation is like a series of small plows following one after the other. The forward edge of each arm is in a transverse plane somewhat in advance of the transverse plane of the rear edge of the preceding arm, so that when operated the material acted on is thoroughly mixed and receives not only a stirring action, but a thorough kneading. Owing to the shape of the arms the material is slowly carried toward the rear of the trough as the mixing progresses. The outer ends of the arms are adapted to keep the walls of the trough free from the material which is being mixed. The mixer-arms are cut away at *z*, so that the liability of clogging from coarse material, such as broken stone, is lessened.

The ingredients are introduced into the mixing-trough in their proper proportion through the hoppers C C′ C″. Each of these hoppers is provided with a spiral conveyer G, which insures a positive feed. By regulating the relative speed of the conveyers the proportions of materials delivered are determined. The quantity of material delivered may also be controlled in a measure by the guards or gates *c*, which are adjustably supported within the hoppers and project over the delivery end of the conveyers. (See Figs. 4, 5, 6, and 13.) These guards or gates are slotted to receive the bolts *c′*, so that they may be adjusted up and down over the conveyers and thereby in a measure control the amount of material delivered by the conveyers and prevent the delivery of the material from the hopper by gravity. These conveyers G are formed of sections *g*, (see Figs. 8, 9, and 10,) which are secured to the shafts E E′ E″, which are rectangular in cross-section to engage the correspondingly-shaped hubs of the sections. The sections are divided longitudinally, and the parts are secured upon the shaft by bolts *n*, and the blades thereof form a continuous spiral. The shafts E E′ are supported by the bearings *f* at their rear ends and by the bearings F at their forward ends. The bearings F are supported upon suitable brackets. The shaft E″ is provided with a bearing F′ at the rear end, which is supported upon suitable brackets on the frame of the machine. The objects of this arrangement will appear later. On the forward end of the shaft E is a fixed gear *a* and removable gears, as *a′ a″*. The shafts E′ E″ are provided with gears *d d′*, which are adapted to mesh with the gears *a′ a″*, respectively. The gear *d″* is splined upon the shaft B, so that it may be thrown into or out of mesh with the gear *a*, as desired. I provide a shifting-lever *e* for this purpose. By this arrangement of the parts the conveyers may be driven at varying relative rates of speed, and therefore the quantity of material delivered from the several hoppers varies according to the speed of their conveyers. This may be adjusted as desired by substituting driven and driving gears of different proportions. The direction of discharge from the hopper C′ is adapted to be reversed, so that it will deliver at the front or at the rear end of the hopper, as desired. This is accomplished by substituting a conveyer with a reversed spiral or by changing the direction of rotation through suitable gear. A cover *i* is provided for closing one of the delivery-openings for the hopper C′, suitable bolts being provided for securing it in position. (See Figs. 6 and 7.) By this arrangement of the parts the cement and sand may be delivered at the forward end of the mixing-trough and thoroughly mixed before the crushed stone or coarse material which is delivered from the rear end of the hopper C′ is introduced.

To the rear of the feed-hoppers I arrange a water-supply tank D for the spray-pipe D′, which is arranged above the mixer-arms in the mixing-trough. I provide a valve D″, so that the amount of water delivered is under the control of the operator. The spray-pipe D′ is preferably formed of a brass pipe or tube with delivery perforations on the under side of the same and is centrally arranged in the mixing-chamber and extends a short distance to the front and rear of the delivery-opening for the hopper C′.

Supported at the rear of the mixing-trough A on the depending frame H in position to receive the material therefrom is a delivery-drum I. The delivery-drum I is divided into four receptacles by partitions I′ and is mounted upon the shaft J, so that it may be revolved, and thereby the material delivered into hods or wheelbarrows, as desired, one of the compartments always being in position to receive the material from the delivery end of the mixing-trough. The shaft J is provided with

a crank *h*, by means of which the drum is revolved. A series of spring-catches *h'* are provided to retain the drum in its proper position to receive the material, and when it is desired to actuate the same the catch is depressed, which permits the drum to move ahead until the next catch or stop is reached.

When it is desired to stop the machine, the gear *d''* is thrown out of mesh with the feed apparatus and the mixer allowed to run until the material is entirely removed from the mixing-trough.

Having described my improved concrete-mixing machine in detail, I will now indicate its operation. With the gear *a' a''* and *d d'* adjusted so that the proper proportions of materials will be delivered by the conveyers E' E'' the machine is ready for operation. The hoppers C and C'' are intended for cement and sand, respectively, and the hopper C' for crushed stone or other coarse material. The ingredients entering into the concrete are supplied to the hoppers C C' C'' by any suitable means, the same not being here illustrated. I preferably provide suitable elevators or carriers for this purpose. Cement and sand are delivered to the forward end of the mixing-trough and are thoroughly mixed as they are carried toward the rear. By the time the same reaches the spray delivered by the pipe D' it is thoroughly mixed. The material thus mixed receives the spray of water, and the mixing is continued as it is carried along, and by the time the same reaches the delivery-opening for the hopper C' the cement and sand are thoroughly moistened and mixed and receive the coarse material or concrete in this condition. The delivery of the water is continued for a short distance as the material is carried along beneath the spray-pipe D' until the same has received as much moisture as desired. The mixing is then continued until the material is delivered from the mixing-trough. These conditions are most satisfactory to procure desirable results, and the product is equal to any that can be produced. To secure the most desirable results, the sand and cement should be thoroughly mixed dry, then moistened, and then the coarse material or crushed stone introduced and a further mixing had. This is all accomplished by my machine. It will be observed that this arrangement delivers a spray of water onto the broken stone and coarse material before it enters the mixture and while it is entering the mixture. The delivery of the spray of water onto the coarse material before its admixture with the cement is for the purpose of cleaning the same thoroughly, so that it will become thoroughly incorporated.

In the best methods of manufacturing concrete by hand the broken stone is thoroughly washed by a spray from a hose and thoroughly wetted before it goes into the mixture. All dust and dirt of every description will thus be cleaned away, and in this connection it is remarked that the dust from crushing the rock is objectionable.

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

1. In a machine for mixing concrete and the like, the combination of a mixing-trough; a shaft arranged therein; mixing-arms spirally arranged on said shaft so that the forward edge of each of said arms projects beyond the plane of the rear edge of the next preceding arm; sand and cement hoppers with discharge-openings arranged to deliver on the same transverse line to the forward end of said mixing-trough; a hopper for coarse material with discharge-opening arranged to deliver to the said mixing-trough at a point at a considerable distance from the forward end; force-feed devices for said hoppers; and a spray device arranged to deliver a spray of water onto the coarse material and onto the sand and cement in advance of the point of delivery of the coarse material, coacting for the purpose specified.

2. In a machine for mixing concrete and the like, the combination of a mixing-trough; a shaft arranged therein; mixing-arms spirally arranged on said shaft; sand and cement hoppers with discharge-openings arranged to deliver on the same transverse line to the forward end of said mixing-trough; a hopper for coarse material with discharge-opening arranged to deliver to the said mixing-trough at a point at a considerable distance from the forward end; force-feed devices for said hoppers; and a spray device arranged to deliver a spray of water onto the coarse material and onto the sand and cement in advance of the point of delivery of the coarse material, coacting for the purpose specified.

3. In a machine for mixing concrete and the like, the combination of a mixing-trough; an agitator arranged to mix the material and convey the same toward the rear end of the trough; sand and cement hoppers with discharge-openings arranged to deliver on the same transverse line to the forward end of said mixing-trough; a hopper for coarse material with discharge-opening arranged to deliver to said mixing-trough at a considerable distance from the forward end; a spray device arranged to deliver a spray of water onto the coarse material and onto the sand and cement in advance of the point of delivery of the coarse materials; spiral conveyers for the said hoppers, and means for driving said conveyers at varying relative speeds, whereby the quantity of material delivered by it is determined, for the purpose specified.

4. In a machine for mixing concrete and the like, the combination of a mixing-trough; an agitator arranged to mix the material and con-

vey the same toward the rear end of the trough; sand and cement hoppers with discharge-openings arranged to deliver on the same transverse line to the forward end of said mixing-trough; a hopper for coarse material with discharge-opening arranged to deliver to said mixing-trough at a considerable distance from the forward end; a spray device arranged to deliver a spray of water onto the coarse material and onto the sand and cement in advance of the point of delivery of the coarse material; and spiral conveyers for the said hoppers; for the purpose specified.

5. In a machine for mixing concrete and the like, the combination of a mixing-trough; an agitator arranged to mix the material and convey the same toward the rear end of the trough; sand and cement hoppers with discharge-openings arranged to deliver to the forward end of said mixing-trough; a hopper for coarse material with discharge-opening arranged to deliver to said mixing-trough at a considerable distance from the forward end; and a spray device arranged to deliver a spray of water onto the coarse material as it is delivered to the mixing-trough and onto the sand and cement in advance of the delivery of the coarse material; for the purpose specified.

6. In a machine for mixing concrete and the like, the combination of a mixing-trough; a shaft supported therein; mixing-arms on said shaft adapted to mix the material and convey the same toward the rear of said mixing-trough; a drum I divided into compartments, adapted to receive the material from said mixing-trough; a crank for operating said drum; and spring-catches adapted to engage said crank as said drum is revolved, for the purpose specified.

7. In a machine for mixing concrete and the like, the combination of a mixing-trough A′; a shaft rectangular in cross-section supported therein; mixing-arms B′ having notches in their inner ends adapted to embrace said shaft, and spirally arranged thereon, so that the front edge of each arm projects beyond the plane of the rear edge of the next preceding arm; retaining-bolts *r* having cams *r′* on one side; and wedge-blocks *s* interposed between said bolts and said shaft whereby said arms are secured in position, for the purpose specified.

8. In a machine for mixing concrete and the like, the combination of a mixing-trough A′; a shaft rectangular in cross-section supported therein; mixing-arms B′ having moldboard-like faces concave on their forward surfaces and inclined rearwardly, corresponding to a screw-surface, with their outer rear corners cut away at *z* to form a narrow cutting edge at its outer end, spirally arranged on said shaft, so that the front edge of each arm projects beyond the plane of the rear edge of the next preceding arm; retaining-bolts *r* having cams *r′* on one side; and wedge-blocks *s* interposed between said bolts and said shaft whereby said arms are secured in position, for the purpose specified.

9. In a machine for mixing concrete and the like, the combination of a mixing-trough A′; a shaft rectangular in cross-section supported therein; mixing-arms B′ with their outer rear corners cut away at *z*, spirally arranged on said shaft, so that the front edge of each arm projects beyond the plane of the rear edge of the next preceding arm; retaining-bolts *r* having cams *r′* on one side; and wedge-blocks *s* interposed between said bolts and said shaft whereby said arms are secured in position, for the purpose specified.

10. In a machine for mixing concrete and the like, the combination of a mixing-trough; a shaft, rectangular in cross-section, supported therein; mixing-arms B having notches in their inner ends adapted to embrace said shaft spirally arranged thereon; retaining-bolts *r* having cams *r′* on one side; and wedge-blocks *s* interposed between said bolts and said shafts whereby said arms are secured in position, for the purpose specified.

11. In a machine for mixing concrete and the like, the combination of a mixing-trough; a shaft supported therein; mixing-arms with moldboard-like faces; concave on their forward surfaces and inclined rearwardly, corresponding to a screw-surface, having their edges curved convexly and rearwardly toward their outer ends; and their outer rear corners cut away to form a narrow cutting edge at their outer ends, spirally arranged on said shaft so that the forward edge of each arm projects beyond the rear edge of the next preceding arm, for the purpose specified.

12. In a mixing-machine for concrete and the like, the combination of the mixing-trough; a shaft supported therein; mixing-arms with moldboard-like faces having their forward edges curved slightly rearwardly toward their outer end and having their outer rear corners cut away to form a narrow cutting edge at the outer end, spirally arranged on said shaft, for the purpose specified.

13. In a machine for mixing concrete and the like, the combination of a mixing-trough; a shaft supported therein; mixing-arms with moldboard-like faces extending into proximity to the bottom of said trough, having their outer rear corners cut away to form a narrow cutting edge at the outer end thereof, spirally arranged on said shaft, for the purpose specified.

14. In a machine for mixing concrete and the like, the combination of a mixing-trough; a shaft supported therein; mixing-arms with moldboard-like faces having faces extending into proximity to the bottom of said trough, having their outer rear corners cut away to form a narrow cutting edge at the outer end thereof, spirally arranged on said shaft, so

that the forward edge of each arm projects beyond the plane of the rear edge of the next preceding arm, for the purpose specified.

15. In a machine for mixing concrete and the like, the combination of a mixing-trough; a shaft supported within the said trough; mixing-arms on said shaft; hoppers C, C′, C″ for said mixing-trough; spiral conveyers G for said hoppers; suitable shafts for said conveyers; and adjustable guards arranged over the delivery end of said conveyers; for the purpose specified.

In witness whereof I have hereunto set my hand and seal in the presence of two witnesses.

HENRY D. CONWAY. [L. S.]

Witnesses:

ETHEL A. TELLER,

OTIS A. EARL.