

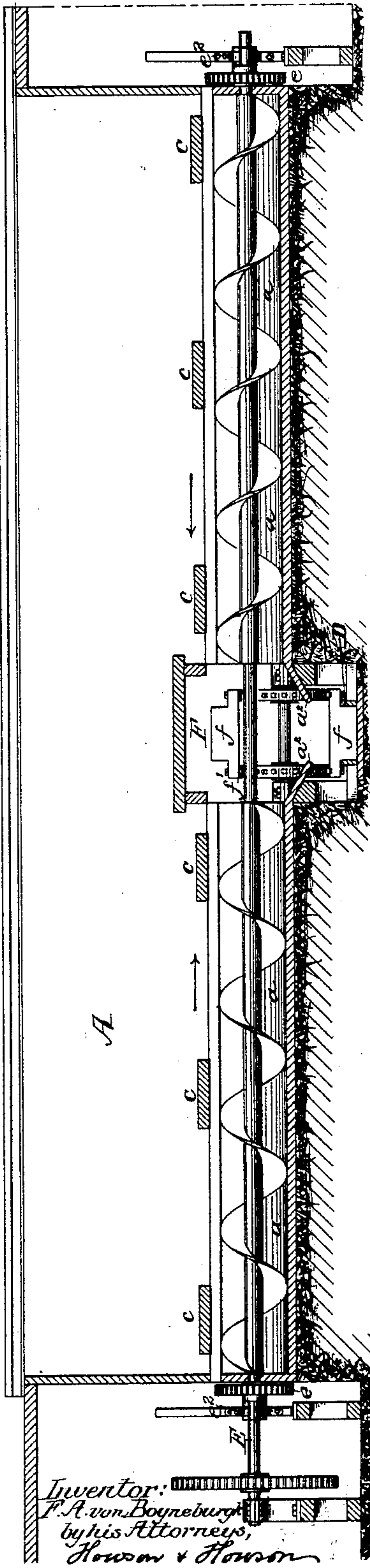
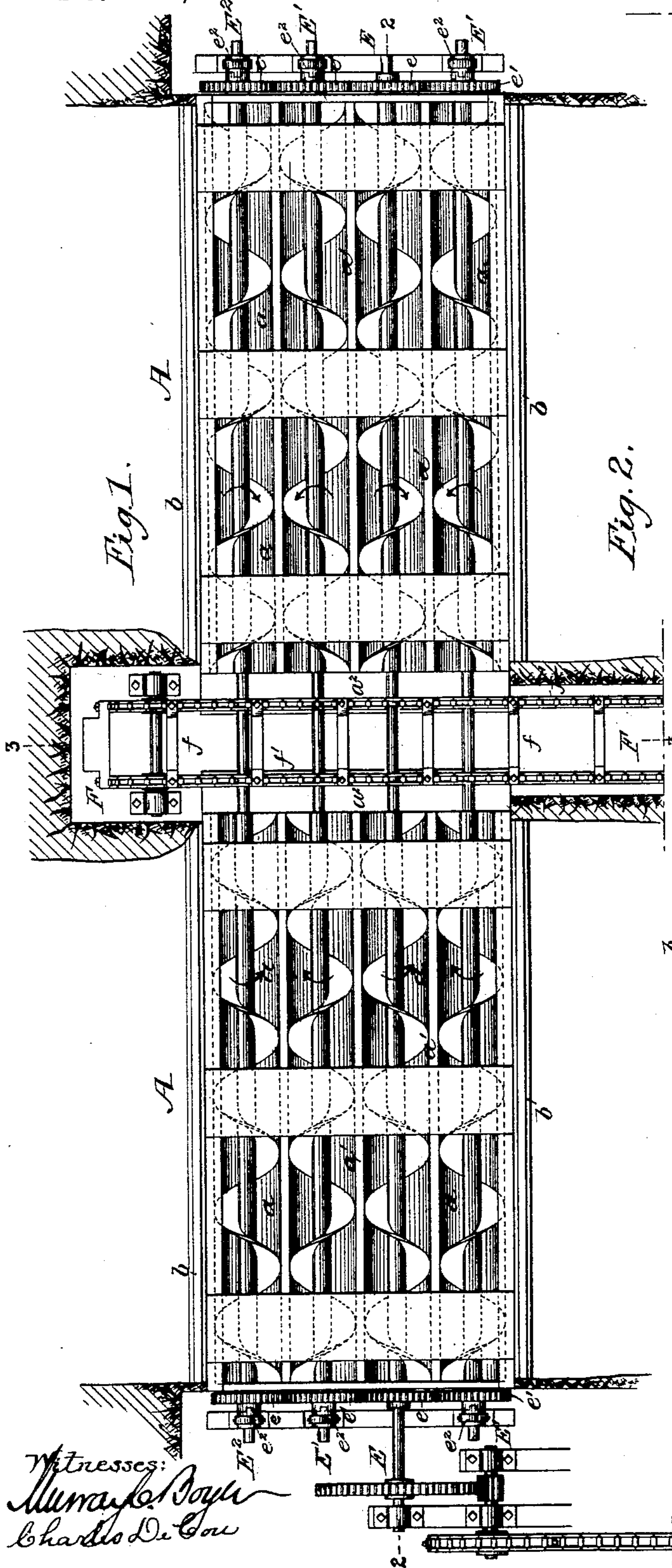
(No Model.)

2 Sheets—Sheet 1.

F. A. VON BOYNEBURGK.
HOPPER FOR GRANULAR MATERIAL.

No. 587,640.

Patented Aug. 3, 1897.



(No Model.)

2 Sheets—Sheet 2.

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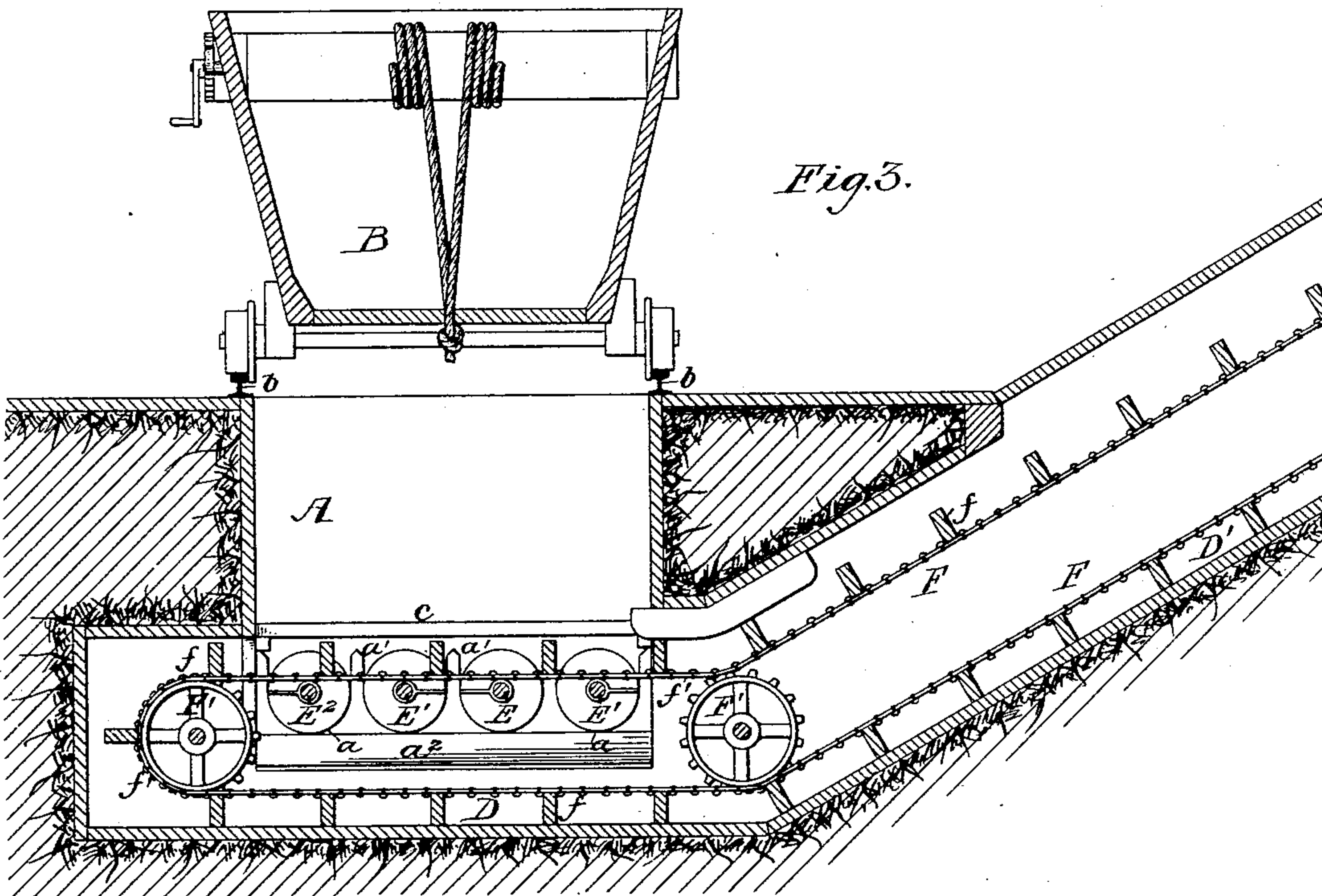
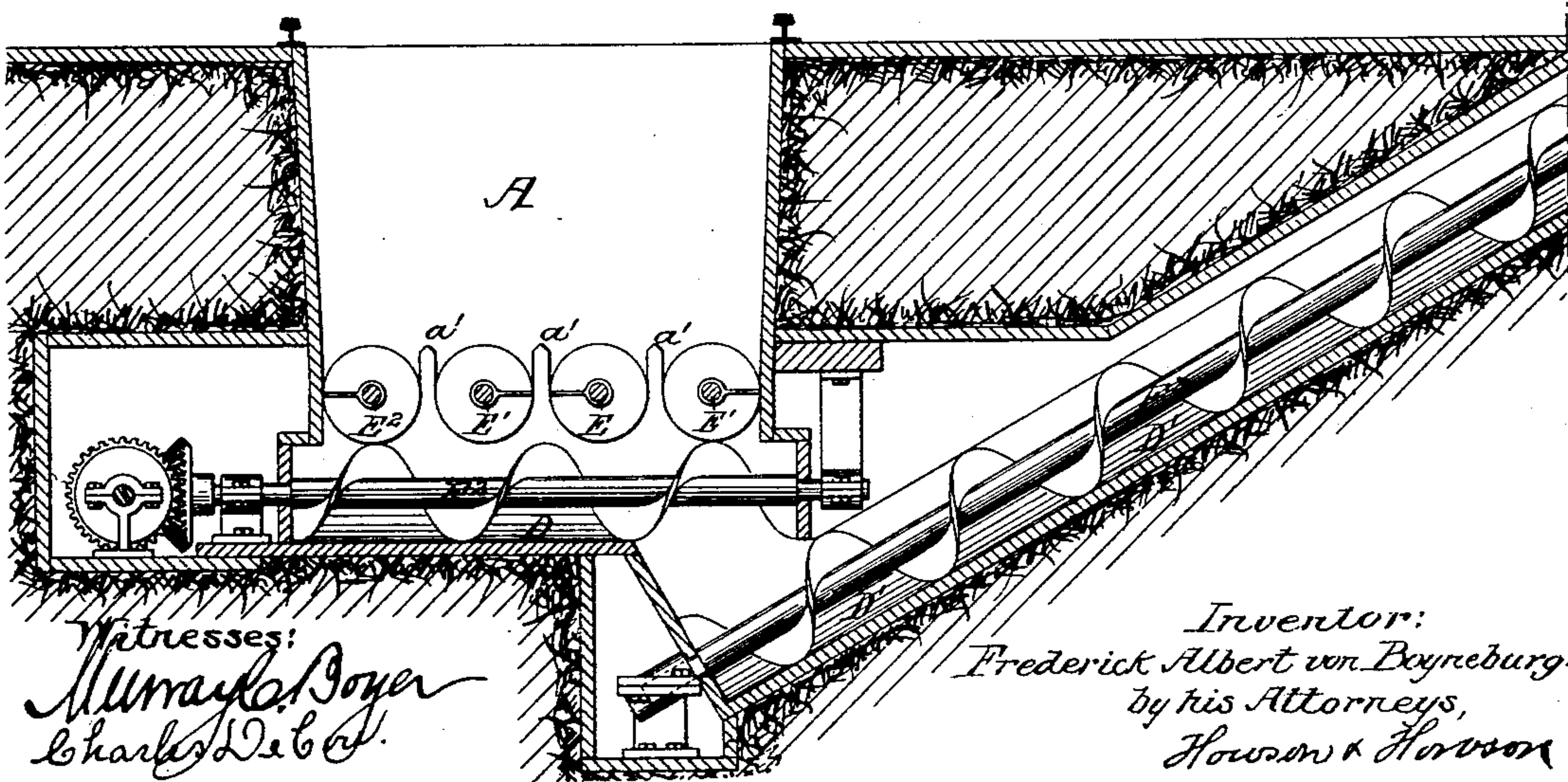


Fig. 4.



Witnesses:
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Inventor:
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UNITED STATES PATENT OFFICE.

FREDERICK ALBERT VON BOYNEBURGK, OF AVALON, NEW JERSEY.

HOPPER FOR GRANULAR MATERIAL.

SPECIFICATION forming part of Letters Patent No. 587,640, dated August 3, 1897.

Application filed February 26, 1897. Serial No. 625,170. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK ALBERT VON BOYNEBURGK, a citizen of the United States, and a resident of Avalon, Cape May county, New Jersey, have invented certain Improvements in Hoppers for Granular Material, of which the following is a specification.

My invention relates to apparatus for the handling of sand preparatory to the cleansing of the same in order to put it into condition for commercial use, and particularly for the manufacture of glass.

The object of my invention is to have the handling of the sand accomplished entirely by mechanical means from the time it is mined until it is taken from the storage-bins for shipment. By this means the sand is kept clean and free from impurities, which injure the glass or other articles of commerce manufactured from the same.

In the accompanying drawings, Figure 1 is a plan view of my improved hopper, into which the sand is dumped when brought from the mine. Fig. 2 is a longitudinal sectional view of the hopper on the line 2 2, Fig. 1. Fig. 3 is a transverse sectional view of the hopper on the line 3 3, Fig. 1; and Fig. 4 is a transverse sectional view taken on the same line as Fig. 3 and showing a modified form of apparatus.

Prior to my invention sand for use in the manufacture of glass and for like purposes has been handled in a very primitive way, and the great difficulty has been to provide suitable means for conveying the material to the washer without discoloring it or allowing it to gather impurities in transit. By my arrangement I can load suitably-designed cars or series of cars at the pit and convey the cars over temporary tracks to a suitable hopper, which is provided with means for conveying the sand to the washer in an even stream and without liability of becoming discolored or impregnated with impurities.

In the present instance my improved hopper is constructed as follows:

A is a quadrangular hopper, preferably of such a length as to accommodate two cars and of such a width as to enable the even distribution of the sand over the bottom of the hopper, so that the conveying mechanism

will not become overloaded. On the upper edge of the hopper I have arranged tracks *b* *b*, on which travel suitably-constructed dumping-cars *B*, which convey the sand from the pits to the hopper.

The hopper, as well as the cars, are lined with or made of wood, as I do not wish to use iron in any part that will come in contact with the sand, as iron will discolor sand and injure the quality. The bottom of the hopper *A* is divided into a series of longitudinal troughs *a* by partitions *a'*, and extending across the hopper at the center is a trough *D*, and the base of this trough is below the bottom of the hopper. The sand from the hopper is fed toward the central trough, and by suitable mechanism traveling in this trough the sand is conveyed to the washers or other point of discharge.

In each longitudinal trough *a* is a screw-shaft. The screw-shaft *E* is the driving-shaft and is adapted to suitable bearings in the frame of the machine, and the screw-blades on one side of the central transverse trough *D* are right-handed blades and those on the opposite side of the central transverse trough are left-handed blades, so that when the shaft is turned to feed the material it will be conveyed toward the central trough.

On each side of the driving-shaft *E* are screw-shafts *E'*, geared to the shaft *E* by gear-wheels *e e'*. The gear-wheels *e'* are loose on the shafts *E' E'*, and in order to couple these wheels to the shaft *E*, I provide suitable clutches *e²*, so that when it is wished to drive two or three screw-shafts the clutches are thrown in gear and the two shafts on each side of the driving-shaft *E* are turned in unison therewith. In some instances I may use three or four screw-shafts within the hopper, and in the present instance I have shown four. A gear-wheel on the fourth shaft *E²* is geared to the gear-wheels *e'* of the shaft *E'* and is provided with a suitable clutch, so that it can be thrown into and out of gear at will.

I have shown in the present instance gearing at each end of each screw-shaft, but in some instances, where short sections are used, they may be geared at one end only, and when extra long lengths of shafting are used they may gear at the center.

The screw-shafts are preferably made of phosphor-bronze, as I find that this material will not discolor the sand and will withstand the strain to which the mechanism is subjected. The driving-shaft E can be driven in any suitable manner, depending altogether upon the location of the plant. Extending across the hopper at intervals are a series of planks *c*, which tend to break the fall of the material when dumped into the hopper and which prevent the choking of the conveyer-troughs.

Adapted to travel in the transverse trough D is an endless-chain conveyer F, having the flights *f*, made of wood or other suitable material, and this conveyer is adapted to carry the sand to the washer or other point of discharge. This trough is level below the hopper A, but just beyond the hopper it rises at an angle of about thirty degrees.

To prevent the sand falling on the chain *f'* of the conveyer, I arrange the inclined shields *a*², (shown in Figs. 1, 2, and 3,) adapted to receive the sand as it is discharged from the screws and direct it into the transverse trough D over the conveyer-chains, so that the sand will not come in contact with the chain, which is preferably of iron or steel. The chain passes over guide-pulley F' and is driven by any suitable mechanism, preferably situated at the top. As a substitute for the conveyer-chain I may use screw conveyers F² F³, (shown in Fig. 4,) geared to the driving mechanism, so that the sand fed to the transverse conveyer will be moved along the trough D and discharged into the elevating-trough D', the screw of which will carry the material up to the point of discharge.

I claim as my invention—

1. The combination in a hopper of the se-

ries of longitudinal troughs in the bottom thereof, a screw conveyer in each trough, one of the said screw conveyers being the driving element, a clutch on each of the other shafts for coupling the said shafts to the driving-shaft, with a transverse discharge-trough into which the material is fed from the hopper, substantially as described.

2. The combination in a hopper for sand or equivalent material having a series of longitudinal troughs therein, with concaved bottoms, of a central transverse trough below the bottom of the longitudinal trough having a flat bottom, a conveyer-shaft in each of the longitudinal troughs, right and left handed screw-conveyer blades on the shafts, with an endless chain having conveyer-flights adapted to the horizontal transverse trough so as to convey material from said trough to the point of discharge, substantially as described.

3. The combination in a hopper having a series of troughs, a central transverse trough below the bottom of the longitudinal troughs, a conveyer-shaft in each of the longitudinal troughs, right and left handed screw-conveyer blades on the shafts, with an endless-chain conveyer having flights adapted to the transverse trough so as to convey material from said trough to the point of discharge, with inclined shields overhanging the chain of the transverse conveyer, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FREDERICK ALBERT VON BOYNEBURGK.

Witnesses:

WILL. A. BARR,
JOS. H. KLEIN.