M. G. BUNNELL.

GROUT MIXER.

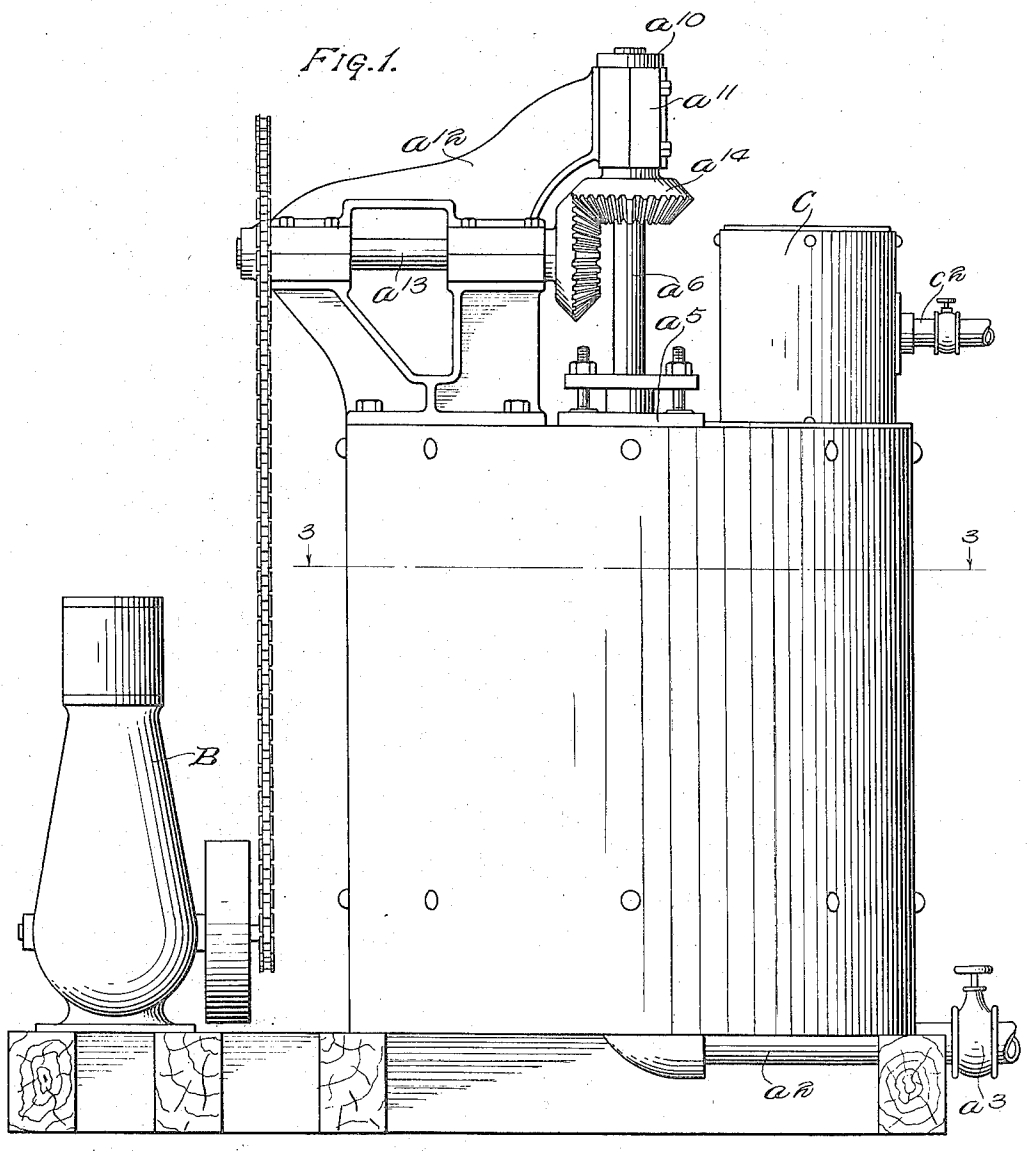
APPLICATION FILED DEC. 9, 1910.

1,194,355.

Patented Aug. 15, 1916.

4 SHEETS—SHEET 1.

FIG. 1.




WITNESSES

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By Bulkley & Durand

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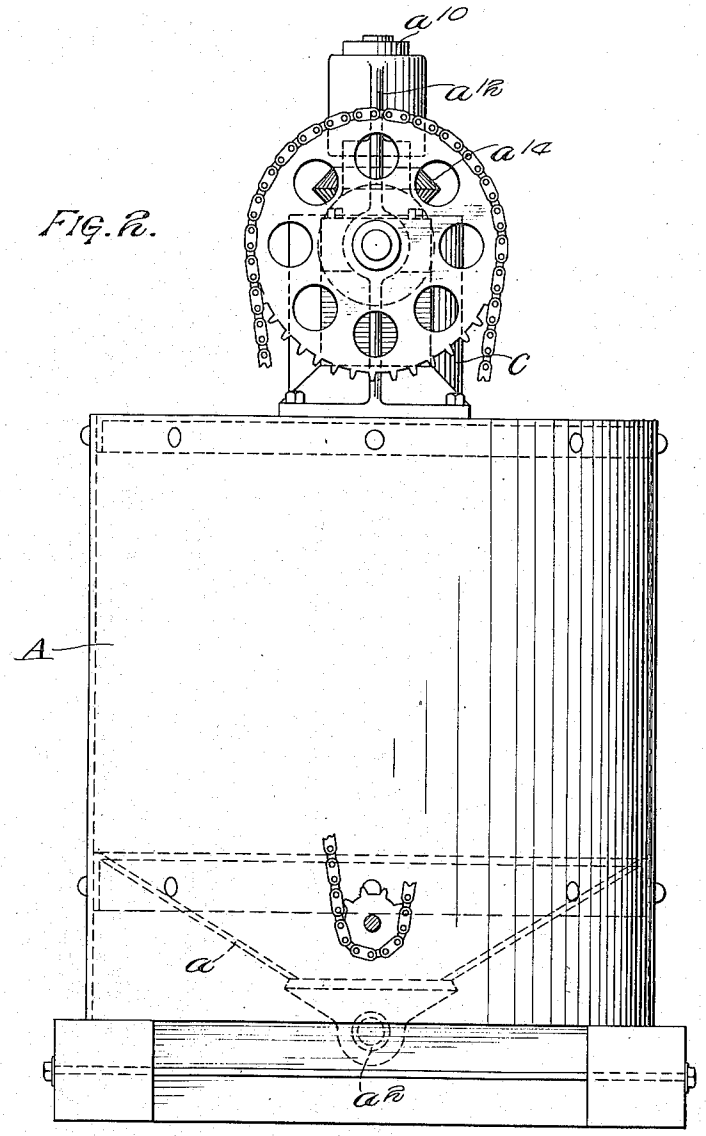
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4 SHEETS—SHEET 2.

FIG. 2.




WITNESSES

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4 SHEETS—SHEET 3.

FIG. 3.

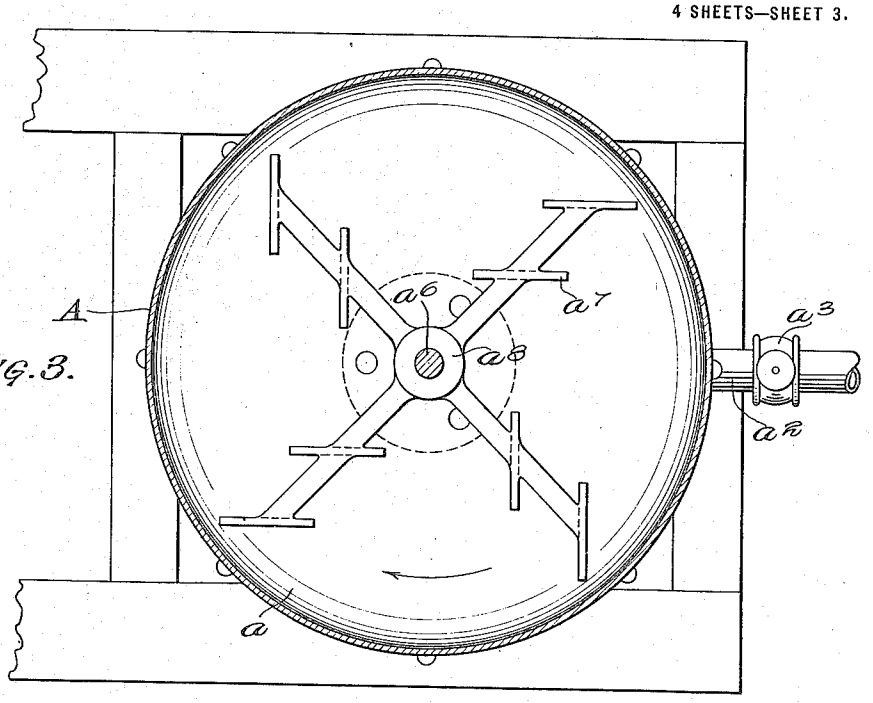
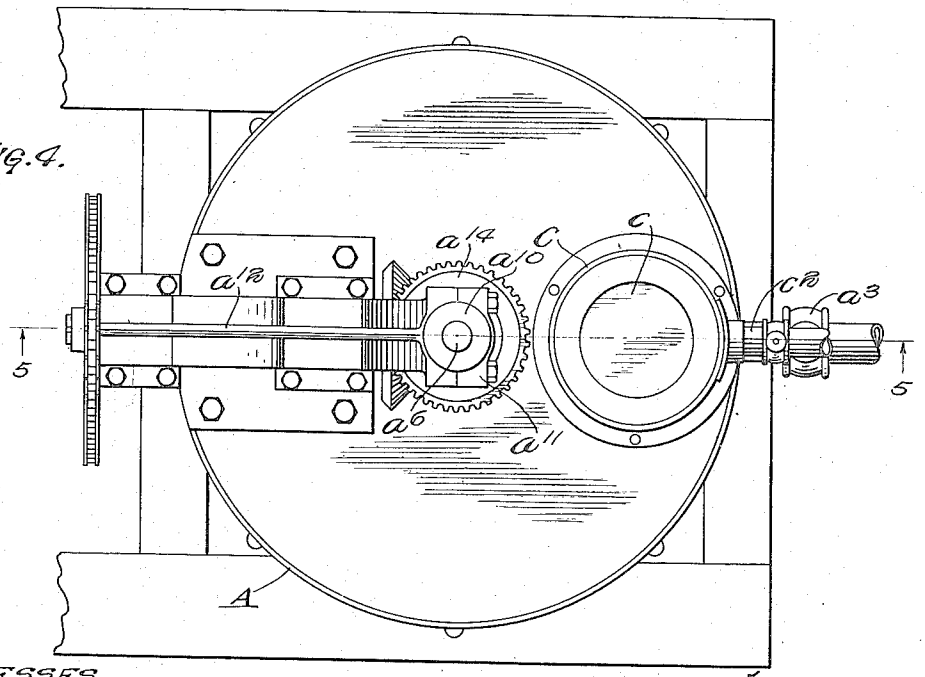



FIG. 4.




WITNESSES

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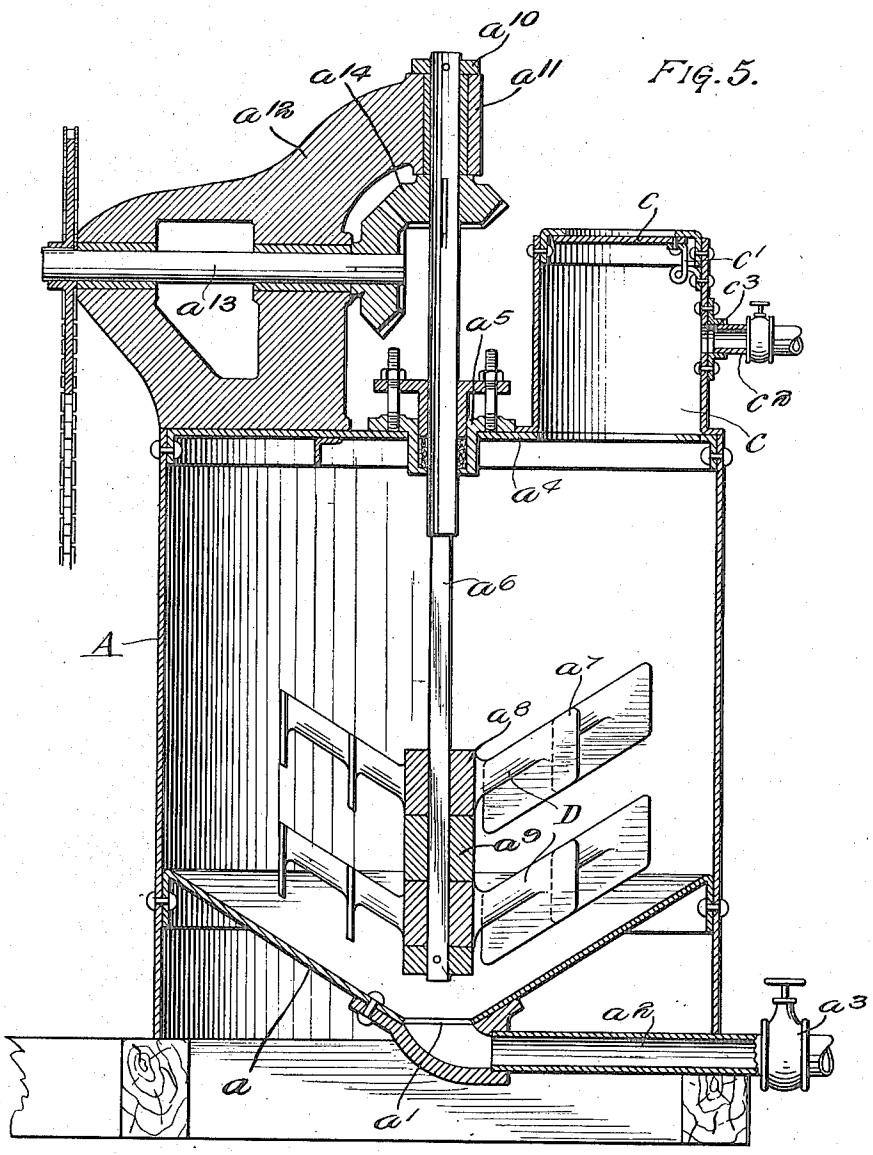
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4 SHEETS—SHEET 4.

FIG. 5.




WITNESSES

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# UNITED STATES PATENT OFFICE.

MORTON G. BUNNELL, OF CHICAGO, ILLINOIS, ASSIGNOR TO FREDERICK C. AUSTIN, OF CHICAGO, ILLINOIS.

## GROUT-MIXER.

1,194,355. Specification of Letters Patent. Patented Aug. 15, 1916.

Application filed December 9, 1910. Serial No. 596,423.

*To all whom it may concern:*

Be it known that I, MORTON G. BUNNELL, a citizen of the United States of America, and resident of Chicago, Cook county, Illinois, have invented a certain new and useful Improvement in Grout-Mixers, of which the following is a specification.

My invention relates to grout mixers of the kind in which provision is made for introducing compressed air to force the mixture from the machine and through a pipe or hose to the point where it is to be used.

It relates more particularly to machines of this kind in which the agitating and mixing of the grout is obtained by means of arms or blades that are mounted on a shaft that enters the receptacle in which the materials are received for treatment.

The objects of my invention are to provide a grout mixer in which a vertical shaft is so arranged that the material will not get into the bearings or tend to make trouble in this manner when the contents of the mixer are subjected to the action of compressed air; to provide an improved construction and arrangement whereby the jet of compressed air in entering the mixer will act directly on the door or closure of the receptacle to automatically close the same when the machine is ready for operation to discharge the mixture; to provide an improved construction and arrangement whereby the mixing action will be more efficient and satisfactory than heretofore; to provide an improved construction whereby the discharge of the mixture is through a funnel the lower end of which is directly in line with the axis of rotation and the vortex of the whirling mixture in the receptacle above; to provide an improved construction whereby the arms or blades on the shaft may be varied in number to suit the conditions, and will revolve about a vertical axis in the mixture; and to provide certain details of construction and combinations tending to increase the efficiency of a grout mixer of this particular character.

To these and other useful ends, my invention consists in matters hereinafter set forth and claimed.

In the accompanying drawings—Figure 1 is a side elevation of a grout mixer embodying the principles of my invention. Fig. 2 is a similar view showing another side of the said machine. Fig. 3 is a horizontal section on line 3—3 in Fig. 1. Fig. 4 is a plan of the machine shown in Fig. 1. Fig. 5 is a vertical section on line 5—5 in Fig. 4.

As thus illustrated, my invention comprises an air tight receptacle A having its bottom formed by a funnel $a$ having a central discharge opening $a'$ communicating with the off-take pipe $a^2$, the latter having a valve $a^3$ to control the discharge. The top $a^4$ has a stuffing box $a^5$ for the vertical shaft $a^6$, which latter has its lower portion squared to receive the paddle wheels or blades or arms $a^7$, which latter are on hubs or sleeves $a^8$ that slip over the shaft with collars $a^9$ between them. These blades or paddles, it will be seen, are set at an angle to throw the mixture inward, thus concentrating it at the center about the shaft or axis and over the point where it is discharged from the lower end of the funnel. These blades or paddles extend upward at about the same angle as the sides of the funnel. With this construction the number of paddle wheels on the shaft can be varied at will to suit the conditions of different kinds of work. The lower end of the shaft $a^6$ is directly over the opening $a'$, but is not supported by any bearings to which the mixture under pressure of the air has access as there are no bearings for the lower end of the shaft. The upper end of the shaft is supported by a collar $a^{10}$ that rests on the bearings $a^{11}$, which latter is a part of the bracket $a^{12}$ that supports the horizontal shaft $a^{13}$. The two shafts are gear connected by bevel gearing $a^{14}$, and the shaft $a^{13}$ is driven by an engine B.

A dome C is mounted on the top $a^4$ and provided with a door $c$ that is supported by a spring $c'$ which tends to hold the said door open. The air pipe $c^2$ leads to the opening $c^3$ that is located behind the said door when the latter is open. A valve $c^4$ is provided in said pipe for controlling the introduction of compressed air into the machine to expel the grout or mixture from the bottom opening $a'$, and then through a pipe or hose to the point where it is to be used. When the valve $c^2$ is opened, the blast or jet of compressed air acts directly on the door $c$ to close the same and thereby confine the pressure until the mixture is discharged. When this has been accomplished, the air is turned off and the door $c$ automatically opens.

There are no bearings that are below or under the mixture, and there are none into which the grout can be forced by the compressed air. The opening $a'$ is directly under the center or vortex of the whirling mixture, and as the paddles tend to throw the materials to the center, the discharge is facilitated and rendered more certain and easy.

The paddles or blades $a^7$ are arranged in pairs on the arms $a^{15}$, and the latter extend upward at about the same angle as the sides of the funnel. In this way the rear ends of the paddles are lower than the forward ends thereof. When the shaft is rotated, they throw the mixture toward the shaft, which latter is at the center of the funnel.

It will be understood, of course, that the machine does not necessarily have to be used as a mixer. To the contrary, the materials can be mixed and then placed in the machine, in which case the paddles or blades act merely as agitators to keep the mixture in condition to discharge easily and smoothly under the pressure of the air. Either method is common and well known.

Of course, it is obvious that the arms D, upon which the blades or paddles $a^7$ are mounted, serve as beaters to stir and mix the ingredients, these beater arms being spaced apart, in the manner shown, and extending away from the shaft and toward the sides of the receptacle, whereby the outermost blades or paddles are adjacent the sides of the receptacle.

I do not limit myself to the exact construction shown and described.

What I claim as my invention is:

1. In a grout mixer, a receptacle for the mixture, a vertical shaft therein, the shaft being polygonal for a portion of its length and free at the lower end thereof, paddle wheels disposed one above the other on the polygonal portion of said shaft and removable from the lower end thereof, said paddles being mounted in pairs on arms that extend upwardly, and a funnel disposed below said wheels, the sides of said funnel corresponding to the pitch of said arms.

2. In a grout mixer, a receptacle for the mixture, a vertical shaft in said receptacle, a paddle wheel on said shaft, said wheel having upwardly extending arms on which the paddles or blades are carried, the said paddles or blades being arranged to throw the mixture inward, the rear ends of the paddles or blades being lower than their forward ends, and a funnel-shaped bottom for said receptacle, the sides of said funnel corresponding to the pitch of said arms and blades.

3. In a grout mixer, a receptacle for the mixture, a vertical shaft in said receptacle, a paddle wheel on said shaft, said wheel having upwardly extending arms on which the paddles or blades are carried, the said paddles or blades being arranged to throw the mixture inward, the rear ends of the paddles or blades being lower than their forward ends, a funnel-shaped bottom for said receptacle, the sides of said funnel corresponding to the pitch of said arms and blades, an off-take for the lower end of said funnel, means for introducing fluid pressure to expel the mixture, a stuffing box for the upper portion of said shaft, to prevent escape of pressure, a thrust bearing for the upper end of said shaft, and means for rotating said shaft, disposed between said stuffing-box and bearing.

4. A mixing machine comprising a receptacle having a fluid pressure inlet, and an opening for introducing the materials having a movable door disposed when open directly in front of and close to said inlet, presenting its inside surface to the fluid jet, and thereby automatically closed by the direct impingement of the jet thereon.

5. A mixing machine comprising a receptacle having a fluid pressure inlet, and an opening for introducing the materials having a movable door disposed when open directly in front of and close to said inlet, presenting its inside surface to the fluid jet, and thereby automatically closed by the direct impingement of the jet thereon, said receptacle having a dome, the door being at the top of said dome, and said inlet being located in the side of said dome.

6. A mixing machine comprising a receptacle having a fluid pressure inlet, and an opening for introducing the materials having a movable door disposed when open directly in front of and close to said inlet, presenting its inside surface to the fluid jet, and thereby automatically closed by the direct impingement of the jet thereon, having spring means for automatically opening said door when the fluid pressure is discontinued.

7. A mixing machine comprising a vertically disposed shaft, mixing blades on said shaft, arranged to deflect the mixture toward the shaft, and sleeves on said shaft, each sleeve having upwardly extending beater arms for supporting said blades.

Signed by me at Chicago, Illinois, this 26th day of November 1910.

MORTON G. BUNNELL.

Witnesses:

S. LEWIS,

S. R. KEARNS.