H. L. WADSWORTH.

MIXING APPARATUS.

APPLICATION FILED DEC. 14, 1916.

1,332,938.

Patented Mar. 9, 1920.

2 SHEETS—SHEET 1.

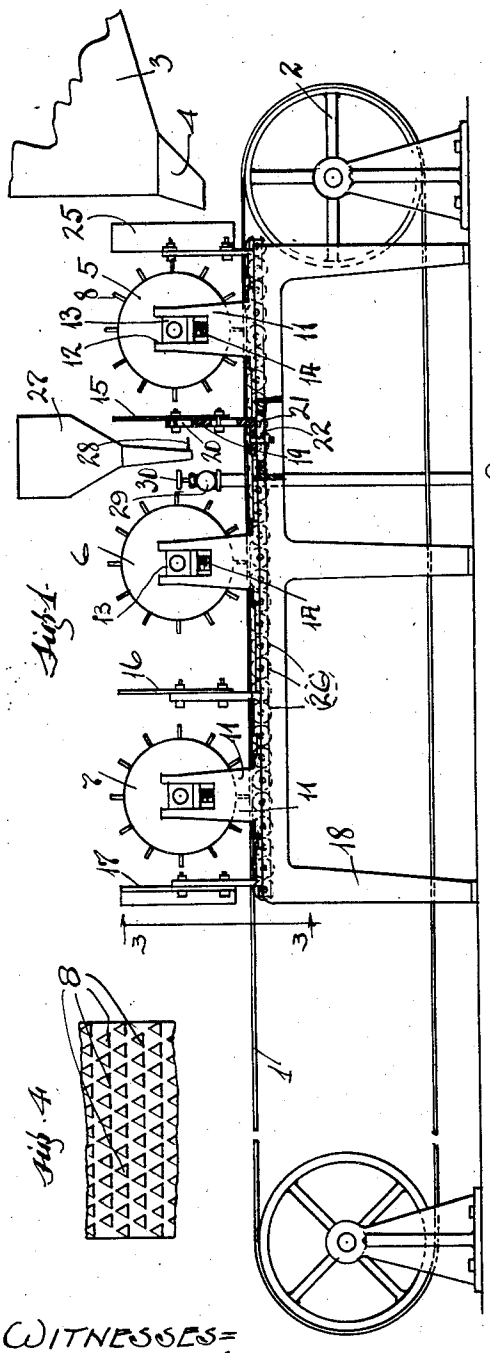


Fig. 1.

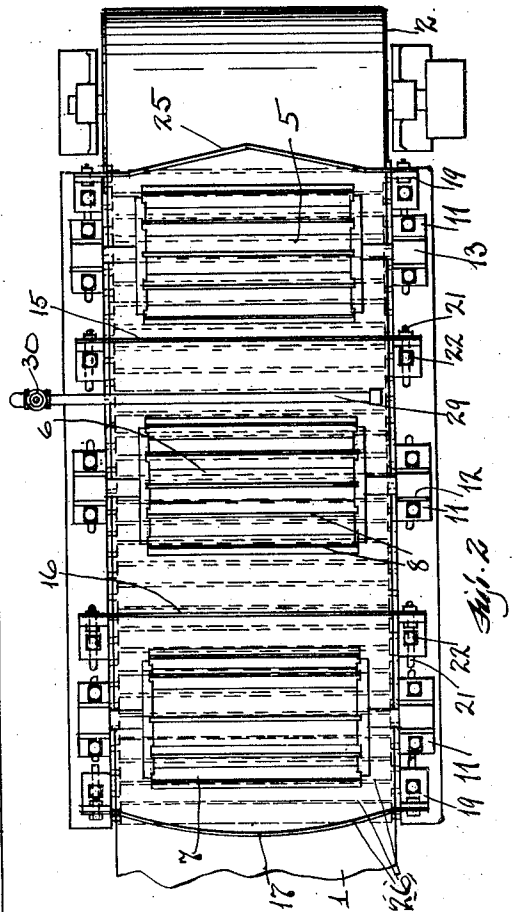


Fig. 2.

Fig. 4.

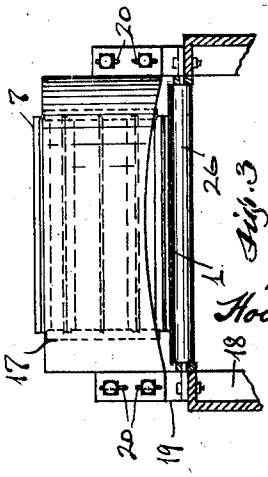


Fig. 3.

WITNESSES=

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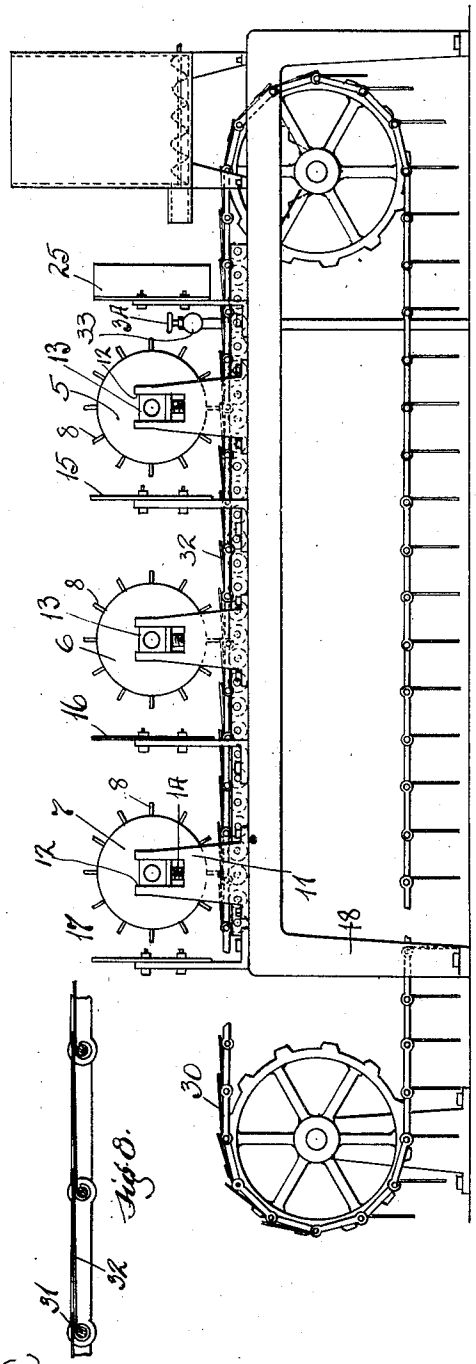


Fig. 3.

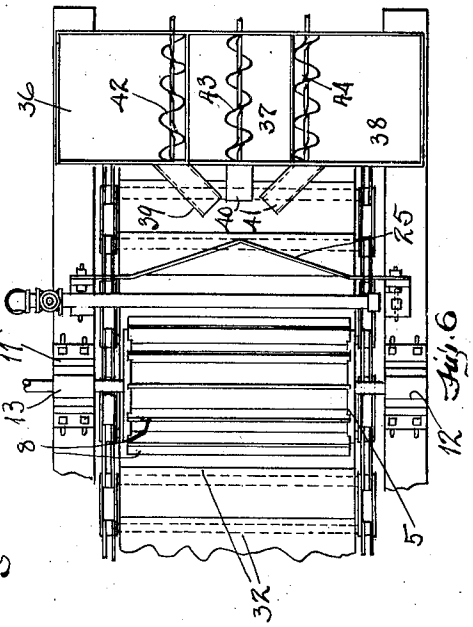


Fig. 6.

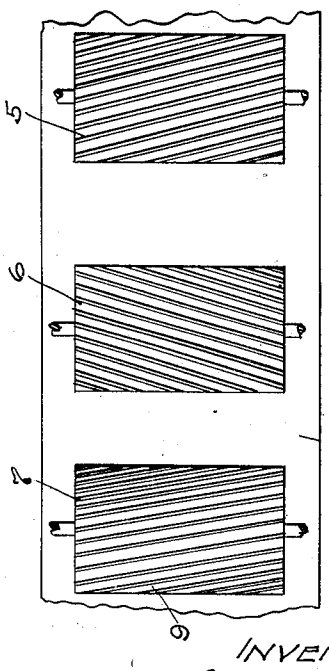


Fig. 7.

Fig. 8.

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UNITED STATES PATENT OFFICE.

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MIXING APPARATUS.

1,332,938. Specification of Letters Patent. Patented Mar. 9, 1920.

Application filed December 14, 1916. Serial No. 136,837.

To all whom it may concern:

Be it known that I, HOWARD L. WADSWORTH, a citizen of the United States, and a resident of Cleveland, county of Cuyahoga, and State of Ohio, have invented a new and useful Improvement in Mixing Apparatus, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

The present invention relating as indicated to mixing apparatus, has to do more particularly with a machine for use in mixing or grinding sand for use in foundries, although it is also adapted, with but slight changes, to the mixing of concrete, and I have here shown and described the invention as embodied in such two types of machines adapted for these two purposes. It will also be appreciated by those skilled in the various arts that the invention may be modified for use in other connections. To the accomplishment of the foregoing and related ends, said invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims.

The annexed drawings and the following description set forth in detail certain mechanism embodying the invention, such disclosed means constituting, however, but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawings:—

Figure 1 is a side elevation of my invention as embodied in a machine for mixing sand; Fig. 2 is a plan view of the same; Fig. 3 is a section on the line 3—3, Fig. 1; Fig. 4 is a plan view of a cutting cylinder for use in the machine; Fig. 5 is a side elevation of a machine embodying the invention and shaped for mixing concrete; Fig. 6 is a partial plan view of the machine shown in Fig. 5; Fig. 7 is a plan view of still another type of cutting cylinders which may be employed; and Fig. 8 is a partial side elevation on an enlarged scale of the conveying belt illustrated in Fig. 5.

In current foundry practice, it is customary to dump all of the sand from the used molds onto a conveyer leading to a hopper at one end of the foundry, and this sand is later dumped in a heap and must be cut up or ground up to separate the particles before it can be again used for molding purposes. Not only does this pile of used sand take up considerable space in the foundry, but it can only be worked over by means of a movable machine such, for example, as a machine having traction wheels, which is then pulled repeatedly over the pile until the cutting cylinder with which it is equipped has operated upon the entire contents of the pile. This is not only a cumbersome process, but a machine for this purpose must be made very large and heavy in order to permanently support the cutting cylinder which must operate at various elevations and against different amounts of sand.

The present apparatus is designed to remove the stored sand from the hoppers and to mix or grind it during such removal, which obviates the necessity for having a pile of sand beneath the hopper, and very much simplifies the machinery for mixing. The general construction of the machine will be readily seen from Figs. 1 and 2, in which there is shown a suitable conveyer 1 operating over spaced sheaves 2, and in a suitable position beneath a hopper or storage bin 3 from which the sand is delivered onto the conveyer belt through a chute 4. One or more cylinders for operating upon the sand and mixing or grinding it may be employed, and I have here shown three such cylinders 5, 6 and 7 disposed at suitable intervals along the conveyer adjacent to the hopper and provided with radially disposed blades 8 adapted to cut into the sand carried on the belt 1.

Various types of cutting blades may be used in the rotary cylinders, such for example as the triangular shaped points placed in staggered relation and shown in Fig. 4, which operate to throw the sand in different directions and mix it even more thoroughly than do the straight radial blades that are shown in Fig. 1. Still another type of cylinder that might be employed for this purpose is shown in Fig. 7 in which the three cylinders 5, 6 and 7 have inclined or diagonal blades 9, the blades of the first of these cylinders being at a considerable angle, while the blades of the second are disposed at a slighter angle and inclined in the opposite direction, while the blades of the last cylinder incline in the same direction as the blades of the first, but at a slighter angle than the blades of either the first or sec-

ond cylinders. The action of these three cylinders is to roll the sand over itself, first toward one side of the belt and then toward the other, and the blades of the cylinders are successively of lesser inclination in order that the sand after passing through the last cylinder will not be thrown too far to one side of the belt. When such cylinders are employed the belt 1 will be of considerably greater width than the cylinders, as is shown in Fig. 7.

The cylinders 5 will be driven at preferably the same speed by any suitable means although the speed may be varied for different conditions, and are mounted, as shown, in suitable supports 11, each provided at its top with a slot 12 in which rests the bearing block 13 for the cylinder, these bearing blocks being supported upon threaded bolts 14 which are adjustable in the supports 11. In this way the height of the various cylinders above the conveyer may be regulated as desired, while the weight of the cylinders will maintain them in the lowest position against the bolts 14 unless there is some obstruction upon the belt, in which case the cylinder is permitted to rise to prevent injury to the belt and to the cylinders.

The cylinders will be operated at varying speeds depending of course upon the nature of the material being operated upon, but as ordinarily this speed will be at least a revolution a second, it will be seen that the sand will be thrown up considerably by the action of the blades, and to catch this sand and return it to the belts I have provided baffle plates 15, 16 and 17 disposed at suitable distances behind each cylinder and adjustably mounted on a frame 18 disposed beneath the belt. The baffle plates 15 are attached to supports 19 provided with vertical slots 20, thus permitting vertical adjustment of the baffle plates 15 while the support 19 may be adjusted longitudinally of the frame 18 by means of slots 21 and bolts 22, as will be easily understood from Fig. 1.

In order to level off the material delivered to the conveyer from the hopper, I have provided leveling means in the form of a curved plate 25 disposed ahead of the cylinder 5 and positioned to level the material delivered onto the belt to the thickness upon which the cylinders can operate most advantageously. It is also desirable to form the pile upon the conveyer after it leaves the last cylinder 7, and for this purpose I have provided the baffle plates 17 with a curved lower surface shown in Fig. 3 which will form a crown upon the pile of material on the conveyer after passing the last cylinder.

In order to maintain the belt in proper relation to the cutting cylinders, I have provided a gravity conveyer of the usual type beneath that portion of the belt beneath the cylinders, such gravity conveyer comprising a plurality of freely rotatable rolls 26 mounted upon the frame 18 and in horizontal alinement.

It is desirable in some instances to mix a binder with the sand as it is run through the cutting cylinders, and for this purpose I have provided a small hopper 27 behind the first cylinder in position to discharge across the conveyer, and having its discharge opening or nozzle controlled by means of a valve 28. If the binder is in the form of a liquid, or if for any purpose it is desired to moisten the same, a suitable liquid can be discharged upon the sand on the conveyer by means of a conduit 29 extending across the belt and controlled by valve 30, this conduit being provided with a number of perforations in its lower side so that the liquid will be discharged evenly across the sand.

In case my improved apparatus is to be used as a concrete mixer, slight changes will be made although the same cutting cylinders 5, 6 and 7 are employed at various intervals along the belt, as well as the various baffle plates 15, 16 and 17 which, however, may be given different positions, as of course the ingredients of concrete being in the main heavier than sand and larger in size, will not be thrown so far by the action of the cylinders, which also will be driven at a considerably reduced speed. The main differences between the machine shown in Fig. 5 which is adapted for handling concrete and the machine already described, is in the construction of the conveyer belt and in the feeding hoppers. In mixing concrete, where crushed stone is employed, it is of course impossible to use an ordinary canvas or leather belt since the cutter blades would drive the sharp pointed fragments of rock into the belt and would soon cut it in two. I have therefore constructed the conveyer with a chain consisting of a number of links 30, and to the pin 31 connecting each two links I have attached a thin steel plate 32 of sufficient length to slightly overlap the next adjacent pin, and being in turn overlapped by the succeeding plate on the next pin. The construction and attachment of these plates is best shown in Fig. 8, from which it will be noticed that the conveyer now consists of a number of overlapping steel plates which can not be injured by the action of the cutting cylinders when they strike fragments of crushed stone, since the cutting cylinders are mounted in the same manner as in machine No. 1, and are vertically movable upon striking an obstruction.

Behind the leveling or grading means 25 I have provided water conduit 33 constructed similar to that shown in Fig. 1, for the purpose of supplying water to the mixture, the rate of flow of this water being controlled by means of a valve 34 and being set in accordance with the feed of the other

ingredients which are contained in hoppers 36, 37 and 38 disposed side by side at the forward end of the conveyer, and discharging through separate chutes 39, 40 and 41 respectively, which are so positioned as to discharge the various materials at substantially the same point on the conveyer, thus preliminarily mixing them as discharged, and materially assisting in the subsequent mixing.

The hoppers will be of the usual type, having preferably an inclined bottom in which there are disposed screw conveyers 42, 43 and 44 respectively which are adapted to be driven at different rates of speed to vary the amount of the different ingredients supplied to the conveyer, any suitable means being employed for this purpose, and these means I have not shown, as they form no part of the present invention.

My improved apparatus is simple in construction, and is capable of being made an integral part of a conveying system, which is of great advantage in sand and concrete mixing and the mixing of other materials which are to be supplied to workmen, as no time is lost in mixing, which is not a separate operation, and since the conveyer must be used any way to transport the materials to the points of use.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the mechanism herein disclosed, provided the means stated by any of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention:—

1. In a mixer, the combination of a conveyer, a cutter positioned to operate on the material carried by said conveyer, a leveler mounted ahead of said cutter for grading the material on said conveyer, and a second leveler mounted behind said cutter for forming the material.

2. In a mixer, the combination of, a conveyer, a rotary cutting cylinder mounted to operate on the material carried by said conveyer and an adjustable leveler mounted ahead of said cylinder, and a plate adjustably mounted behind said cylinder.

3. In a mixer, the combination of, a conveyer, a rotary cutting cylinder mounted to operate on the material carried by said conveyer and an adjustable leveler mounted ahead of said cylinder, and a plate adjustably mounted behind said cylinder, and provided with a curved lower edge for grading and forming the material on said conveyer.

4. In a mixer, the combination of, a conveyer, a rotary cutting cylinder mounted to operate on the material carried by said conveyer, and a V-shaped distributing plate mounted ahead of said cylinder for evenly spreading the material on said belt.

5. In a concrete mixer, the combination of a conveyer, a cutter positioned to operate upon the material carried by said conveyer, and means for feeding the desired ingredients onto said conveyer at substantially the same point.

6. In a concrete mixer, the combination of a conveyer, a cutter positioned to operate upon the material carried by said conveyer, means for feeding the desired ingredients onto said conveyer at substantially the same point, and means for leveling the material so fed onto said conveyer.

7. In a concrete mixer, the combination of a conveyer, a cutter positioned to operate upon the material carried by said conveyer, a plurality of hoppers discharging onto said conveyer at substantially the same point, and positive feeding means in each of said hoppers capable of variable speeds of operation.

8. In a concrete mixer, the combination of a conveyer, a cutter positioned to operate upon the material carried by said conveyer, a plurality of hoppers discharging onto said conveyer at substantially the same point, and screw conveyers mounted in said hoppers for feeding the material therefrom, said screw conveyers being unconnected from each other to permit of individual speed variation.

Signed by me this 7th day of December, 1916.

HOWARD L. WADSWORTH.