April 6, 1965 G. CIANI ETAL 3,176,877

COMBINED MIXER AND CONVEYOR UNIT FOR GRANULAR, POWDERED OR LIKE MATERIALS

Filed Dec. 27, 1962 2 Sheets-Sheet 1

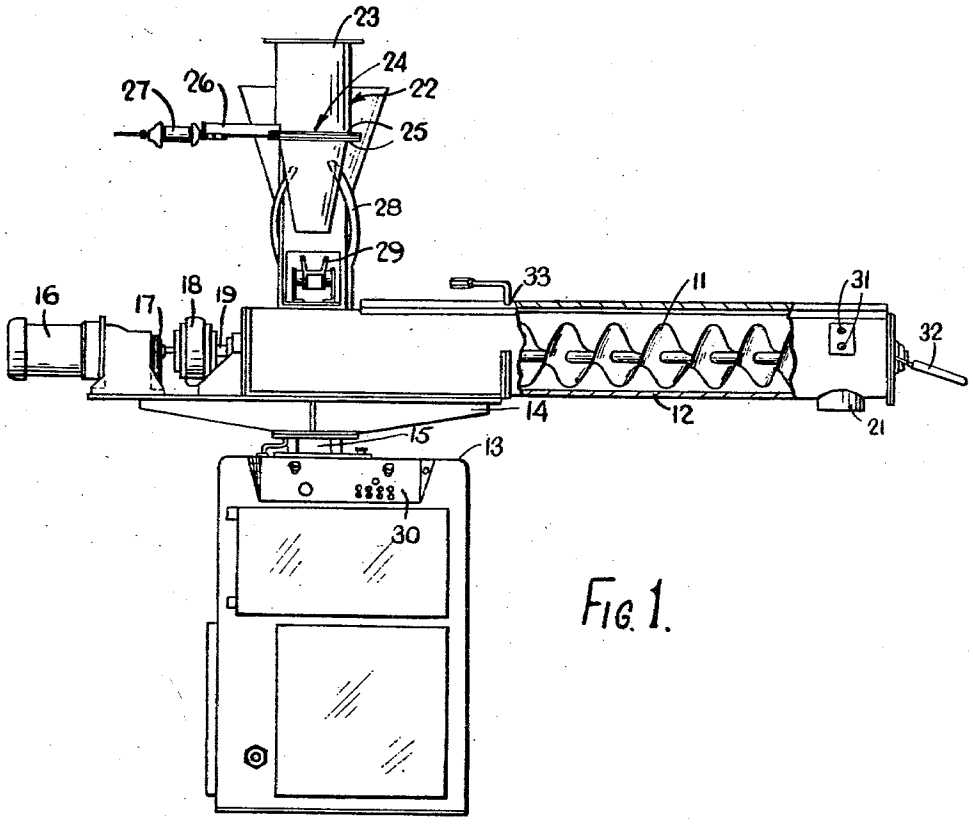


FIG. 1.

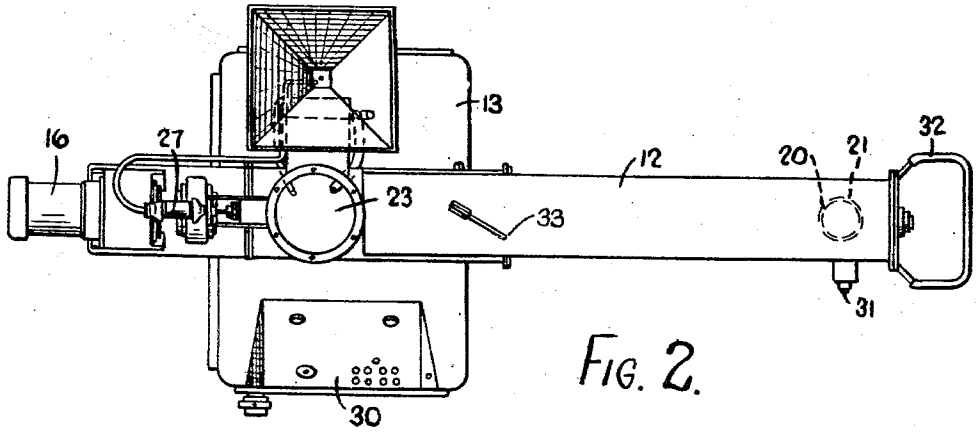


FIG. 2.

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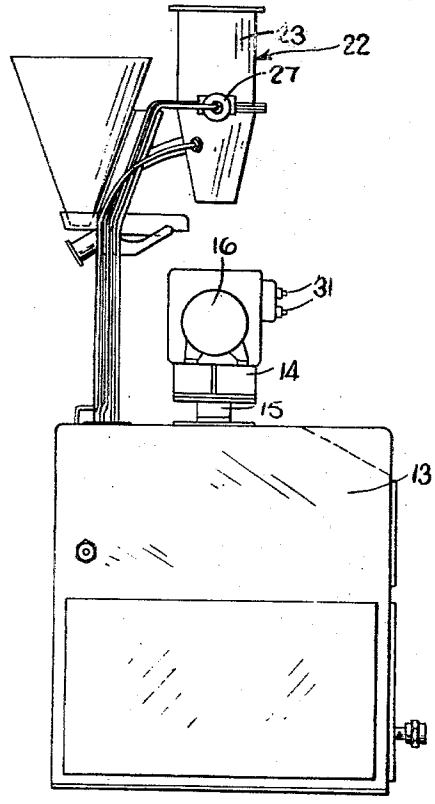


FIG. 3.

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COMBINED MIXER AND CONVEYOR UNIT FOR GRANULAR, POWDERED OR LIKE MATERIALS

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3 Claims. (Cl. 222—57)

This invention relates generally to a combined mixer and conveyor unit for granular, powdered or like material hereinafter referred to as the principal material, and more specifically to a mixer for mixing foundry sand, the principal material, with a core binder and an accelerator, hereinafter referred to as additives, in order to provide a mixture for use with the cold setting of foundry cores.

The recent development of the cold setting core binders enables core boxes to be filled and left to set at room temperature and the setting time can be controlled by the amount of accelerator used. The normal practice in foundries is for the sand, binder and accelerator to be mixed in some suitable mixer and to be then conveyed possibly by a barrow to the station where the core boxes are being filled. The setting time is therefore governed by the delay which may occur between discharging the material from the mixer and the actual filling of the core box, for obviously if a high proportion of the accelerator is used the mixed sand may set before it has been rammed into the core box.

From the point of view of the foundry it is desirable that the setting time should be as short as possible and it is therefore a specific object of the present invention to provide a mixer which will enable a high proportion of accelerator to be used and thus the achievement of a short setting time.

It is a further object of the present invention to provide an apparatus for mixing sand and an additive which includes a screw-type conveyor contained within a housing which can be swung with respect to a supporting frame to alter the position of discharge of mixed materials from said conveyor so as to facilitate the distribution of the mixed materials in a core box.

It is a still further object of the present invention to provide an apparatus for mixing sand and a binding material in which operation of the apparatus is under the control of a single operator who is able to maintain a constant check on the discharge of mixed materials into a core box and to stop and start said discharge when required without interrupting his constant check or moving away from the core box.

One construction according to the invention is diagrammatically illustrated by way of example in the accompanying drawing wherein:

FIGURE 1 shows a front elevation of a combined mixer and conveyor unit,

FIGURE 2 shows a plan view of the combined mixer and conveyor unit, and

FIGURE 3 shows a side elevation of the combined mixer and conveyor unit.

A combined mixer and conveyor unit for foundry sand includes a screw-type conveyor **11**, mounted in a horizontally extended housing **12**, the screw being provided with formations which will assist in the mixing of the material, or alternatively, the screw being interrupted at one or more spaced positions and suitable mixing paddles being secured to the shaft of the screw at such positions. The housing **12** is supported adjacent the one end thereof upon a suitable bed or frame **13**, the arrangement being that housing **12** can be swung about a vertical axis with respect to frame **13**.

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The housing **12** is secured to a longitudinally extending beam **14** which is itself secured to a downwardly extending stub shaft **15** engaging in a suitable bearing housing in the top of frame **13**. Also carried by beam **14** is an electric motor **16** which is coupled through a suitable gear box **17** and through a suitable flexible coupling **18** to a shaft **19** of the conveyor .

Adjacent its other end the underside of the housing is cut away to provide a discharge opening **20** and a downwardly extending baffle **21** is secured thereto to provide controlled discharge of the material. In between discharge opening **20** and the actual adjacent end of the housing the hand of the conveyor worm **11** is reversed so as to ensure that all material is discharged from the housing.

Mounted above that end of the housing **12** which is supported by frame **13** and having a suitable shield for guiding material into the housing is a loading unit **22** which includes, at its upper end, a sand hopper **23** there being mounted in hopper **23** adjacent the lower end thereof an adjustable sand gate **24** which includes a pair of apertured plates **25** whereby by effecting relative movement between plates **25** the size of the discharge opening from hopper **23**, and thus the rate of feed of sand, can be controlled. Additionally sand gate **24** has associated therewith a closure plate **26** which can be moved so as to close the opening, the closure plate **26** being operated through a suitable pneumatic or hydraulic cylinder **27**.

Leading into the lower end of the hopper, below the sand gate, is a nozzle **28** through which the core binder, which may be in the form of an oil or a resin, can be fed. This core binder is fed from a suitable variable speed pumping unit which can of course be adjusted to give the desired rate of feed and thus the desired proportion between the sand and the binder.

A further feed point **29** may be provided adjacent the lower end of hopper **23** or through the guide between hopper **23** and housing **12**, this further feed point **29** being for the reception of an accelerator which is normally in the form of a powder and which can be injected by any suitable mechanism.

Where a resin-acid catalyst system of binder is employed provision is made in the core for the introduction of the liquid catalyst into the sand stream controlled by a suitable variable speed pump. The liquid catalyst is introduced into the partially mixed sand at a point **33** some distance along the mixing trough.

The frame **13** upon which housing **12** is mounted carries a suitable control panel **30**. The drive for the conveyor unit, the sand gate, the binder feed and the accelerator feed are all operated through control panel **30** by the medium of STOP and START buttons **31** which are mounted adjacent discharge opening of housing **13**. Thus the operator who is filling the core box will have complete control of the machine from his operating position. A handle **32** is provided at the end adjacent discharge opening **20** so that housing **12** can be swung about a vertical axis with respect to frame **13**.

In order to ensure that all the mixed sand has been discharged from the machine a suitable time delay circuit is provided so that the conveyor unit will continue operating for a predetermined time after the STOP button has been pressed. In view of the cold setting nature

of the materials some provision is made in order to prevent the mixed materials setting in the conveyor.

What we claim then is:

1. Apparatus for simultaneously mixing and conveying sand and an additive comprising:

(*a*) a frame,

(*b*) a housing pivotally mounted upon said frame,

(*c*) a screw-type conveyor contained within said housing,

(*d*) means for feeding sand at a predetermined rate to one end of said conveyor,

(*e*) a discharge nozzle at the other end of the said conveyor,

(*f*) means for feeding the additive at a predetermined rate to said conveyor,

(*g*) drive means for said conveyor,

(*h*) an operating handle disposed near said discharge nozzle for swinging said conveyor and housing relative to said frame,

(*i*) control means for said apparatus comprising a pair of manually operable control members disposed near said discharge nozzle, operation of one of the said members serving to start the drive means, the feed means for the sand and the feed means for the additive and operation of the other said member serving to stop the drive means, the feed means for the sand and the feed means for the additive.

2. Apparatus according to claim 1 which includes a sand hopper having a downwardly directed discharge opening mounted upon said frame and disposed above said conveyor, said hopper having a gate which includes:

(*a*) a pair of apertured plates for adjusting the size of said discharge opening and thus the rate of feed of said from said hopper, and

(*b*) a closure plate for opening and closing said discharge opening.

3. Apparatus for simultaneously mixing and conveying sand and a binding material and then discharging the mixed materials into a core box comprising:

(*a*) a frame,

(*b*) a housing pivotally mounted upon said frame for movement about a substantially vertical axis relative to said frame,

(*c*) a screw-type conveyor contained within said housing,

(*d*) a hopper fixedly supported by said frame and disposed above said conveyor,

(*e*) means for feeding sand from said hopper to one end of the said conveyor,

(*f*) a discharge nozzle at the other end of said conveyor,

(*g*) means for feeding binding material at a predetermined rate to said conveyor,

(*h*) an electric motor mounted on said housing for driving said conveyor,

(*i*) an operating handle disposed near said discharge nozzle for swinging said conveyor, housing and motor about said substantially vertical axis to facilitate the distribution of materials discharged from said discharge nozzle into a core box, and

(*j*) control means for said apparatus comprising a pair of push buttons mounted on said housing and disposed near said discharge nozzle, operation of one of which serves to stop, and operation of the other serves to start, the drive to said conveyor, the feed means for the sand and the feed means for the binding material.

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