Oct. 14, 1958 E. H. GORDTNEY 2,856,165

EXTRUDING DEVICE

Filed June 19, 1957 4 Sheets-Sheet 1

Fig. 1.

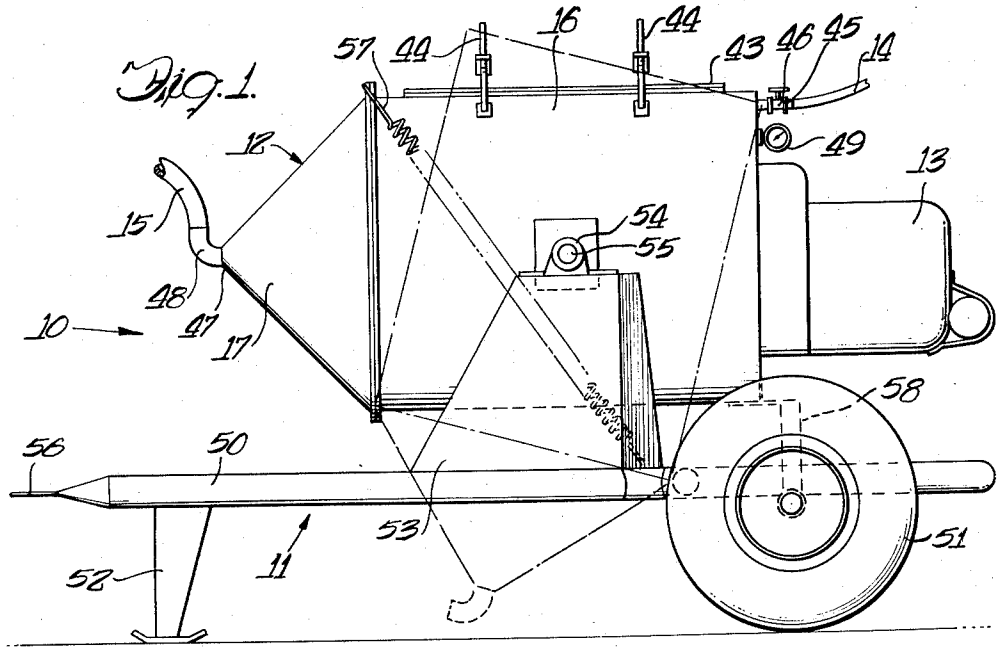
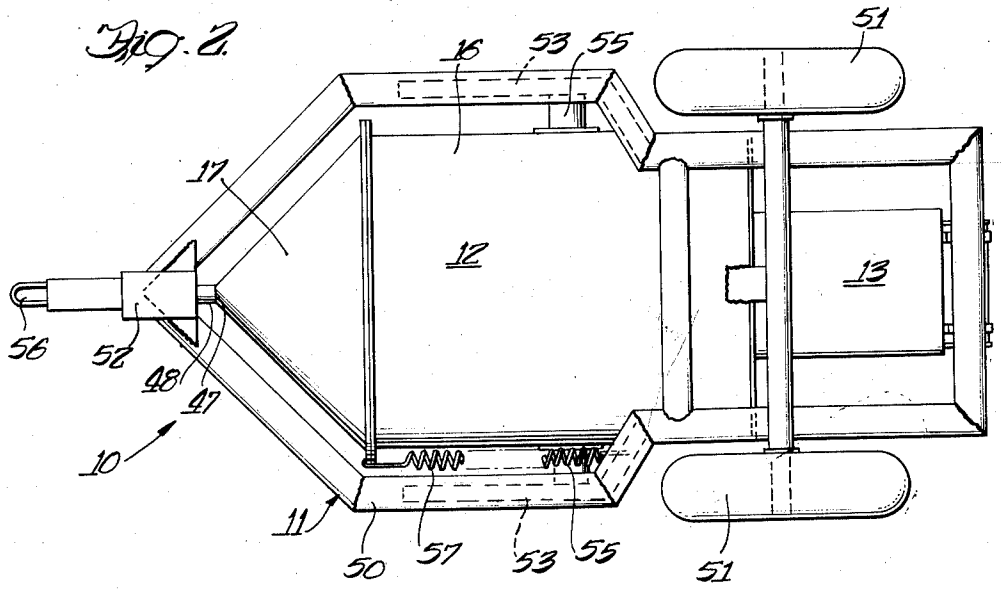


Fig. 2.



Inventor
Eric H. Gordtney
Dolbert M. Shefte
Attorney

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EXTRUDING DEVICE

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Fig. 3.

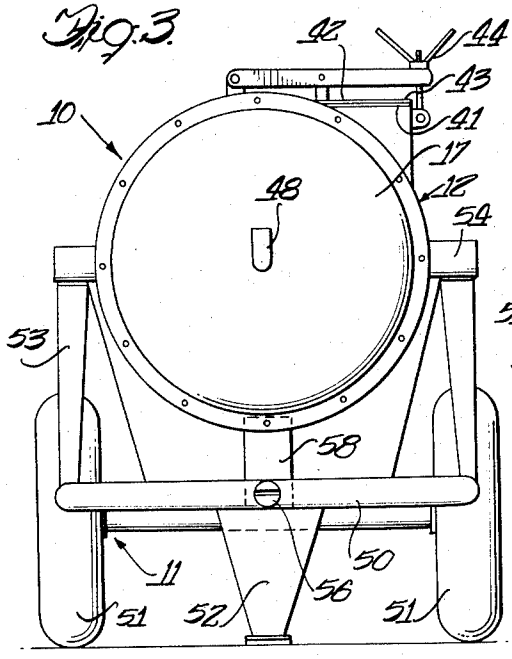


Fig. 4.

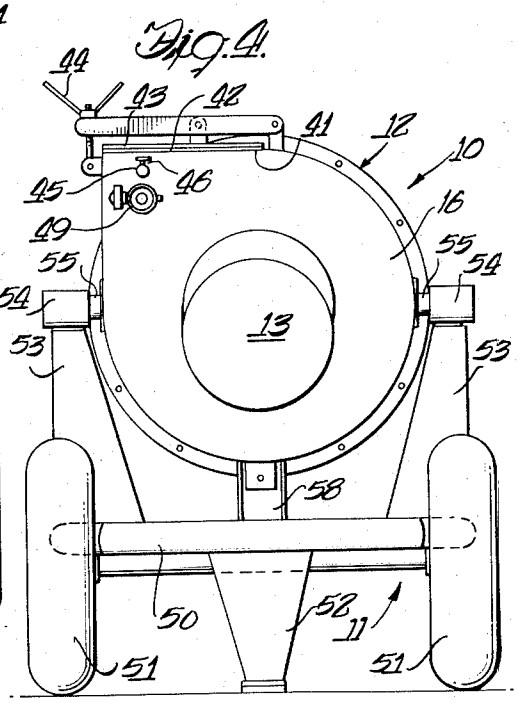


Fig. 5.

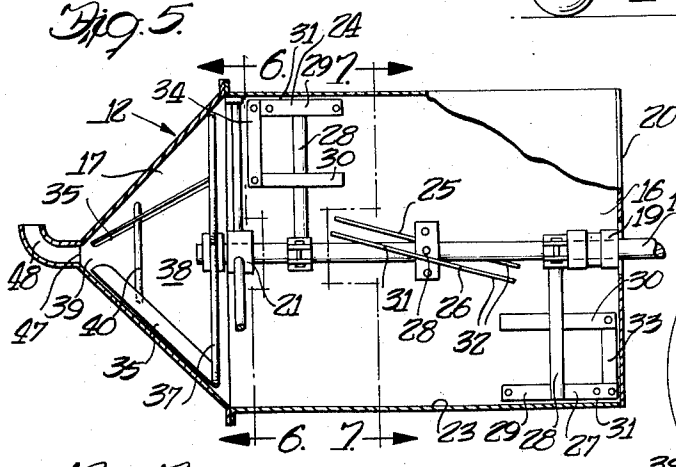


Fig. 6.

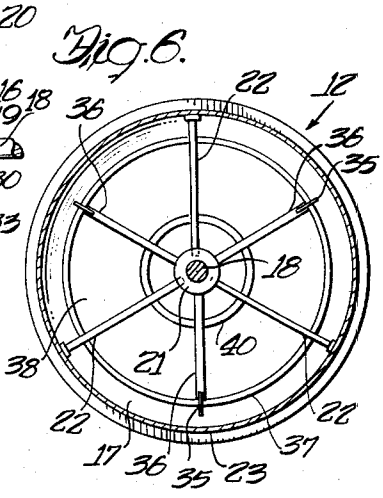
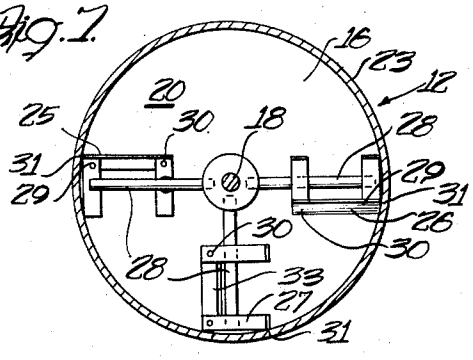


Fig. 7.



Inventor
Eric H. Gordtney
Dalbert U. Shafer
Attorney

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Fig. 8.

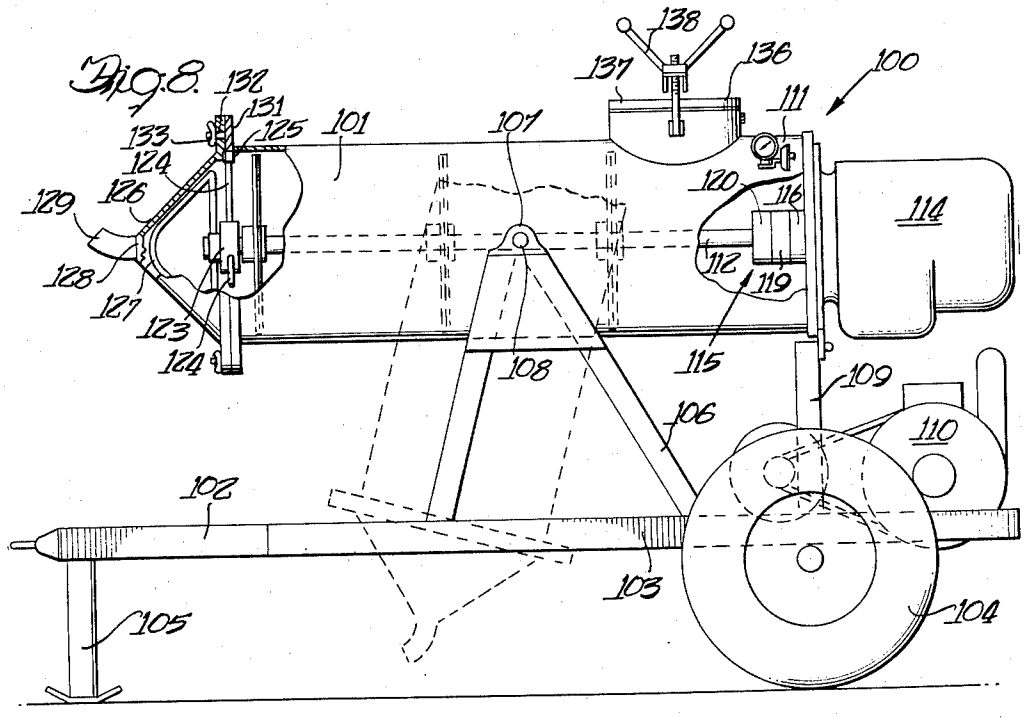


Fig. 9.

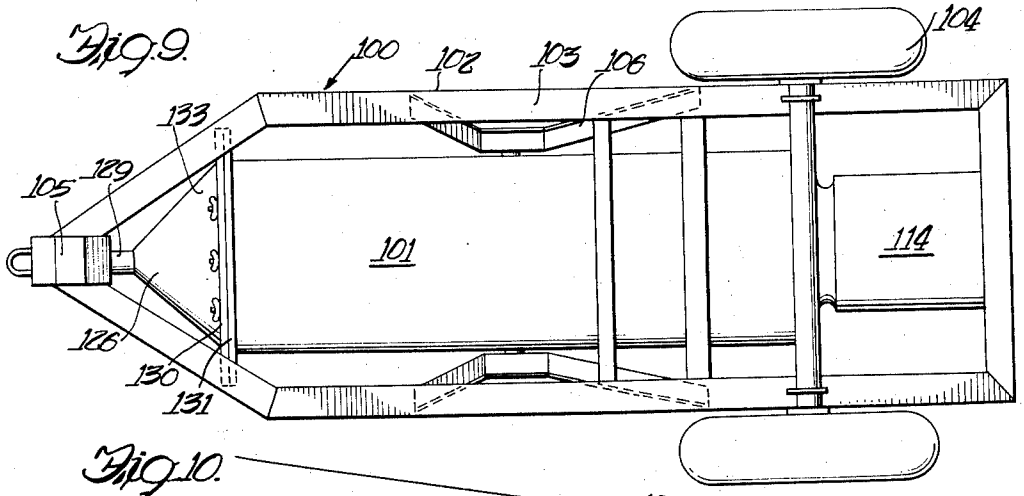
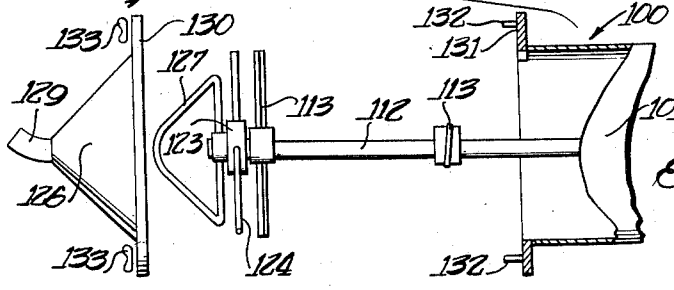


Fig. 10.



Inventor
Eric H. Gordtney
Dalbert U. Shafte
Attorney

Oct. 14, 1958 E. H. GORDTNEY 2,856,165

EXTRUDING DEVICE

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Fig. 11.

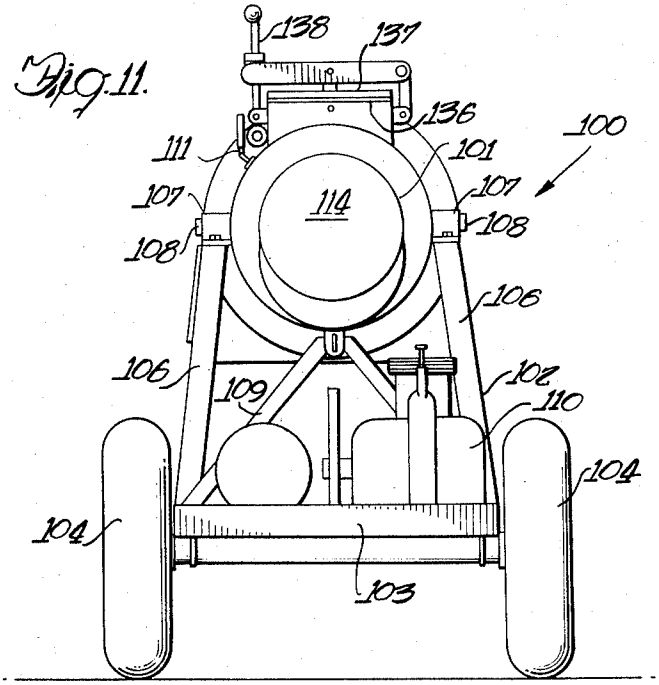


Fig. 13.

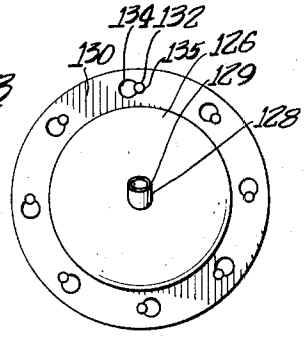


Fig. 12.

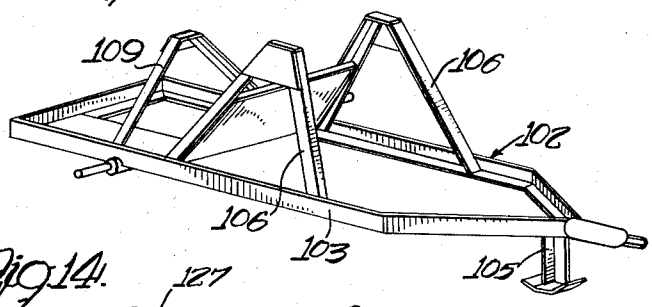


Fig. 16.

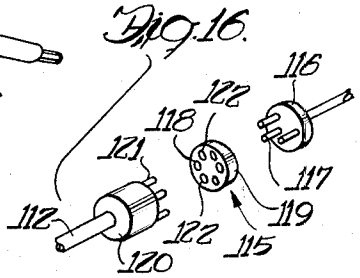


Fig. 14.

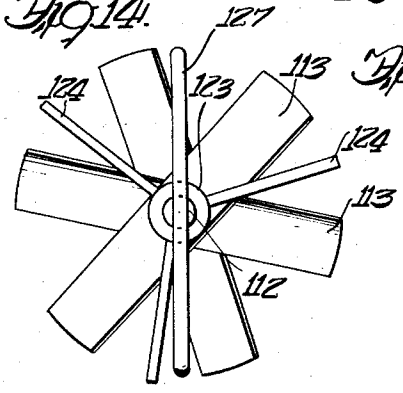
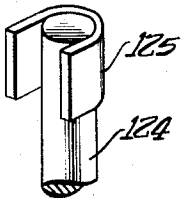


Fig. 15.



Inventor
Eric H. Gordtney
Talbot U. Shefte
Attorney

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2,856,165

EXTRUDING DEVICE

Eric H. Gordtney, Ashtabula, Ohio, assignor to Structural Clay Products Research Foundation

Application June 19, 1957, Serial No. 667,067

5 Claims. (Cl. 259—151)

This invention relates to an extruding device and more particularly to a mortar extruding device having means for agitating the mortar therein to facilitate extruding.

The bricklayers' age-old hawk and trowel are still the most common tools used in tuck pointing and other types of joint filling operations wherein mortar or other similar materials are used. The hawk provides a simple means for carrying a quantity of mortar for handy application with a trowel but is limited to a quantity that can be upheld by one hand of the worker and thus the worker is required to return frequently to the batch to reload his trowel. This results in a serious waste of time especially when the batch is located a considerable distance from the work.

Various devices have been developed to increase the amount of mortar available to the tuck pointer, bricklayer or other user by providing an extruding mechanism into which previously mixed mortar is poured and subsequently extruded through a hose extending to the worker. These devices have several disadvantages, the most important being the difficulty of maintaining a constant flow of material due to the semi-liquid character of mortar.

The present invention provides a solution to the above problem in that it is an extruding device having agitating blades which rotate to maintain constant flow of material being pushed out of the device and through the hose by air pressure.

It is the general object of the invention to provide a new and improved extruding device.

Another object of the present invention is to provide a new and improved mortar extruding device having means for agitating the mortar to facilitate extruding.

A further object of the present invention is to provide a device as described wherein air pressure is used to extrude the mortar from the device.

Still another object of the invention is to provide a device as described which is portably mounted on a vehicular member.

A still further object of the present invention is to provide a device as described wherein the agitating blades are mounted on a shaft which is removable to permit efficient cleaning of the device.

Yet another object of the present invention is to provide a new and improved mortar mixing and extruding device in which mortar is both mixed and extruded.

A further object of the present invention is to provide a mixing and extruding device as described having a cylindrical mixing portion, a conical extruding portion and a shaft on which both mixing paddles and agitating blades are mounted for rotation.

Still another object of the present invention is to provide a device as described which is tiltable from a mixing to an extruding position.

Other and further objects and advantages of the present invention will be apparent from the following description and drawings in which:

Figure 1 is a side elevation view of the device incorporating one embodiment of the present invention;

Fig. 2 is a bottom plan view of the device of Fig. 1;

Fig. 3 is a front elevation view of the device of Fig. 1;

Fig. 4 is a rear elevation view of the device of Fig. 1;

Fig. 5 is a partial side elevation view of the device of Fig. 1 showing a portion of the device in section;

Fig. 6 is a vertical sectional view taken along line 6—6 of Fig. 5; and

Fig. 7 is a vertical sectional view taken along line 7—7 of Fig. 5;

Fig. 8 is a side elevational view partially in section of the device incorporating an alternate embodiment of the present invention;

Fig. 9 is a bottom plan view of the device of Fig. 8;

Fig. 10 is a side elevational view partially in section of a portion of the device of Fig. 8 showing the members disengaged;

Fig. 11 is a rear elevational view of the device of Fig. 8;

Fig. 12 is a perspective view of the frame of the device of Fig. 8;

Fig. 13 is a front elevational view of a portion of the device of Fig. 8;

Fig. 14 is a front elevational view of the shaft and blades of Fig. 8;

Fig. 15 is a perspective view of the shaft support mounting of the device of Fig. 8; and

Fig. 16 is an exploded view of the coupling for the shaft of the device of Fig. 8.

Referring now to Figs. 1–7, a mortar mixing and extruding device indicated generally as **10** is seen to comprise a vehicular support member **11** on which a tank **12** is pivotally mounted for the mixing of mortar or the like. The power to perform the mixing is provided by a motor **13** attached to the tank **12** and the air pressure to extrude mortar from the device is supplied from a source through the air line **14**. The mixed mortar is extruded through a flexible hose **15** to the tuck pointer or other worker who may be situated a considerable distance up, down or to the side of the device.

Referring now to Figs. 5, 6, and 7, the tank and its components will be described in more detail. The tank **12** is composed of a cylindrical mixing chamber **16** and a conical agitating chamber **17** coaxial therewith and having a common annular base. The chambers are hermetically sealed together with their open bases abutting to form a communicating passage therebetween. A shaft **18** extends along the axis through the cylindrical chamber **16** and into the conical chamber **17** and is secured in a sealed rear bearing **19** on the rear wall **20** of the cylindrical chamber and in a forward bearing **21** at the end of the cylindrical chamber **16** adjacent the conical chamber **17**. The forward bearing **21** is supported by three stationary arms **22** extending from the wall **23** of the tank **12** to rigidly position the bearing in the center of the tank.

Four mixing paddles **24**, **25**, **26**, and **27** are attached to the shaft **18** for rotation therewith within the cylindrical mixing chamber **16**. These paddles are rigidly secured to the shaft and consist of a radial arm **28** extending from the shaft **18** to a point adjacent the wall **23**. Bars **29** and **30** are perpendicularly attached to the arms with the bar **29** adjacent the wall **23** and the bar **30** intermediate the bar **29** and the shaft **18**. Rubber strips **31** are attached to the bars **29** and extend into contact with the wall **23** to scrape material from the wall as the paddles are rotated. The bars **29** and **30** of the two middle paddles **25** and **26** are at an angle with the axis so that the leading end **32** is to the rear thereby impelling the mortar forwardly in the direction of the conical agitating chamber **17** as the paddles are rotated. The rear paddle **27** has a radial bar **33** secured to and extending between the horizontal bars **29** and **30** adjacent the rear wall **20**

of the tank 12 to insure mixing of the material adjacent the rear wall. The forward paddle 24 has a similar radial bar 34 secured to and extending between the horizontal bars 29 and 30 adjacent the arms 22 of the bearing supporting structure so as to insure mixing of material adjacent thereto.

Agitating blades 35 are secured to the shaft 18 by radial arms 36 secured to the shaft and extending therefrom. An annular ring 37 is secured to the arms 36 adjacent the wall 38 of the conical agitating chamber 17 and secures one end of the agitating blades 35 in place. The blades extend from the ring in the direction of the apex 39 of the conical chamber 17 and are positioned relative to each other by a second ring 40 secured intermediate the ends of the blades 35.

The shaft 18 extends outwardly through the sealed rear bearing 19 and is attached to the motor 13 for rotation therewith. The motor is mounted on the outside of the tank 12 and supplies power for rotating the mixing paddles 24, 25, 26 and 27 and the agitating blades 35.

Referring to Figures 1, 2, 3, and 4 the tank 12 is seen to have an open top portion 41 forming an intake opening 42 through which unmixed ingredients may be added. A cover plate 43 is hingedly mounted over the intake opening 42 and can be hermetically sealed in place by the wing nuts 44 during the extrusion process.

An air intake fitting 45 is attached to the rear wall 20 of the tank 12 and includes a regulating valve 46 which controls the supply of air from the source through the air line 14 into the tank 12 and thereby controls the extrusion of mortar through a discharge opening 47 having an L fitting 48 extending therefrom for attachment of the flexible hose 15.

A pressure gauge 49 is attached to the tank to indicate the air pressure therein.

As briefly mentioned above the tank 12 is pivotally mounted on a vehicular support member 11 which will be presently described. It has a body 50 formed from tubular lengths secured together as by welding and mounted on two wheels 51 at the rear and by a strut 52 at the front. A pair of support arms 53 extend upwardly from the body 50 and are provided with bearings 54 within which lugs 55 are contained. These lugs are secured to the tank 12 and permit rotation in the bearings. A spring 57 is attached to both the body 50 and the front of the tank 12 and urges the tank in a vertical position against the counterweight of the motor 13 and the other structure at the rear of the tank thereby facilitating tilting of the tank. Further, the support member 11 has a rear support 58 extending upwardly from the body 50 for supporting the rear of the tank 12 in the horizontal position and the center of the body 50 is open to accommodate tilting of the tank 12 so that the center of gravity of the device will be as low as possible. If desired, the device 10 can be attached to a powered vehicle for movement therewith by engaging the eye 56 extending from the front of the body.

In operation, a quantity of ingredients, proportioned according to the final mix desired, is poured through the intake opening 42 of the tank 12. The motor 13 is then put in operation rotating the shaft 18 thereby moving the mixing blades 24, 25, 26, and 27 to provide thorough mixing of the ingredients. After mixing, the motor is stopped, the cover 43 is sealed in place by tightening the wing nuts 44 and the tank 12 is tilted to a position approaching the vertical, as shown in the dotted lines of Fig. 1, the mix flowing by gravity into the agitating chamber. The air regulating valve 46 is opened and adjusted to the proper pressure as indicated on the gauge 49 thus forcing the mixed material through the discharge opening 47 into the hose 15 and through the hose to the worker who controls the extrusion of the material by any desirable controls on the hose or simply by pinching and releasing the end of the hose as desired.

During extrusion the motor is periodically operated to rotate the shaft which moves the agitating blades 35 to prevent a vortex of air from forming in the material. Also when the shaft 18 is rotated the mixing paddles 24, 25, 26 and 27 rotate to assist in agitating and the middle paddles 25 and 26 which are at an angle to the shaft impel any material adjacent thereto in the direction of the agitating blades 35 to ensure extrusion of the entire contents of the tank 12.

After the tank has been emptied, the air regulating valve 44 is turned off, the motor 13 is stopped and the tank 12 is tilted back to a horizontal position for a repetition of the loading, mixing and extruding cycle.

A mixing and extruding device according to this invention has been constructed having a capacity of approximately 4 cubic feet. For best results, the dry ingredients and water are added simultaneously with the motor in operation until approximately 2 cubic feet of ingredients are in the tank. A ¾ horsepower motor running at 25 to 30 R. P. M. is used and requires about ten minutes to thoroughly mix the mortar or grout. The tank is then tilted about 75° below horizontal and air pressure is introduced at about 10 to 15 p. s. i. depending upon the length of the hose and the height of the end of the hose above the tank. The mixed mortar or grout is then extruded through the hose and approximately every 10 minutes the motor is started and the agitating blades rotated about six revolutions. Continuous rotation of the blades has been found to be unnecessary and tends to entrain air in the mix because of the air pressure acting on the relatively large surface. When the grout left in the tank is reduced to a small amount the combination of the air pressure and relatively viscous grout results in the suction of mortar from the center of the mix to form a vortex of air requiring more frequent agitation.

After the tank is emptied, it is rotated back to horizontal for repetition of the cycle. During the 10 minute mixing period, the worker is free to finish the joints or perform any other necessary operations permitting one man to efficiently use the present device when working on a wall or other structure. Thus it is apparent that the present invention results in a mixing and extruding device wherein no premixing is required and wherein the mixed material is agitated to maintain flow during extrusion. The device is portable and is provided with a hose to permit an operator to work a considerable distance away from the device, while extruding mortar or grout.

Referring now to Figs. 8–16, an alternate embodiment of the present invention is generally indicated as **100**. This latter device operates on the same general principles as the above described embodiment except that it does not perform the mixing function. It has been found that the size of the container necessary to efficiently mix a batch of mortar requires a fairly large diameter which results in a large surface area when the device is tilted to the extruding position. This increases the possibility of entrapping air in the mortar when air pressure is applied to extrude the mortar. In order to overcome this, the embodiment illustrated in Figs. 8–16 has a smaller diameter than that of Figs. 1–7 so that when the tank **101** is tilted in the extruding position as shown in dotted lines in Fig. 8, the surface area is relatively small thereby avoiding the entrapment of air.

The general arrangement of a tank **101** tiltably mounted on a vehicular support **102** is much the same as the arrangement of the tank **12** and support **11** of the embodiment of Figs. 1–7. The support **102** consists of a body **103**, wheels **104**, a forward strut **105** and support arms **106** extending upwardly from the body **103** on which are mounted bearings **107** for the receipt of lugs **108** extending from the sides of the tank **101**. A rear support **109** extends upwardly from the body **103** to support the rear of the tank when in the horizontal position. All of the above elements are similar in structure

and function to the elements of the support **11** of the embodiment of Figs. 1–7.

Mounted on the rear of support **102** is an air compressor **110** which can be of any desired construction sufficient to produce a pressure which will extrude mortar through the device. The normal extruding pressure found to be desirable is between 15 and 25 p. s. i. An air hose (not shown) leads from the compressor **110** to the air valve and gauge **111** mounted at the rear of the tank **101** so that air pressure is introduced behind the mortar to force it toward the forward end of the tank.

Within the tank **101** is a rotating shaft **112** on which are mounted radially extending agitating blades **113** with a slight pitch so as to agitate the mortar during extrusion without providing an appreciable forward thrust which might cause packing of the mortar at the front of the tank and reduce the efficiency of the device or even stop the flow of mortar completely. It has been found that a pitch of approximately 5° provides efficient operation.

The shaft **112** is driven by a motor **114**, which can be mounted at the rear of the tank. This motor may be coupled to the shaft in any desirable manner. However, in order to properly clean the interior of the tank after use, a coupling **115** has been designed which permits removal of the shaft from the tank. This coupling, as seen in Fig. 16, consists of a plate **116** directly connected to the motor **114** and having axially extending prongs **117** which engage in holes **118** in a cylindrical pad **119** formed from rubber or some other similar material. A complementary plate **120** is attached to the end of the shaft **112** and has similar axial prongs **121** extending into engagement with other holes **122** in the pad **119**. In the embodiment illustrated, each of the plates **116** and **120** is provided with three prongs and the pad **119** has six holes for receipt of the prongs. Thus, rotation imparted by the motor to the plate **116** is transmitted by means of the pad and prongs to the plate **120** and thus to the shaft **112** with the resilient pad **119** acting as a clutch to absorb the shock upon acceleration or when the agitating blades **113** meet a sudden resistance.

The motor **114** can be of any desired design and capacity, an example being a one-third horsepower 1200 R. P. M. electric motor with a reduction to 25 R. P. M. With the device of Figs. 8–16, this optimum rotation of 25 R. P. M. was found to properly agitate the mortar without foaming and entrapping quantities of air in the mortar.

To removably secure the shaft in place and the plates in engagement with the pad, the forward end of the shaft **112** is mounted in a bearing **123** which has three radially extending support arms **124**. As seen in Fig. 15, these arms removably seat in U-shaped brackets **125** permanently secured to the interior of the tank. The open ends of the U-shaped brackets face the conical funnel **126**, which is mounted on the forward end of the tank **101** so that when the funnel is secured to the tank, as will be described below, the arms **124** of the bearing are locked in the brackets **125**, thus securing the shaft in engagement with the motor for rotation therewith.

The shaft **112** extends outwardly beyond the bearing **123** and has a scraper **127** mounted thereon. This scraper is shaped to conform to the interior of the conical funnel **126** so that as the shaft rotates, the scraper will agitate mortar within the funnel. At the apex of the funnel, there is an extruding opening **128** through which the mortar is extruded into the hose **129**. This hose leads to the worker, who controls extrusion of mortar onto the work. For example, when he may be tuckpointing or filling any joint or crack.

The funnel **126** has an annular flange **130** which mates with the flange **131** of the tank and is locked in place by a bolt **132** and wing nut **133** locking combination as illustrated in Fig. 13 where it is seen that the flange **130** of the funnel has over-sized holes **134** for the receipt of the bolts **132**. Each of these holes has a locking slot **135** arranged so that upon a slight rotation of the funnel, the locking slots will engage the bolts and when the wing nuts **133** are tightened, the funnel is secured to the tank.

The tank **101** is provided with an intake opening **136**, similar to the opening **42** of the first described embodiment. This opening is provided with a similar cover **137** which is locked in place by a wing nut **138** with a resilient gasket which hermetically seals the opening.

The operation of the device **100** illustrated in Figs. 8–16 is similar to the operation of the device of Figs. 1–7, except that the mixing of the mortar is accomplished before the mortar is loaded into the device, thus avoiding tieing up the device for a period of time while the mixing takes place. The empty tank **101** is first tilted to the inclined, almost vertical position shown in dotted lines in Fig. 8. Mixed mortar is loaded through the intake opening **136** which is then sealed. The air compressor **110** and motor **114** are then started and extruding begins. It is feasible that efficient extrusion can be accomplished at a height of 20 feet or more above the tank.

When it is desired to clean the device to avoid hardening of mortar left in the tank, the funnel **126** is simply detached by releasing the wing nuts **133** and rotating the funnel so the locking slots **135** disengage the bolts **132** and permit the removal of the funnel. With the funnel removed, the shaft **112** and attached blades **113** are withdrawn and the parts simply flushed with a hose. The parts are easily re-assembled for further operation.

Thus it is seen from the above description and the accompanying drawings that a simple yet efficient extruding device has been invented which is capable of efficient use with such thick materials as mortar and can be further utilized as a mixing as well as an extruding device.

While this invention is susceptible of embodiments in many different forms, there is shown in the drawings and will herein be described in detail several embodiments with the understanding that the present disclosure is to be considered as an exemplification of the principles of the invention and is not intended to limit the invention to the embodiment illustrated. The scope of the invention will be pointed out in the appended claims.

I claim as my invention:

1. A device for extruding semi-fluid materials, comprising: a support member; a cylindrical hollow tank mounted on said support member and having an open end, a closed end and an intake opening through which material to be extruded is loaded into the tank; a hollow conical funnel removably mounted on the tank with its open base across the open end of the tank, said funnel having an extruding opening at its apex and an annular flange circumscribing the base; a rotatable shaft removably mounted in said tank; a bearing support adjacent the open end of the tank for support of the shaft, said bearing support having radially extending arms; U-shaped brackets secured to the interior of the tank and having their open side abutting the flange of the funnel to form a receptacle for the removable mounting of the bearing arms; radially extending agitating blades and a scraper member secured to the shaft for rotation therewith, said scraper member extending into the funnel and shaped to conform to the interior surface thereof; means for rotating the shaft thereby rotating the blades and scraper so as to agitate the material and prevent solidification thereof; and means for forcing said material through said extruding opening.

2. The device for extruding semi-fluid material of claim 1 wherein the means for rotating the shaft includes a coupling in which the shaft is removably mounted, the coupling including a drive plate connected to the means for rotating the shaft, said drive plate having prongs extending therefrom, a driven plate secured to the shaft and having prongs extending in the direction of the drive plate, and a resilient pad positioned between said plates and having holes to removably engage the prongs of the

plate, rotation of the drive plate being transmitted by the prongs of the drive plate through the resilient pad to the prongs of the driven plate and thereby ultimately to the shaft and blades, said resilient pad serving as a clutch to cushion sudden changes in the rate of rotation.

3. A device for extruding semi-fluid materials, comprising: a support member; a cylindrical hollow tank mounted on said support member and having an open end, a closed end and an intake opening through which material to be extruded is loaded into the tank; a hollow conical funnel removably mounted on the tank with its open base across the open end of the tank, said funnel having an extruding opening at its apex and an annular flange circumscribing the base; a rotatable shaft removably mounted in said tank; a bearing support adjacent the open end of the tank for support of the shaft; a mounting for said bearing support formed in said tank adjacent said removable funnel, said funnel locking the bearing support in said mounting; radially extending agitating blades and a scraper member secured to the shaft for rotation therewith, said scraper member extending into the funnel and shaped to conform to the interior surface thereof; means for rotating the shaft thereby rotating the blades and scraper so as to agitate the material and prevent solidification thereof; and means for forcing said material through said extruding opening.

4. A device for extruding semi-fluid materials, comprising: a support member; a cylindrical hollow tank mounted on said support member and having an open end, a closed end and an intake opening through which material to be extruded is loaded into the tank; a hollow conical funnel removably mounted on the tank with its open base across the open end of the tank, said funnel having an extruding opening at its apex and an annular flange circumscribing the base; a rotatable shaft removably mounted in said tank; a bearing support adjacent the open end of the tank for support of the shaft, said bearing support having radially extending arms; brackets secured to the interior of the tank and having openings adjacent the flange of the funnel, said brackets receiving the bearing arms and the funnel locking said arms in the brackets; radially extending agitating blades and a scraper member secured to the shaft for rotation therewith, said scraper member extending into the funnel and shaped to conform to the interior surface thereof; means for rotating the shaft thereby rotating the blades and scraper so as to agitate the material and prevent solidification thereof; and means for forcing said material through said extruding opening.

5. A device for extruding semi-fluid materials, comprising: a support member; a cylindrical hollow tank mounted on said support member and having an open end, a closed end and an intake opening through which material to be extruded is loaded into the tank; a hollow conical funnel removably mounted on the tank with its open base across the open end of the tank, said funnel having an extruding opening at its apex and an annular flange circumscribing the base; a rotatable shaft removably mounted in said tank, said shaft having a drive plate adjacent the closed end of the tank and having prongs extending from said plate; a drive plate rotatably secured in the closed end of the tank and having prongs extending in the direction of said driven plate; a resilient pad positioned between said plates and having holes to removably engage the prongs of the plates to removably connect said plates; a bearing support adjacent the open end of the tank for support of the shaft, said bearing support having radially extending arms; brackets secured to the interior of the tank and having openings adjacent the flange of the funnel, said brackets receiving the bearing arms and the funnel locking said arms in the brackets; radially extending agitating blades and a scraper member secured to the shaft for rotation therewith, said scraper member extending into the funnel and shaped to conform to the interior surface thereof; means for rotating the shaft thereby rotating the blades and scraper so as to agitate the material and prevent solidification thereof; and means for forcing said material through said extruding opening.

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