Sept. 7, 1937. W. F. PIPER 2,092,329

APPARATUS FOR FILLING FOUNDRY FLASKS

Filed Oct. 18, 1934 2 Sheets-Sheet 1

Fig. 2

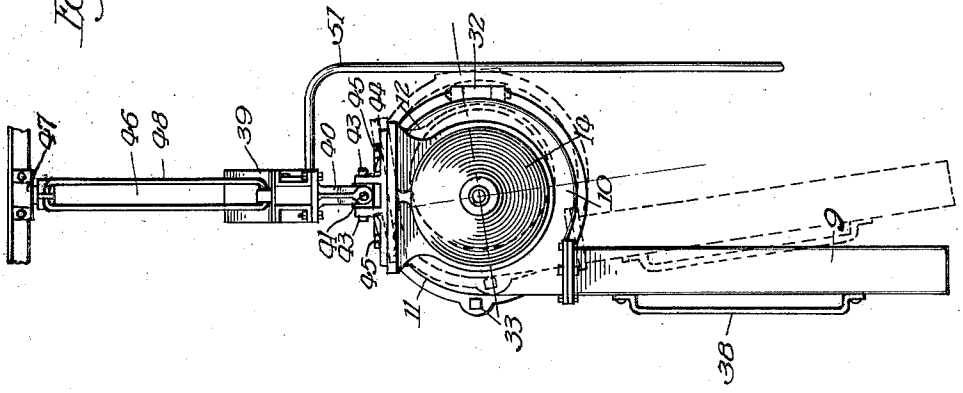
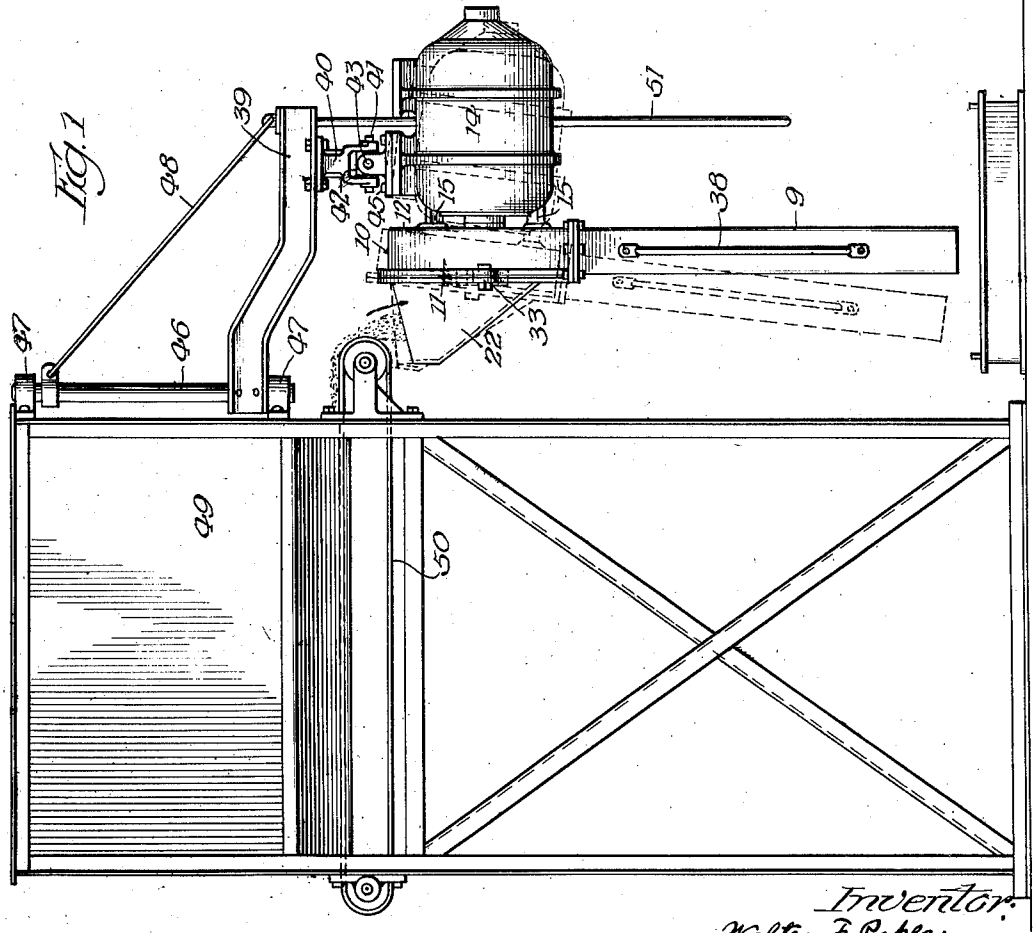


Fig. 1



Inventor:
Walter F. Piper
By Fred Gerlach Atty

Sept. 7, 1937. W. F. PIPER 2,092,329

APPARATUS FOR FILLING FOUNDRY FLASKS

Filed Oct. 18, 1934 2 Sheets-Sheet 2

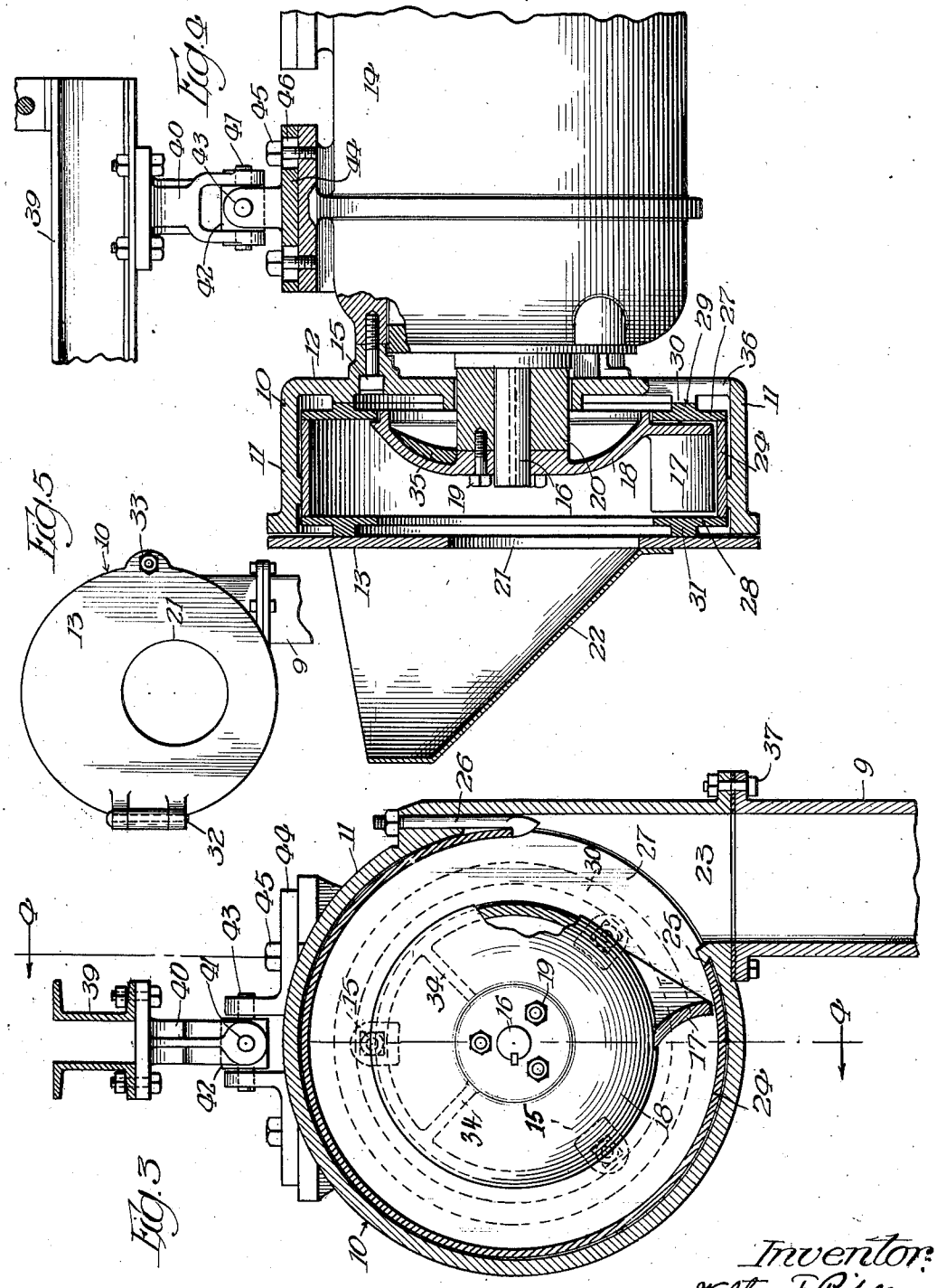


Fig. 3

Inventor:
Walter F. Piper
By Fred Gerlach
his Atty.

Patented Sept. 7, 1937 2,092,329

UNITED STATES PATENT OFFICE

2,092,329

APPARATUS FOR FILLING FOUNDRY FLASKS

Walter F. Piper, Oak Park, Ill., assignor to The Beardsley & Piper Company, Chicago, Ill., a corporation of Illinois

Application October 18, 1934, Serial No. 748,795

6 Claims. (Cl. 22—36)

The invention relates generally to apparatus for filling flasks in making molds for castings. More particularly the invention relates to that type of apparatus in which wads of sand are projected into the flask by a high speed rotary blade to pack or ram the sand with the desired density in the flask.

One object of the invention is to provide an improved apparatus of this type which comprises a ramming unit of novel design and improved means for suspending the unit so it can be easily shifted to deliver sand into all portions of a flask.

Another object of the invention is to provide an apparatus of the aforementioned type in which the sand ramming unit comprises a casing into one side of which the sand is delivered, a rotary projector blade in the casing, and an electric motor for driving the propeller which is located at the other side of the casing where it can be secured directly to the casing so the ramming unit will be compact, light in weight and easily shiftable by the operator to fill flasks without fatiguing the operator.

Another object of the invention is to provide simple means for pivotally suspending the ramming unit so it can be swung universally to direct the wads of sand into all portions of a flask.

A further object of the invention is to provide a support from which the ramming unit is pivotally suspended to permit the operator to direct the wads of sand into all portions of a flask, with means whereby the support may be shifted laterally to bring the ramming unit into position successively to fill adjacent flasks on a foundry floor.

A still further object of the invention is the provision of replaceable peripheral and side liners for the ramming unit of the apparatus.

Other objects of the invention and the various advantages and characteristics of the present flask filling apparatus will be apparent from a consideration of the following detailed description.

The invention consists in the several novel features which are hereinafter set forth and are more particularly defined by claims at the conclusion hereof.

In the drawings which accompany and form a part of this specification or disclosure and in which like numerals of reference denote corresponding parts throughout the several views:

Figure 1 is a side elevation of an apparatus embodying the invention,

Figure 2 is a front view,

Figure 3 is a transverse section through the sand projector,

Figure 4 is a section on the line 4—4 of Fig. 3, and

Figure 5 is a rear elevation of the projector casing.

The apparatus which forms the subject matter of the invention comprises a movable sand ramming unit. The latter embodies a rotary projector which receives sand from any suitable feed mechanism and is adapted to project wads of sand. The unit also embodies a horizontally positioned electric motor 14 coaxial with the projector, and a depending tube 9 for delivering projected wads of sand into a subjacent flask on the foundry floor. It is suspended from an overhead support, as hereinafter described, so the operator can swing the unit to distribute the projected wads of sand to all portions of the flask. The projector has a casing 10 which consists of an integral peripheral wall 11, an outer side wall 12 and a removable side plate 13 which constitutes a removable wall at the other side. The motor 14, is arranged so that its axis is coaxial with the casing, and is fixedly and directly secured to the outer side wall 12 of the casing by bolts 15. The armature shaft 16 of the motor extends through the side wall 12 and into the casing 10. A projector blade 17 is secured to a head 18 which is secured by screws 19 to a hub 20. The hub 20 and head 18 are keyed to the shaft 16 so as to be driven directly by the motor 14. An inlet 21 through which the sand enters the casing is formed in the side plate 13. A hopper 22 for directing the sand to the inlet 21 is secured to the plate 13. The sand entering the casing falls into the lower portion thereof and into the path of the projector plate 17. The head 18 is rotated at a speed ranging from 1200 to 1800 revolutions per minute and is of such size that the blade will have a speed of approximately 5000 to 7000 feet per minute. During rotation of the head, the blade engages the sand in the lower portion of the casing 10 and the centrifugal force and inclination of the blade cause the sand picked up during each revolution to be packed into a wad which is carried around the top of the casing and then discharged through an outlet 23 in the peripheral wall 11 of the casing. A characteristic of the present invention is that the sand is delivered into one side of the projector-casing and the shaft for driving the blade 17 extends through the other side of and into the casing. This makes it possible to mount the motor directly on the casing. In rotary projectors, as heretofore constructed, the sand was delivered into the casing and the drive shaft for the blade through the same side of the projector, which necessitated placing the motor some distance from the casing. In projectors which are movable over the flasks, a desideratum is to reduce the weight of the ramming unit and to make it as compact as possible, and the present construction attains this advantage.

To provide for the wear which results from the movement of the sand around the casing, a removable peripheral liner **24** is clamped in the casing between a shoulder **25** at the inner or lower side of the outlet **23** and a hook bolt **26** at the upper and outer portion of said outlet **23**. The liner **24** coacts with the blade in forming the sand into wads and conducting them to the outlet **23**. The blade **17** rotates between an outer liner ring **27** and an inner liner ring **28**. These rings fit inside of the peripheral wall **11** of the casing and lap the sides of the peripheral liner **24**. The ring **27** has an annular shoulder **29** abutting against a shoulder **30** on the outer side wall **12** of the casing, and the ring **28** has an annular shoulder which abuts against the side plate **13** of the casing. Said side plate serves to clamp the peripheral liner and the rings **27, 28** together and in the casing to secure them against relative longitudinal movement. It is hinged at one side, as at **32**, to the casing **10** and at its other side is secured to the casing by a bolt **33**. As shown in the drawings the head **18** is spaced sufficiently from the inner end of the peripheral wall **11** of the casing so that the pressure applied to said head by the bolt **13** will clamp the liners **27, 28** and the liner **24** in the casing. This exemplifies a projector casing with peripheral and side liners which can be easily removed and replaced.

The inner face of the head **18** extends from the outer side of the casing to a point beyond the longitudinal center of the blade **17**. Said blade is attached to the head only at its outer side. Radial ribs **34** are formed on the outer face of the head **18**. The space between these ribs is diametrically opposite to the blade **17** and is filled, as at **35**, with suitable metal, such as lead, to counterbalance the blade. The purpose of extending the inner portion of the head **18** inwardly from the outside of the casing is to provide a space for the counterweight **35** at the longitudinal center of the blade **17** to balance the blade against longitudinal vibration. The inner face of the head **18** between its central portion and its rim is curved to direct some of the sand to the outer side of the casing. The outer periphery of the head is grooved so as to lap the inner edge and inner face of the ring **27** and prevent sand from escaping from the casing. An opening **36** is formed in the lower portion of the casing wall **12** to permit any sand which may work its way between the head **18** and ring **27** to escape.

Another feature of the invention consists in providing suspension means for the ramming unit to permit the operator to swing or tilt it to direct the wads of sand into all portions of a flask. For this purpose the unit is pivotally suspended at a point sufficiently high to make it possible to distribute the wads in the flask without varying the angle of delivery sufficiently to cause the wads to skid or slide in the flask. The ramming unit is supported above the normal reach of the operator and the delivery tube **9** is secured to the casing **10** so that it is in communication with the tangential outlet **23** through which the wads are discharged by the projector blade. This tube is secured by bolts **37** to said casing and is of sufficient length to conduct the wads to a point adjacent the flask. As shown in the drawings the tube is fixed to the casing so that its axis, with respect to the direction of discharge of the wads, will not be changed when the ramming unit is tilted. A handle **38** is fixed to the tube **9** so the operator can conveniently swing the ramming unit over the flask to direct the wads into all portions thereof. An arm **39** serves as an overhead support for the ramming unit. The suspension device for the ramming unit consists of a universal joint. The latter comprises a bracket **40** which is bolted to the arm **39** and is provided at its lower end with a fork in which studs **41** are pivotally mounted. These studs extend into a member **42** which is provided with studs **43** at right angles to the studs **41**. The studs **43** are mounted in the forked end of a bracket **44**, which is secured to the casing of the motor **14** by bolts **45**. Slots are provided in the bracket **44** to permit the ramming unit to be adjusted longitudinally so that it will be longitudinally balanced under the universal joint. This exemplifies an overhead support and a pivotal suspension which permits the entire ramming unit with its delivery tube **9** to be freely swung about a point sufficiently high so that the angle of delivery of the wads is not sufficiently oblique to cause them to skid in the flask and to fill all portions of the flask.

In operating the ramming unit to fill a flask, the operator will grasp the handle **38** and swing the ramming unit so its lower end can be moved over the entire flask to fill all portions thereof. The universal pivotal suspension permits the operator to swing freely the entire ramming unit so as to move the lower end of the tube **9** in any desired direction.

The arm **39** is fixedly secured to a vertical rod **46** which is pivotally mounted in brackets **47**. A suitable brace **48** is provided between the upper portion of the rod **46** and the outer end of the arm **39**. The purpose in mounting the universal suspension device for the ramming unit on the arm **39** which is free to swing laterally is to permit the entire unit to be shifted from one flask to another and so that the filled flask can be removed and replaced with an empty flask while the other is being rammed. A handle **51** is secured to the arm **39** and depends therefrom to a point within the reach of the operator to permit the arm and ramming unit to be moved laterally from one flask to another.

Any suitable means may be provided to feed sand to the hopper **22** of the ramming unit, such as an overhead tank **49** containing a supply of sand and an endless belt **50** at the bottom of the tank which is continuously operated to discharge sand from one end of the tank into said hopper. The arm **39** is supported from the supporting structure for the tank **49**.

The invention exemplifies a ramming unit comprising a coaxial rotary projector and motor and a depending delivery tube, in which the sand is fed to one side of the projector casing and the motor is secured directly on the other side to provide a compact unit which is light in weight, simple in construction, and can be readily moved by the operator to fill all portions of the flask. Also, a ramming unit of this type which is pivotally suspended from an overhead support to swing about a point which will permit the unit with the delivery tube to be swung to fill all portions of a flask without sufficient inclination to cause the wads to skid or slide in the flask. Also, a ramming unit which is simple in construction and can be produced at a low cost.

The invention is not to be understood as restricted to the details set forth, since these may be modified within the scope of the appended claims, without departing from the spirit and scope of the invention.

What I claim as new and desire to secure by Letters Patent is:

1. In an apparatus of the character described, the combination of a sand projector comprising a substantially cylindrical casing with an inlet in one side thereof for sand and a peripheral downwardly directed outlet, and also comprising a rotatable blade in the casing for projecting wads of sand downwardly through the outlet, an electric motor disposed immediately adjacent and connected to the other side of the casing, a shaft extending from the motor through said other side and into the casing for driving the blade from said motor, an elongated rigid delivery tube secured to and depending from the casing for delivering the wads of sand from the outlet into a flask beneath the projector, an overhead support, and means for movably suspending the assembly of projector, motor and tube from the support so it can swing universally to a limited extent and thus effect discharge into all portions of the flask.

2. In an apparatus of the character described, the combination of a sand projector comprising a casing and a blade rotatable in the casing and adapted to project wads of sand, said casing being provided with a downwardly directed peripheral outlet for the wads and an inlet for sand in one of its sides, an electric motor located outside of and immediately adjacent to the other side of the casing and having the housing thereof attached directly to said other side of the casing, a shaft extending from the motor through said other side and into the casing for driving the blade from said motor, a rotatable comparatively narrow disk-like head fixed on the shaft adjacent said other side of the casing and spaced from the inlet side, said blade extending from said head across the inside of the casing, a rigid comparatively long delivery tube secured to and depending from the casing for delivering the wads from the casing outlet, into a subjacent flask, and means for movably supporting the assembly of projector, motor and tube from above so the operator of the apparatus can swing the assembly and effect discharge of the wads from the projector into all portions of the flask.

3. In an apparatus of the character described, the combination of a sand projector comprising a substantially cylindrical casing and a blade rotatable in the casing for projecting wads of sand, said casing being provided with a peripheral, downwardly directed outlet for the wads and an inlet for sand, an electric motor secured directly to one side of, and coaxial with, the casing, a shaft extending from the motor into the casing and connected to drive the blade from the motor, an elongated delivery tube rigid with and depending from the outlet portion of the casing, an overhead support, and a universal joint between the support and the motor housing for supporting the assembly of projector and motor so the operator can swing it by manipulation of the tube and effect discharge of the wads via said tube into all portions of a subjacent flask.

4. In a projector, the combination of a substantially cylindrical casing provided with an inlet in one side thereof for sand and having a peripheral outlet, a rotatable blade in the casing for forming the sand entering the casing via the inlet into wads and projecting the wads through the outlet, a strip formed peripheral liner disposed in the casing and around the path of the blade and having the ends thereof terminating adjacent to the outlet, an arcuate liner fitting against one side of the peripheral liner and against said one side of the casing and adapted to have the sand pass thereacross from the inlet into the path of the blade, an arcuate liner fitting against the other side of the peripheral liner and the other side of the casing, a drive shaft extending through said other side of the casing and also through the space defined by the inner edge of said second liner, and a comparatively narrow disk-like head to which the blade is attached, mounted on the shaft adjacent to said second liner and in spaced relation with respect to the first mentioned liner and having an annular groove in the periphery thereof for receiving and forming a lap joint with the inner margin of said second liner.

5. In a projector of the character described, the combination of a substantially cylindrical casing provided with a sand inlet in one side thereof and having a peripheral downwardly directed outlet, a rotatable blade in the casing for forming the sand entering the casing via the inlet into wads and projecting the latter through the outlet, a strip formed peripheral liner disposed in the casing and around the path of the blade and having the ends thereof terminating adjacent to the outlet, an arcuate liner fitting between the other side of the casing and the contiguous side of the peripheral liner, a drive shaft extending through said other side of the casing and also through the space defined by the inner edge of said arcuate liner, a comparatively narrow disk-like head to which the blade is attached, mounted on the shaft adjacent to the inner face of said arcuate liner and in spaced relation with respect to said one side of the casing and having the margin thereof in lapped relation with the inner margin of said arcuate liner, and means associated with the bottom portion of said other side of the casing forming an opening through the latter for permitting sand accumulating between said other side of the casing and the arcuate liner to be discharged from the casing.

6. In a projector of the character described, the combination of a substantially cylindrical casing provided with an inlet for sand and comprising a peripheral wall with an outlet, a side wall fixedly connected to one end of the peripheral wall, and a separately formed side plate positioned against the other end of the peripheral wall and forming the other side wall of the casing, a rotatable blade in the casing for forming the sand entering the casing via the inlet into wads and projecting the wads through the outlet, a strip formed peripheral liner disposed in the casing and around the path of the blade and having the ends thereof terminating adjacent to the outlet, arcuate liners disposed in the casing at the sides of the blade and fitting against the sides of the peripheral liner, a drive shaft extending through the fixedly connected side wall of the casing and one of the arcuate liners and connected to rotate the blade, and releasable means for holding the side plate in its operative position and so that it jams or clamps the three liners together and against the fixedly connected side wall and holds them in place.

WALTER F. PIPER.