June 2, 1959 G. G. EISENBEIS 2,888,863

POWERED ROTARY TROWELS

Filed Sept. 9, 1955 2 Sheets-Sheet 1

FIG. 1

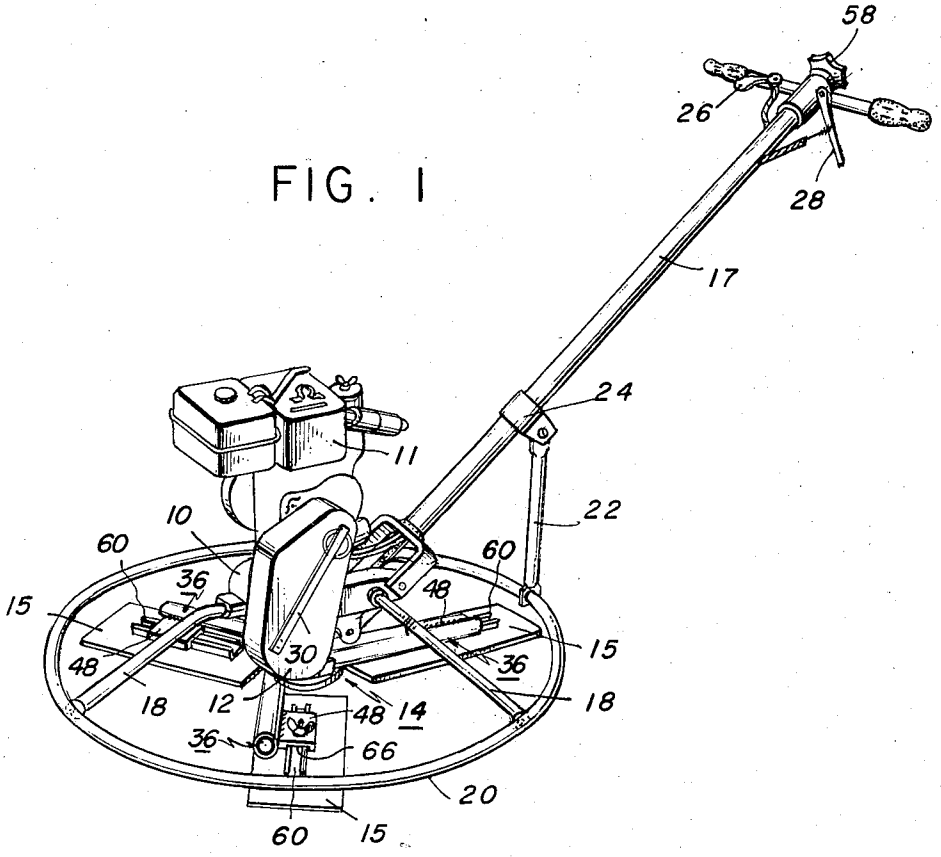


FIG. 2

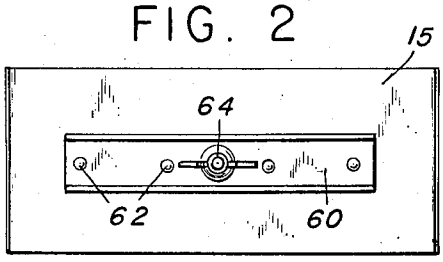
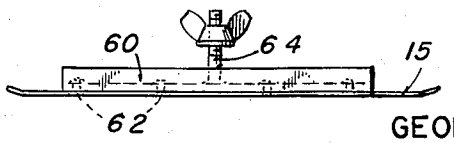


FIG. 3



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June 2, 1959 G. G. EISENBEIS 2,888,863

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Filed Sept. 9, 1955 2 Sheets-Sheet 2

FIG. 4

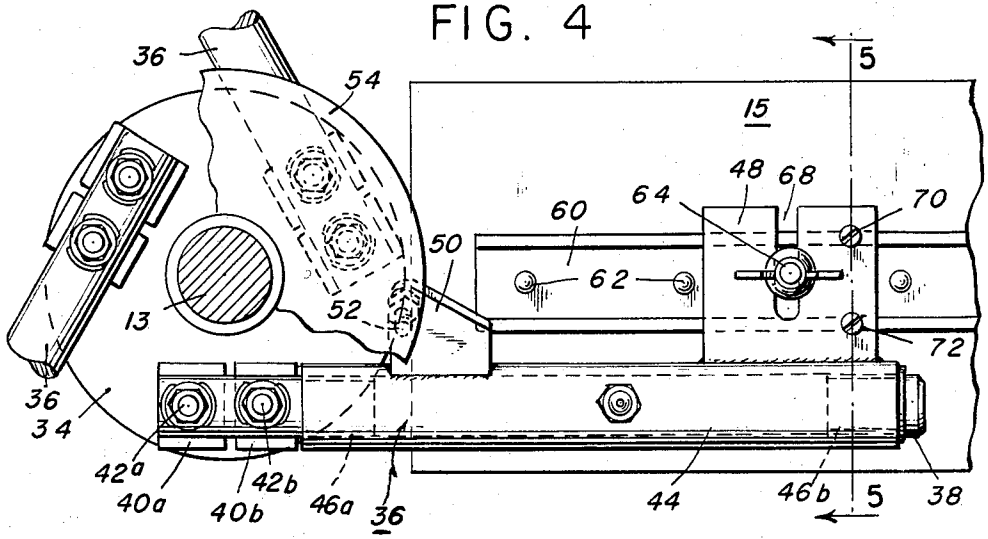


FIG. 5

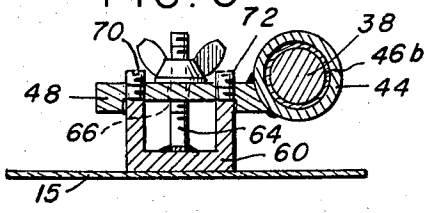


FIG. 6

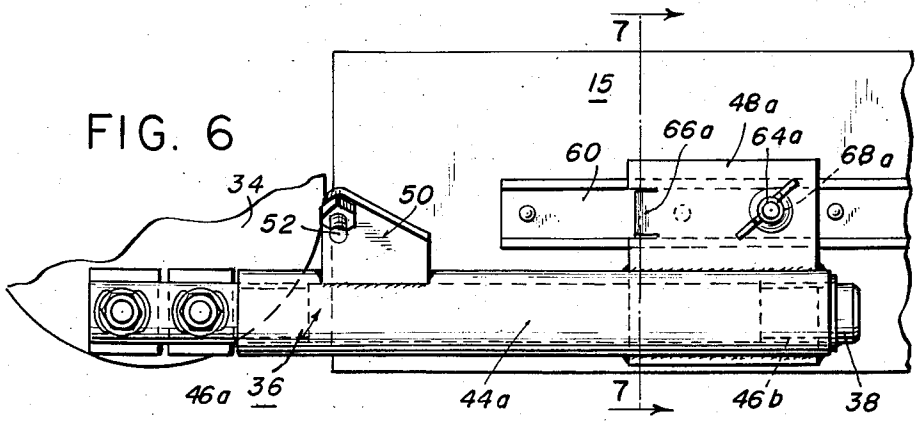
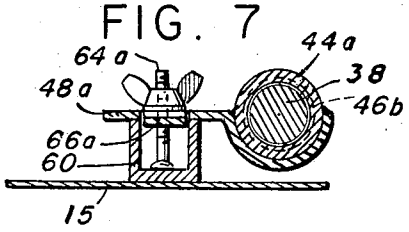


FIG. 7



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2,888,863

Patented June 2, 1959

2,888,863

POWERED ROTARY TROWELS

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Application September 9, 1955, Serial No. 533,323

2 Claims. (Cl. 94—45)

This invention relates to improvements in powered rotary trowels, and more particularly to improved blade attaching means for use therein.

As is well known, a type of rotary trowel now widely used incorporates a powered rotating blade assembly generally comprising a rotating hub carrying outwardly extending arms to which the troweling blades are attached, either directly or indirectly. If provision is made for tilting the blades as adapts the trowel for both floating and finishing operations, it becomes highly desirable that the blade attaching means, in addition to being effective as such, be capable of fast and easy operation, so that a change of blades as required to convert the machine from floating to finishing operations, and vice versa, can be made rapidly, with a minimum of effort and preferably without the use of tools.

It is also well known that the troweling blades of powered rotary trowels wear rapidly and must be replaced when worn. This requirement for frequent replacement of the blades is but another reason for the devising of a simple yet readily operable blade attaching means. Finally, if the blades are made reversible for longer life, i.e. designed so that when one side edge portion of the blade is worn, it may be turned 180° in its plane so as to permit use of the other side edge portion for troweling, the blade attaching means should not only be capable of permitting speedy blade reversal, but also it must be so fashioned as to secure to both sides of the blades in equally effective manner.

Moreover, due to manufacturing tolerances, it may sometimes happen that an individual blade requires slight adjustment about an axis disposed at an angle to the longitudinal axis of the blade. It will be appreciated that if means for adjusting the individual blades so as to bring their working surfaces or edges into exact horizontal alignment were built into the blade attaching means, economical and simplified construction would result.

Based on the above considerations, a principal object of the invention is the provision of improved blade attaching means for use in powered rotary trowels, which is so constructed and arranged as to permit change, replacement and/or reversal of the troweling blades thereof to be effected rapidly, with a minimum of effort, and without the use of tools.

A more particular object of the invention is the provision of blade attaching means for securing the individual blades of a powered rotary trowel in operative position with respect to their blade mounting members, which is characterized by its ability automatically to draw a longitudinally disposed blade part into and positively seat same in a longitudinally extending recessed slot provided in the mounting member, thereby to preclude lateral canting or cocking of the blade about the longitudinal axis of the blade.

Yet another object of the invention is the provision of blade attaching means for powered rotary trowels which is especially designed for the attachment of reversible

troweling blades to their mounting members and which is thus equally effective in securing the individual blades from either side thereof.

A still further object of the invention is the provision of blade attaching means for powered rotary trowels which functions as aforesaid and moreover incorporates means for adjusting the blades about axes extending generally transversely of the longitudinal blade axes, thereby to insure that the working surfaces and/or edges of the plurality of blades of a rotating blade assembly are contained in the same horizontal plane.

The above and other objects and advantages of the improved blade attaching means for powered rotary trowels according to the present invention will appear from the following detailed description, reference being had to the accompanying drawing illustrative thereof, wherein:

Fig. 1 is a perspective view of a rotary trowel incorporating the improved blade attaching means of the present invention;

Figs. 2 and 3 are plan and side elevational views, respectively, of one of the troweling blades, shown on an enlarged scale, as employed in the rotary trowel illustrated in Fig. 1;

Fig. 4 is a broken-away enlarged plan view of a blade supporting means incorporating one form of blade attaching means according to the present invention;

Fig. 5 is a section taken along line 5—5 of Fig. 4, the view additionally illustrating a means for adjusting the blades about axes transverse to the longitudinal blade axis, as represents a further feature of the invention;

Fig. 6 is a view similar to Fig. 4 but illustrating a modified construction of blade attaching means suitable for the small model rotary trowels; and

Fig. 7 is a section taken along line 7—7 of Fig. 6.

Referring to the drawings, wherein Fig. 1 illustrates a powered rotary trowel incorporating the herein proposed improvements, reference numeral 10 generally designates a gear box assembly, to the upper face of whose box or case is mounted a power source 11, illustratively a gas engine but which may alternatively be an electric motor. As usual, the engine connects to gearing contained in the gear box through a driving belt (not shown) enclosed in a belt guard 12 and said gearing is drivingly connected to a vertically disposed spindle 13 (Fig. 4) which extends downwardly below the under face of the gear box. At its lower end, the spindle 13 mounts a rotating blade assembly generally designated 14 which preferably incorporates the blade supporting means illustrated in Fig. 4 and combines therewith the blade attaching means of the present invention, as will be more fully described. Said blade supporting means provides a support for a plurality of troweling blades 15 (Figs. 2 and 3), three such blades being shown, which blades are adapted to rest on and support the machine from a suitable surface which, when the machine is placed in operation, is the surface of a body of freshly laid concrete which is to be floated and/or finished.

An operating handle 17 is provided, such being pivotally connected at its lower end to the gear box 10. Also connected to the gear box by means of radiating arms 18 is a stationary guard ring 20 which not only makes the machine safer to operate than powered rotary trowels of the prior designs employing a rotating guard ring, but also permits it to be operated close up to walls or other obstructions without being thrown sideways as by contact of a rotating guard ring therewith.

To secure the handle 17 at an inclination best suited to the individual operator, a handle securing rod 22 is provided, such being pivoted at its lower end to the stationary guard ring and at its top end to a clamp sleeve 24 carried by the handle. By adjusting the clamp sleeve along the handle, the inclination of the latter may be ad-

justed as desired. Also, unfastening of the clamp sleeve permits the handle to be swung to a substantially vertical position which is desirable in conserving the space taken by the machine when not in use.

Suitable controls are provided, such preferably being mounted as to be operated from the cross bar of the handle. For example, there is provided an engine throttle control which is energized from a pivoted finger lever **26** carried by one arm of the handle cross bar and operating through a Bowden wire running through the handle to the throttle, the handle being formed tubular as is usual. There is also provided a so-called "dead man control," which is operated from a pivoted lever **28** mounted on the other arm of the cross bar and being connected by means of a Bowden wire similarly running through the handle with a clutch actuating leaf spring **30**, serving to effect energization of a clutch (not shown) in the drive connection between engine shaft and the spindle **13** only when the lever **28** is positively held by the operator in one position, i.e. against the handle cross arm.

Referring to Fig. 4, the aforesaid rotating blade assembly **14** comprises a center disc or hub **34** which is screw-threaded to or otherwise rigidly affixed to the lower end of the driven spindle **13** so as to rotate therewith, outwardly extending blade supporting and mounting means generally designated **36** which are secured at their inner ends to said hub so as to rotate bodily therewith in a generally horizontal plane, and the aforesaid blades **15** which are secured in operative position to said means by the blade attaching means forming the subject matter of the present invention. Preferably, the aforesaid blade supporting and mounting means **36** are of the type disclosed and claimed in companion application Serial No. 533,370, filed September 9, 1955, being each characterized by a non-rotary arm member **38** which is seated at its inner end in mounting blocks **40***a*, **40***b* and is rigidly affixed to the upper face of the hub **34** as by bolts **42***a*, **42***b* so as to extend tangentially therefrom, and by a sleeve-form blade mounting member **44** carried by said arm member and turning on widely spaced end bearings, i.e. bearing bushings **46***a*, **46***b* press-fitted into the ends of the sleeve bore. As explained in said companion application, such arm and sleeve construction permits tilting of the blades while at the same time insuring maximum rigidity of blade mounting not possible of attainment in rotary trowels of the tilting blade type according to the prior designs, wherein the blades were mounted directly to the arms as necessitated said arms being mounted to turn with respect to the hub in short-length inner-end bearings.

The aforesaid blade mounting sleeves **44** each carries at its outer end an offset attaching arm **48** and at its inner end a tilt arm **50**. While the means for rotating the aforesaid sleeves **44** as required to tilt the blades forms no part of the present invention, it is explained that the tilt arms **50** each mounts at its outer-rearward end corner an inverted bolt **52** whose upper shank-end is adapted to be engaged by the under surface of a tilting plate **54** (Figs. 1 and 4) which is mounted on the aforesaid spindle **13** above the spindle-driven hub **34**. The tilting plate **54** is axially translated in response to rocking movement imparted to a yoke **56** by means (not shown) extending through the handle **17** and which is energized by a knob **58** carried by the cross bar of said handle.

Now considering the blade attaching means proper of the invention, such includes complemental blade and attaching arm structure as will next be described. As seen in Figs. 2 and 3, the blade **15** is provided on its upper face with a blade attaching member **60** of overall square or rectangular section, such illustratively having the form of an upwardly opening upright channel whose bottom web is secured flush against the upper surface of the blade as by rivets **62**. It is a feature of the innvention that the channel is arranged with its longitudinal center line exactly coinciding with the longitudinal center line of the blade. An attaching stud and wing nut **64** is affixed to the blade at its geometric center as by welding one end of the stud to the bottom web of the channel **60** at the intersection of the longitudinal and transverse center line of the blade. Thus, all blades are symmetrical about their longitudinal and transverse center lines and hence they are reversible simply by turning them 180° in their plane. It will also be appreciated that the blades are each characterized by a mounting member (channel **60**) having straight parallel sides and a top surface which is square with the blade throughout its length.

According to the Figs. 4 and 5 form of attaching means, the attaching arm **48** of each blade mounting sleeve **44**, which is formed of heavy plate stock, is provided on its under face with a milled groove **66** which extends from inner to outer edge thereof and which has width substantially equaling that of the attaching channel **60**, as well as sufficient depth as to substantially seat said channel. The attaching arm **48** is also provided with slot **68** of width as to snugly receive the stud **64**, said slot preferably opening through the rear or free edge of the arm, i.e. the edge which extends parallel to the sleeve axis.

According to the above construction, to attach a blade **15** to a mounting sleeve **44** secured as in Fig. 4, it is necessary only to dispose the blade along the arm side of the sleeve in position such that its stud is in line with the slot **68** of the sleeve arm and with its wing nut loosened, and thereupon to move the blade towards the sleeve until the attaching channel **60** is directly beneath the arm groove **66**. Thereupon the wing nut is tightened, which may be done by hand, such positively drawing the blade toward the arm and firmly seating the blade channel in the arm groove, wherein it is held positively by the groove side walls against lateral or canting movement either about the blade axis or about the wing bolt axis. To detach or dismount a blade, it is necessary only to back off the wing nut a few turns as enables the blade to drop away from the arm **48** sufficiently to disengage the channel from the arm groove, whereupon the blade as a whole may be moved laterally away from the arm, it being noted that the detaching operation may also be performed without the use of tools. It will be seen therefore that the invention provides not only an effective means for initially attaching and thereafter changing and replacing the troweling blades of a rotary trowel, but also one that is fast and easy to operate, and does not require tools such as elastic nut wrenches commonly used for blade attachment and detachment with other makes of trowels. And since the blades are reversible, said attaching means provides an equally simple and fast means for reversing the troweling blades as and when needed.

Due to manufacturing tolerances, it sometimes happens that an individual blade may require slight adjustment to prevent a portion of its troweling surface or edge from biting into the concrete on which it bears. Such a condition is usually corrected by adjusting the blade about an axis or axes which extend generally transversely to the longitudinal blade center line. According to a further feature of the present invention, which is best illustrated in Fig. 5, such adjustment may be simply made through the provision of a pair of blade adjusting screws **70**, **72**, which as shown in Figs. 4 and 5 may be simple set screws. Said adjusting screws are threaded through each of the attaching arms **48** in position such that their bottom ends which are projectible through the arm are adapted to bear directly against the buried side-flange edges of the seated attaching channel **60** at corresponding points along the length thereof, which points are spaced a substantial distance outwardly of the slot **68** and hence of the wing bolt **64** of the attached blade. By the simple operation of appropriately loosening the wing nut and of turning either one or both of said set screws **70**, **72** in the direction required to correct the misalignment, the blades may be quickly brought to a position in which their troweling surfaces or edges are exactly horizontal.

Figs. 6 and 7 illustrate a somewhat modified form of blade attaching means designed for use in the smaller model trowels of the present design. The blades for such trowels may be and preferably are of the type shown in Figs. 2 and 3, but it is here noted that in the smaller model trowels it is customary to use the same blades for both the floating and finishing operations. Consequent to the lighter loads which they are required to carry, the blade attaching arms **48***a* employed in the modified attaching means, rather than being made of heavy plate stock are instead fashioned from sheet metal and such a sheet metal arm may be rigidly affixed to its sleeve **44***a* as by providing the arm with a concavity along one edge thereof which has curvature matching that of the external surface of the sleeve assembling the sleeve to the arm with its concavity extending about the sleeve, and welding along the front and rear and end contact boundary lines. Instead of a milled groove **66**, the sheet metal arm is provided in its inner edge with a tongue **66***a* which is depressed downwardly out of the plane of the arm and has width corresponding to the space between the side flanges of the blade attaching channel **60**. The tongue **66***a* may be simply formed by providing two cut lines running a small distance outwardly from the inner edge of the arm **48**a, and thereupon depressing the material of the arm between said lines of cut so as to delineate the tongue as shown.

Since the same blades are used for both floating and finishing operations in the smaller model trowels, the requirement for frequent change of blades does not exist as with the heavier model trowels. Therefore the arm slot corresponding to the slot **68** is eliminated and in its place is substituted a simple punched hole **68***a* of diameter as to snugly yet easily receive the blade attaching stud **64**. It will be observed that this hole is disposed towards the outer edge of the attaching arm **48***a*, and hence it is substantially spaced outwardly from the two side edges of the tongue **66***a*, which latter are of course spaced laterally. Thus, when a blade is finally attached and secured by tightening of the wing nut, it is firmly held both to the arm and against any lateral turning or canting movement about the wing bolt, the latter by virtue of the three spaced points at which the blades are held.

While the above described forms of blade attaching means achieve the desirable objectives explained in the foregoing, it will be understood that many changes may be made in carrying out the above constructions without departing from the scope of the invention, and it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. Means for attaching the individual troweling blades of a powered rotary trowel to the blade supporting members thereof comprising a blade attaching arm extending substantially horizontally from each said members, said arm having a downwardly opening, open-ended groove in its under face extending between its inner and outer edges and a through slot which intersects the groove and opens through the free end edge of said arm, the blades each having an attaching member affixed to its upper face on the longitudinal center line of the blade, said groove having width corresponding to the width of said attaching member and depth as to substantially seat the same, and a stud affixed at its lower end to the blade-affixed attaching member at substantially the geometric center of the blade and extending upwardly therefrom and passing through said slot, said stud carrying a wing nut bearing on the upper face of said arm, the construction and arrangement being such that the blades are attached by passing the stud of each said blade into the slot of its attaching arm to a position such that the blade attaching member aligns with the under face groove of the arm and thereupon tightening the wing nut thereby positively to seat said member in the groove, and means for adjusting the blades about an axis or axes extending transversely of the blades, said last means comprising spaced adjusting screws threaded through each said attaching arm and protruding into the groove and engaging the blade mounting member at laterally spaced points thereof which are disposed to the sides of the blade center line and are also spaced longitudinally from the stud slot.

2. Troweling blade attaching and adjusting means as set forth in claim 1, wherein the blade-affixed attaching member has an upwardly opening channel in its upper surface and which is defined along its sides by side flanges, and said adjusting screws are disposed to bear on the seated edges of the channel side flanges.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 2,888,863

June 2, 1959

George G. Eisenbeis

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

In the grant, lines 1, 2 and 3, for "George G. Eisenbeis, of Conklin, New York, read — George G. Eisenbeis, of Conklin, New York, assignor to Stow Manufacturing Co., of Binghamton, New York, a corporation of New York, —; line 12, for "George G. Eisenbeis, his heirs" read — Stow Manufacturing Co., its successors —; in the heading to the printed specification, line 3, for "George G. Eisenbeis, Conklin, N. Y." read — George G. Eisenbeis, Conklin, N. Y., assignor to Stow Manufacturing Co., Binghamton, N. Y., a corporation of New York —.

Signed and sealed this 11th day of August 1959.

(SEAL)
Attest:

KARL H. AXLINE

Attesting Officer

ROBERT C. WATSON
Commissioner of Patents