Sept. 8, 1970 C. L. RASSIEUR 3,527,309

VEHICLE-MOUNTED EARTH DRILL WITH DETACHABLE TOWER

Filed Oct. 8, 1968 2 Sheets-Sheet 1

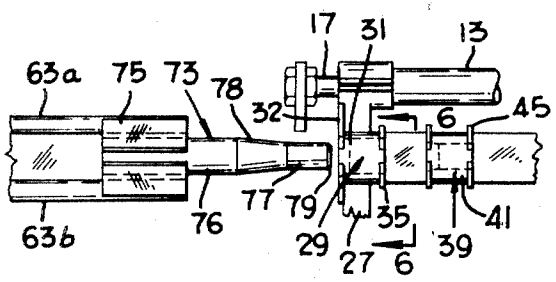

FIG. 5

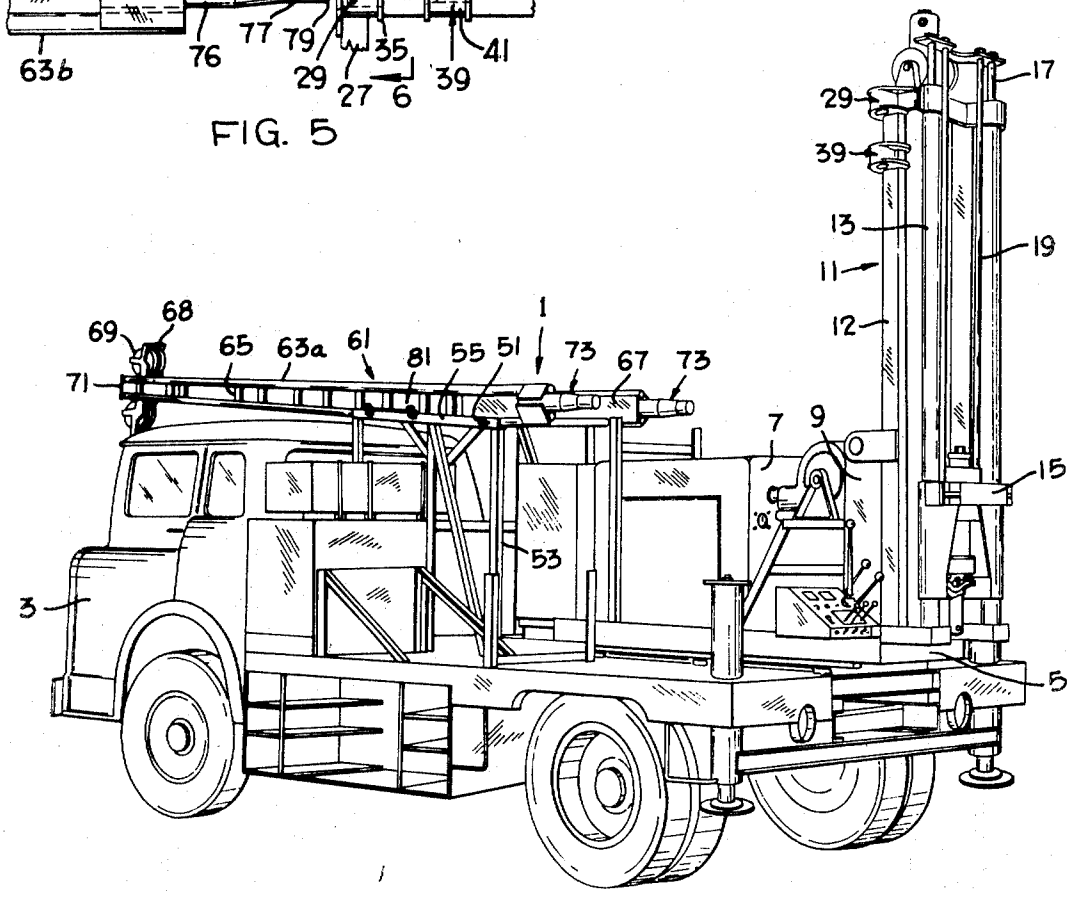

FIG. 1

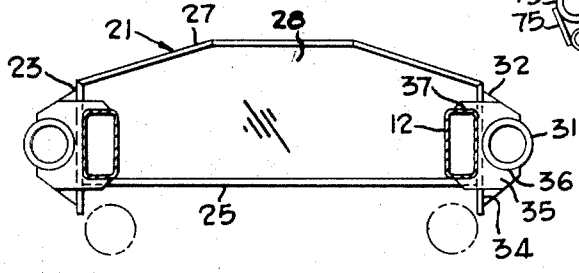

FIG. 6

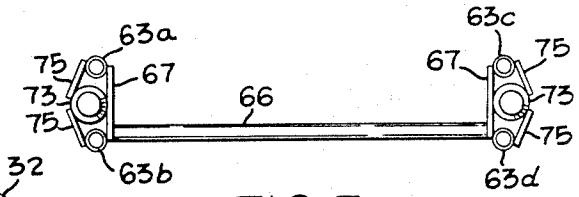

FIG. 7

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VEHICLE-MOUNTED EARTH DRILL WITH DETACHABLE TOWER

Filed Oct. 8, 1968 2 Sheets-Sheet 2

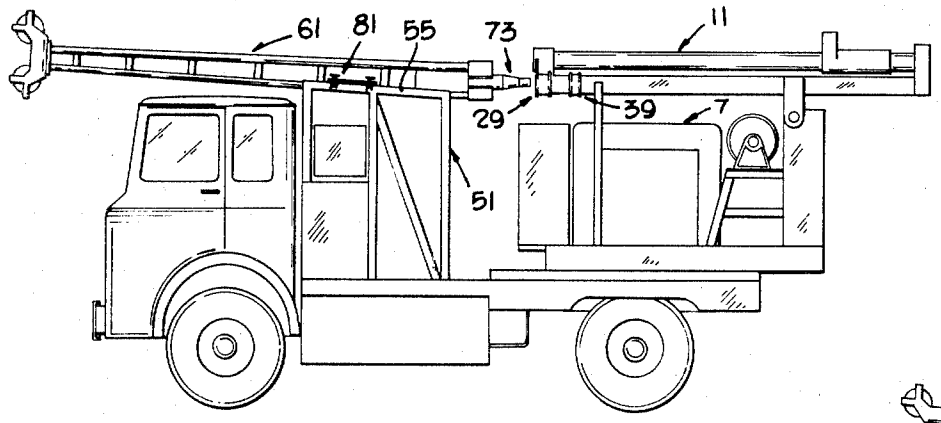

FIG. 2

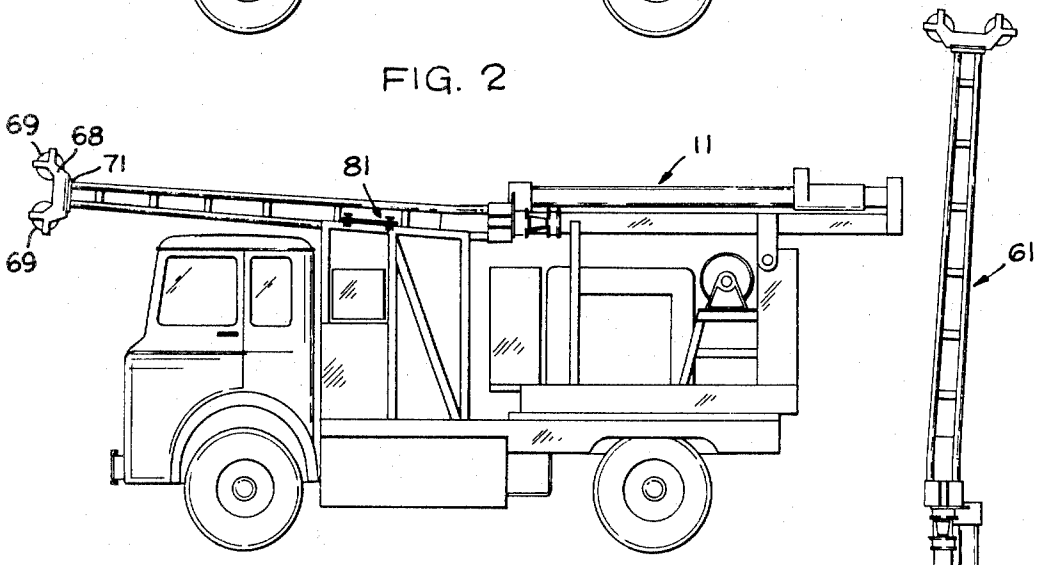

FIG. 3

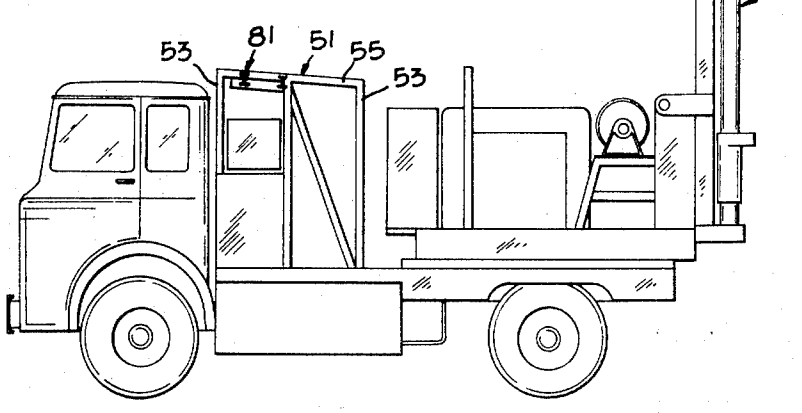

FIG. 4

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VEHICLE-MOUNTED EARTH DRILL WITH DETACHABLE TOWER

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Int. Cl. E21c 11/02
U.S. Cl. 173—28 7 Claims

ABSTRACT OF THE DISCLOSURE

An earth drill mounted on a sliding bed at the rear of a truck and having a detachable tower part which may be detached from the main earth drill frame and mounted on a headache rack forward of the main earth drill frame by lowering the drill frame, clamping the tower to the rack and sliding the drill from a forward to a rearward position. Tapered pins on the lower end of the tower slide out of sockets on the drill frame when the drill frame is lowered to a horizontal position and the drill slides from its forward to its rearward position. The tower is attached by reversing the process.

BACKGROUND OF THE INVENTION

This invention relates to vehicle-mounted earth drills, and in particular to such a drill having a detachable tower, provided with quick-disconnect couplings.

A vehicle-mounted earth drill is generally mounted on a slidable bed at the rear of a truck, or on a track carrier, trailer, skid or the like. The drill is pivotally mounted, so as to be movable from a substantially vertical operational position to a substantially horizontal travel position for moving the drill from place to place. The drill is supported by a drill frame. The lower part of the frame forms a support for a slidable drill drive, while the upper part of the frame forms a tower. The term drill frame will be used herein to designate the lower part of the frame, and the upper part will be referred to simply as the tower.

In operation, the vehicle is moved to a desired drilling site, the drill is raised to a vertical position, and the slding bed is hydraulically moved rearward a short distance, on the order of a foot or a foot and a half to the "on-hole" position. The hole is then drilled.

Taking samples of the soil at frequent intervals with sampling tools such as thin-wall tube and split-tube samplers requires the sliding base, tower, and a rope or cable hoist. The drill is hydraulically slid forward to the "off-hole" position, and tools are handled by means of a cable or rope brought over a pulley at the top of the tower. However, use of the tower is not always required, as for example in making a series of probes to determine the depth of bedrock. These can be made by advancing the hole by means of augers, and the augers then pulled hydraulically.

The height of the tower necessitates lowering the drill each time the vehicle is moved from one drilling site to another, thus causing delay and inconvenience. Particularly in wooded areas, it also restricts the number of convenient drilling sites.

One of the objects of this invention is to provide a vehicle-mounted earth drill which can be moved conveniently from location to location without lowering the drill.

Other objects will become apparent to those skilled in the art in the light of the following description and accompanying drawing.

SUMMARY OF THE INVENTION

In accordance with this invention, generally stated, a vehicle-mounted earth drill of the type in which a drill is pivotally mounted on a slidable bed is provided, in which a tower is detachably mountable on the drill frame, and may be stored on a support mounted on the vehicle. The pivotal movement of the drill frame and the sliding movement of the sliding bed move the drill frame into engagement with the tower while the tower is on its support.

In the preferred embodiment, the tower is provided with tapered pins at its lower end which fit into sockets on the upper end of the drill frame. The tower and drill frame are coupled by lowering the drill frame while the bed is in its rearward position and then moving the bed forward. The pins and sockets thus form quick connect couplings which when engaged mount the tower on the drill frame and allow the tower and drill frame to be lifted as a unit. The tower is detached from the drill frame by the reverse procedure.

Also in the preferred embodiment clamps are provided on the tower support for holding the tower to the support when it is stored on the support, and when the tower is being mounted on or detached from the drill frame.

BRIEF DESCRIPTION OF THE DRAWING

In the drawing, FIG. 1 is a view in perspective of one illustrative embodiment of vehicle-mounted earth drill of this invention, with a tower stored on a support structure, a drill frame in a raised position, and a sliding bed in a rearward position;

FIG. 2 is a somewhat diagrammatic view in side elevation of the earth drill of FIG. 1 in which the tower is on its support structure, the drill frame is lowered, and the bed is in its rearward position;

FIG. 3 is a somewhat diagrammatic view in side elevation of the earth drill shown in FIGS. 1–2 in which the tower is on its support structure, the drill frame is lowered, and the bed is in its forward position;

FIG. 4 is a somewhat diagrammatic view in side elevation of the earth drill shown in FIGS. 1–3, in which the drill frame and tower have been raised, and the bed is in its forward position;

FIG. 5 is a detail in side elevation of one pin and socket used to join the tower and the drill frame;

FIG. 6 is a sectional view taken along the line 6—6 of FIG. 5; and

FIG. 7 is a bottom plan view of the tower.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, reference numeral **1** indicates one illustrative embodiment of vehicle-mounted earth drill of this invention. The earth drill **1** includes a truck **3** having a hydraulically slidable bed **5**. The slidable bed **5** is movable from a rearward position, shown in FIG. 1, to a forward position. The length of travel of the slidable bed **5**, in this illustrative embodiment, is about 15 inches.

Mounted on the bed **5** are a primary power source **7** and a drill frame support **9**. Pivotally mounted on the drill frame support **9** is a drill frame **11** having a pair of laterally spaced girders **12** on which are mounted a pair of hydraulic cylinders **13**. A drill drive **15** is slidably mounted on the hydraulic cylinders **13**. The drill drive **15** is raised and lowered on the hydraulic cylinders **13** by rams **17** in the hydraulic cylinders **13**. The rams **17** are connected to the housing of the drill drive **15** by means of connecting rods **19**.

The drill frame girders **12** are joined at their upper ends by a web **21** consisting of a pair of parallel side plates **23** welded to the girders **12** outboard of the girders

12, a rear tie plate 25 welded to the side plates 23, and three forward tie plates 27 welded end-to-end to each other and to the side plates 23. A stiffener plate 28 is welded between the rear tie plate 25 and the forward tie plates 27.

Near the upper end of each girder 12 an upper coupling 29 and a lower coupling 39 are provided on the outboard side of the girder 12. Each upper coupling 29 consists of a sleeve 31, an upper sleeve support plate 32 and a lower sleeve support plate 35. The upper sleeve support plate 32 is provided with an arcuate yoke which snugly embraces the upper end of the sleeve 31 and is welded to it. A flat edge 34 of the upper plate 32 is welded to the side plate 23. The lower sleeve support plate 35 is provided with an arcuate yoke 36 which is welded to the bottom margin of the sleeve 31. A square yoke 37 on the lower support plate 35 is welded to the drill support frame girder 12 at a position immediately below the side plate 23.

Each coupling 39 consists of a sleeve 41 having a smaller inner diameter than the sleeves 31 of the upper couplings 29, and an upper and a lower sleeve support plate 45. The upper and lower support plates 45 are identical with the lower support plates 35 of the upper coupling, and are welded to the upper and lower margins of the sleeve 41 and to the girder 12 in the same manner as the sleeve support plates 35.

Also mounted on the truck 3, straddling the slidable bed 5 and generally forward of it, is a headache rack 51 designed to support a tower 61 when the tower 61 is in a lowered position. The headache rack 51 includes six vertical angle irons 53 arranged in two generally parallel rows. Cross braces are provided to stabilize the vertical angle irons. Welded to the tops of the three vertical angle irons defining each row is an upper angle iron 55. The height and spacing of the vertical angle irons 53 are so chosen that the upper angle irons 55 form a cradle for the tower 61. The tower 61 is held in position on the headache rack 51 by means of clamps 81 hinged to the upper angle irons 55.

The tower 61 is generally of standard construction, having a box frame defined by four tubular frame members 63*a–d*. The short sides of the box are vertical when the tower is in its lowered position. The pairs of tubular members, 63*a*–63*b* and 63*c*–63*d*, defining the short sides are joined by spaced struts 65 through most of the height of the tower. At the lower end of the tower (that is, at the end of the tower which is lower when the tower is in a raised position) the pairs of tubular members defining the short sides of the box are joined by support plates 67. The tubular frame members 63*b* and 63*d* defining a broad face of the box are joined by cross braces 66. At the upper end of the tower 61 the tubular frame members 63*a–d* are welded to a flat plate 71. A sheave bracket 68 and sheaves 69 are mounted on the plate 71.

At the lower end of the tower 61 a tapered tubular pin 73 is secured to each support plate 67, outboard of the support plate 67. Each pin 73 is also stabilized by a pair of plates 75 welded to the pin 73 and to an adjacent tubular frame member 63. The pins 73 are conveniently machined from a tubular piece of steel to form three sections: a cylindrical upper section 76, a cylindrical lower section 77 of smaller diameter than the upper section 76, and a frusto-conical center section 78.

The headache rack 51 is proportioned to hold the tower 61 in such a position that the long axes of the pins 73 are horizontal. The clamps 81 are of a length equal to the distance between adjacent short tower struts 65. When the tower 61 is on the rack 51, the clamps 81 are tightened to engage tubular frame members 63*b* and 63*d* between struts 65, thereby preventing the tower 61 from sliding on the rack or bouncing off of it.

The tower 61 and the pins 73 are so proportioned that the upper and lower pin sections 76 and 77 mate snugly with the couplers 29 and 39 respectively on the drill frame 11. Therefore, when the tower 61 is mounted on the drill frame 11, the tower and frame act as one unit without appreciable play. Chamfers 79 on the lower ends of the lower pin sections 77 and slight bevels on the upper ends of the inner surfaces of the sleeves 31 and 41 are provided to ease the fit of the pins 73 into the couplers 29 and 39. A small amount of play in the headache rack 51 and clamps 81 allows the couplings 29 and 39 to slide over the pins 73 smoothly, even if they are slightly misaligned. Smooth coupling and separation are assured by the fact that the hydraulic system moving the slidable bed 5 provides a force on the order of several tons.

Because the travel of the slidable bed in this illustrative embodiment is about fifteen inches, the length of the pin 73 is conveniently about fourteen inches, to give adequate clearance when the tower and drill frame are detached while assuring maximum strength and stability when they are coupled. With a fourteen inch pin on the tower, each sleeve on the drill frame may be about four inches long, and the upper and lower drill frame couplings may be separated by about six inches.

In operation, the tower 61 may initially be mounted on the drill frame 11, and the tower and drill frame may be in their lowered position, with the tower clamped to the headache rack 51, all as shown in FIG. 3. If the drill is to be used without the tower, for example for auger drilling, the slidable bed 5 is first moved to its rearward position, thereby sliding apart the couplings 29 and 39 from the pin 73, as shown in FIG. 2. The tower 61 is prevented from sliding by the clamps 81 on the rack 51. The drill frame 11 is then moved to its upright position, as shown in FIG. 1. The drill drive 15 is raised on the hydraulic cylinders 13. An auger section is inserted in the drill drive and the hole is advanced. The augers are generally five feet in length. Additional auger sections are added until the required depth has been reached. The hydraulic rams then remove the auger sections. The drill is then ready to be moved to another location, generally without the need to lower the drill frame 11.

When use of the tower becomes necessary, the drill frame 11 is moved to its lowered position, in which the common central axes of the sleevs 31 and 41 are horizontal and aligned with the long axes of the pins 73, as shown in FIG. 2. The slidable bed 5 is then moved to its forward position, as shown in FIG. 3. The clamps 81 are then loosened and folded clear of the tower 61, and the drill frame 11 and tower 61 are raised to their upright position, as shown in FIG. 4. If cables have been left on the tower's pulleys 69, as may be done, the tower is ready for immediate use.

The tower 61 is lowered and stored on the headache rack 51 by reversing the procedure used to raise the tower.

Numerous variations in the vehicle-mounted earth drill of this invention, within the scope of the appended claims, will occur to those skilled in the art in the light of the foregoing disclosure. For example, the pins and sockets may be reversed, or different quick-connect couplings may be used on the tower, the drill frame or both. Brackets may be provided on the tower to engage the ends of the headache rack for additional protection against sliding of the tower on the rack. Other towers, other drill frames and other tower supports may be used. These variations are merely illustrative.

Having thus described the invention, what is claimed and desired to be secured by Letters Patent is:

1. A vehicle-mounted earth drill comprising a vehicle, a slidable bed in said vehicle, said slidable bed being adapted to slide to a forward and a rearward position; a drill frame support on said slidable bed; a drill frame movably mounted on said drill frame support; means for moving said drill frame to a substantially vertical position and to a substantially horizontal position; a tower, said tower being mountable on and detachable from said drill frame; and a tower support on said vehicle, said tower support supporting said tower when said tower is

detached from said drill frame and holding said tower in a position to be mountable on said drill frame when said drill frame is in said substantially horizontal position, said tower being adapted to detach from said drill frame when said tower is mounted on said tower support, said drill frame is in said substantially horizontal position, and said slidable bed slides from said forward position to said rearward position.

2. The earth drill of claim 1 including a clamp, said clamp being adapted to secure said tower to said tower support.

3. The earth drill of claim 1 including a tower coupling on said tower and a drill frame coupling on said drill frame, said drill frame coupling being adapted to cooperate with said tower coupling.

4. The earth drill of claim 1 wherein said tower coupling and said drill frame coupling comprise a plurality of sockets and pins, the axes of said sockets and pins being substantially parallel with said tower and said drill frame, said pins and said sockets comprising essentially the entire means for mounting said tower on said drill frame.

5. The earth drill of claim 4 wherein said pin tapers toward a free end.

6. A vehicle-mounted earth drill comprising a vehicle; a drill frame movably mounted on said vehicle; a tower adapted to be mountable on and detachable from said drill frame, and means for mounting said tower on said drill frame, said means comprising a plurality of pins on one of said tower and said drill frame and a plurality of cooperating sockets on the other of said tower and said drill frame, said pins and said sockets having long axes parallel to said tower and said drill frame when said tower is mounted on said drill frame, said pins and said sockets comprising essentially the entire means for mounting said tower on said drill frame.

7. A vehicle-mounted earth drill comprising a vehicle, a slidable bed in said vehicle, said slidable bed being adapted to slide to a forward and a rearward position; a drill frame support on said slidable bed; a drill frame movably mounted on said drill frame support; means for moving said drill frame to a substantially vertical position and to a substantially horizontal position; a tower; coupling means on at least one of said tower and said drill frame for mounting said tower on said drill frame; and a tower support on said vehicle, said tower support supporting said tower when said tower is detached from said drill frame and holding said tower in a position in which said coupling means mounts said tower on said drill frame when asid drill frame is in said substantially horizontal position, said slidable bed slides from said rearward position to said forward position, and said means for moving said drill frame move said drill frame from said substantially vertical position, and in which said coupling means does not mount said tower on said drill frame when said drill frame is in said substantially horizontal position, said slidable bed slides from said rearward position to said forward position, and said means for moving said drill frame move said drill frame from said substantially horizontal position to said substantially vertical position.

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ERNEST R. PURSER, Primary Examiner

U.S. Cl. X.R.

52—115, 117

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,527,309 Dated September 8, 1970

Inventor(s) Charles L. Rassieur

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 5, line 16, "claim 1" should read -- claim 3 --.
Column 6, line 14, "asid" should read -- said --.

Signed and sealed this 23rd day of March 1971.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents

FORM PO-1050 (10-69)

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