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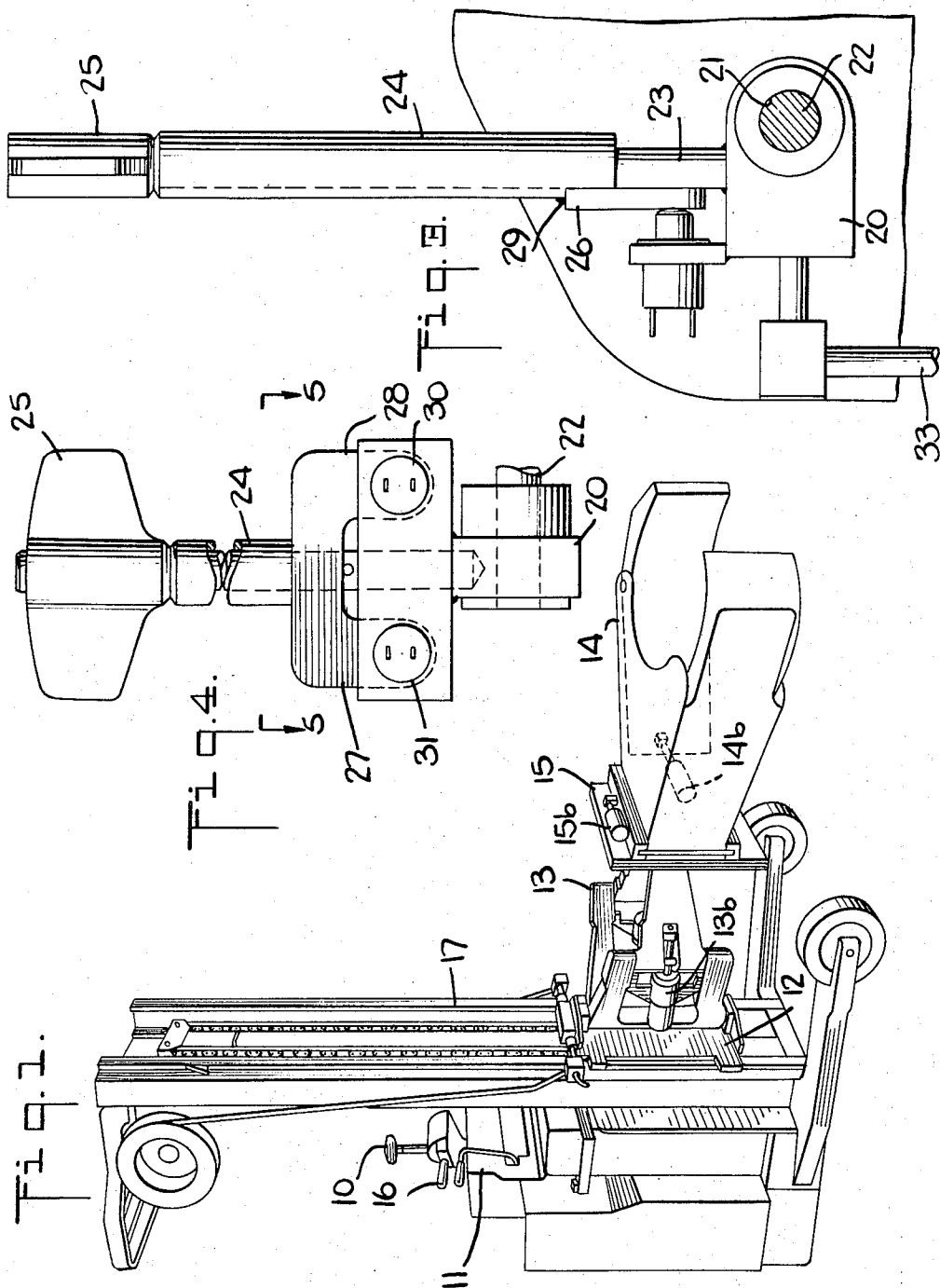
B. I. ULINSKI

3,373,886

MULTIPLE LOAD MANIPULATOR

Filed Sept. 22, 1965

3 Sheets-Sheet 1



INVENTOR.

B. I. ULINSKI

BY

Peagno, Sadler & Paddy  
ATTORNEY

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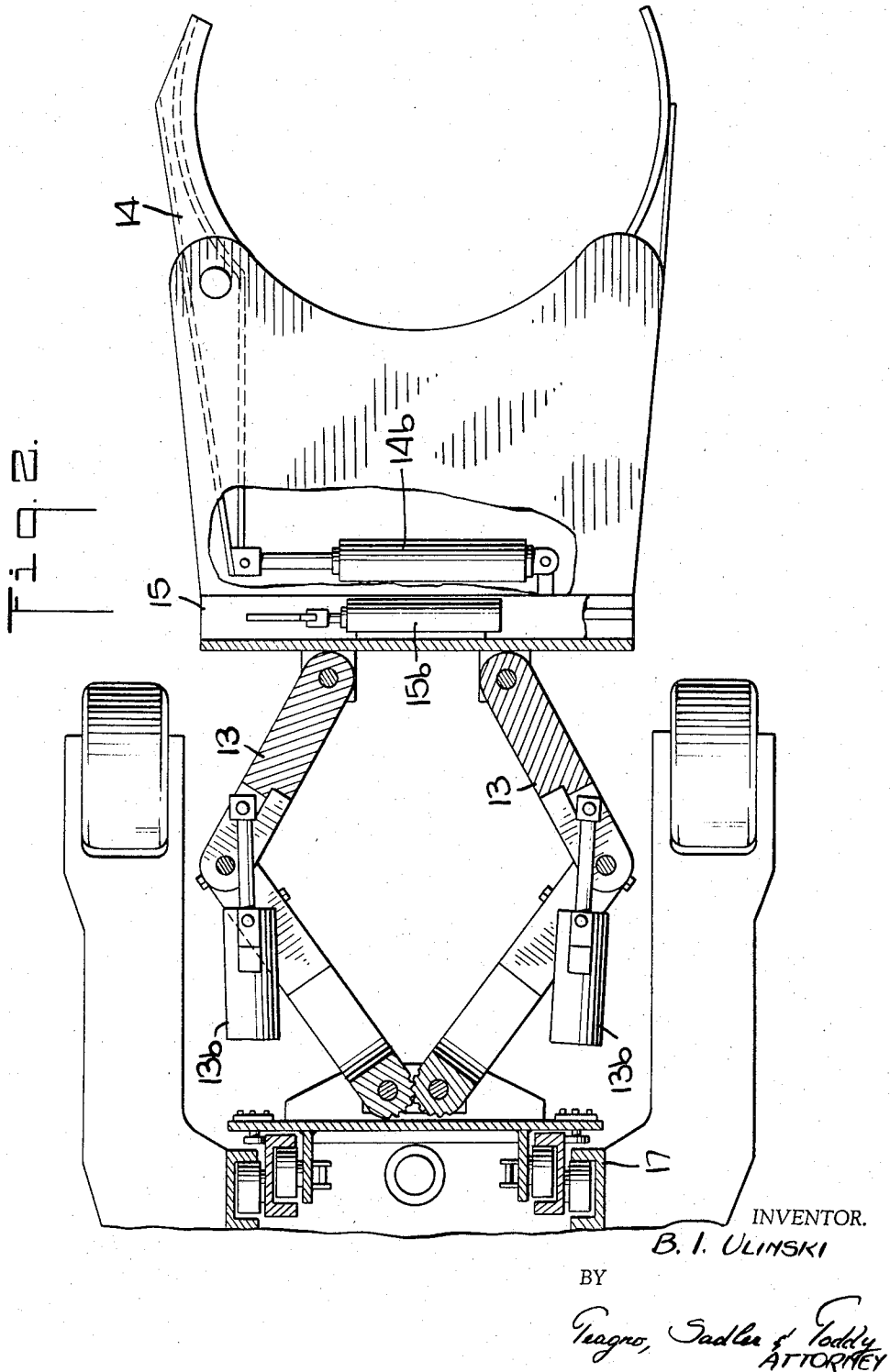
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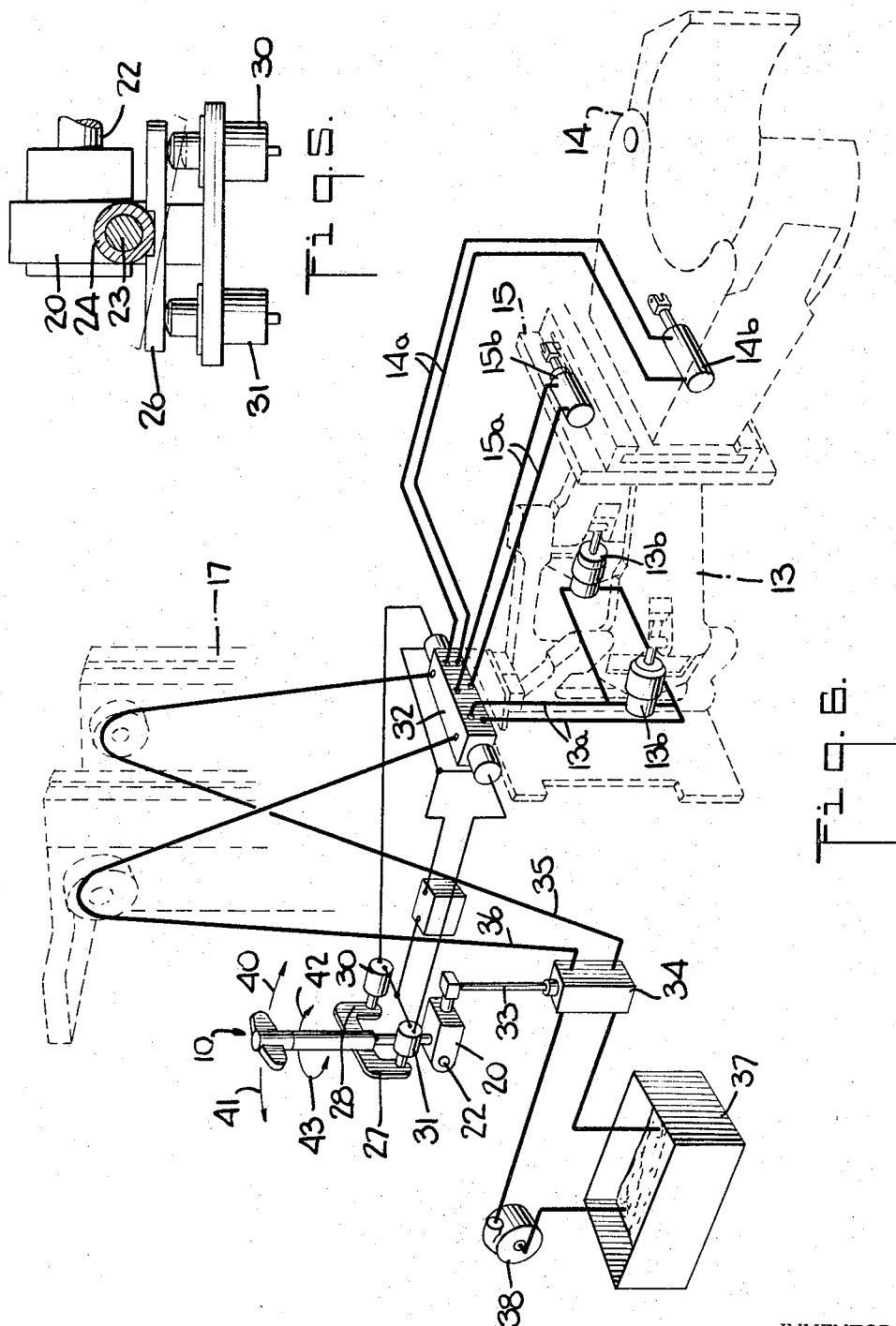
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INVENTOR.

B. I. ULINSKI

BY

Reagno, Sadler & Paddy  
ATTORNEY

1

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## MULTIPLE LOAD MANIPULATOR

Bronislaus I. Ulinski, Jenkintown, Pa., assignor to Eaton Yale & Towne Inc., a corporation of Ohio  
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2 Claims. (Cl. 214-653)

### ABSTRACT OF THE DISCLOSURE

Relates to a control handle for controlling the manipulation of at least three load manipulating devices on the carriage of a lift truck. Movement of the handle in a fore-and-aft direction controls the direction of fluid to an electromagnetic valve which in turn controls fluid to each of the three load manipulating devices. The arrangement is such that control of any one device may be made in any fore-and-aft position of the control handle simply by rotating the control handle to actuate the electromagnetic valve.

This invention relates to the art of industrial lift trucks and in particular has reference to an improved type of control means for actuating the load manipulating devices provided on such trucks.

In Schroeder U.S. Patent 2,754,018, there is disclosed an industrial truck characterized by a hydraulic system that includes two flexible hydraulic lines interconnecting a switching mechanism and a plurality of load manipulating devices, with the switches selectively directing hydraulic fluid to the selected load manipulating device to cause operation of the same.

While the teachings of the Schroeder patent above discussed represent a marked advance over the prior art, it has nonetheless been discovered that the Schroeder device is possessed of certain disadvantages which preclude attainment of maximum operator efficiency. Specifically, the Schoeder device basically requires two hands to operate the switching mechanism, with one hand being utilized on a handle to actuate the hydraulic means, while the other hand is required to engage the appropriate switch and thus initiate operation of the selected load manipulating device.

It has been discovered that the above disadvantages can be obviated by providing a single control handle that is movable about a plurality of axes so as to selectively control two or more load manipulating devices.

It has further been discovered that this single handle can be utilized by the operator to perform two separate and distinct operations with the single handle first selecting the particular load manipulating device to be operated and then controlling operation of the selected load manipulating device.

Production of an improved control means of the type above discussed, accordingly becomes the principal object of this invention with other objects of the invention becoming more apparent upon a reading of the following brief specification considered and interpreted in the light of the accompanying drawings.

Of the drawings:

FIGURE 1 is a perspective view of the forward portion of an industrial truck having the improved control means.

FIGURE 2 is a plan view of the industrial truck shown in FIGURE 1.

FIGURE 3 is a side elevation of the improved control means.

FIGURE 4 is a front elevation of the improved control means.

FIGURE 5 is a sectional view taken on the lines 5-5 of FIGURE 4.

2

FIGURE 6 is a schematic view illustrating the electrical and hydraulic operation achieved by the improved control means.

Referring now to the drawings, and in particular to FIGURE 1 thereof, the improved control means, generally designated by the numeral 10, is shown positioned on the forward end of the main body portion 11 of an industrial truck with a carriage means 12 being positioned forwardly thereof, and with the handle 10 selectively controlling the operation of the load manipulating devices 13, 14 and 15 as will be more fully described below.

In this regard, three conventional load manipulating devices have been illustrated schematically, with load manipulating device 13 being commonly referred to as the "reach" mechanism by which the gripping device 14 can be extended and retracted relatively of the lift truck, with the load manipulating device 14 having movable jaws capable of clamping about the object being carried by the truck. Finally, the load manipulating device 15 permits lateral movement of the gripping device 14 with respect to the truck body 11. It is to be understood that the three load manipulating devices illustrated are representative only, and that other load manipulating devices could be substituted in their stead to meet particular customer requirements.

Referring again to FIGURE 1, the remaining handle 16 shown in FIGURE 1, does not form a part of the present invention, and merely controls mechanism that lifts the entire carriage 12 vertically along the frame 17 in well understood fashion.

Referring next then to FIGURE 3, which is a detailed description of the control means 10, it will be first noted that the same includes a block 20 having an appropriate bore 21 therein to facilitate pivotal mounting of the block 20 with respect to shaft 22 that is fixed to the exterior of the body 11 as clearly shown in FIGURE 3. The block 20 has an upright arm 23 projecting from the upper face thereof, and telescoped about the arm 23 is an auxiliary switching member 24 that terminates at its upper end in a handle portion 25 as clearly shown in FIGURE 3. The lower end of the sleeve portion of member 24 is further provided with a U-shaped plate 26, as shown in FIGURES 3 and 4, with plate 26 including leg or wing portions 27 and 28, with plate 26 being secured to the sleeve 24 as by weld 29 (see FIGURE 3).

Referring next to FIGURES 3, 4, 5 and 6, it will be noted that the block 20 also has secured thereto a pair of contact members 30 and 31, with these contacts being electrically connected to an electromagnetic valve mechanism 32 (FIGURE 6) for selective operation of a given load manipulating device as will be subsequently described. It should be noted that in this fashion the contact members 30 and 31 can be selectively contacted by legs 27, 28 upon rotating handle 10, with such rotation selectively operating valve 32.

For the purpose of controlling the direction of hydraulic flow so as to cause reciprocal movement of the load manipulating devices in question, the forward end of the block 20 is provided with a rigid link arm assembly 33 that connects to a conventional four-way valve 34, so as to permit fluid to be directed in either direction within the two flexible supply lines 35 and 36. In this manner, fluid under pressure can be supplied from fluid reservoir 37 through pump 38 to either line 35 or line 36 so as to cause reversible operation of the cylinders that operate the respective load manipulating devices 13, 14 and 15.

In this regard, a detailed discussion will not be undertaken with respect to the hydraulic supply lines and the valves that selectively control the three load manipulating devices referred to since the supply line of the type shown in Schroeder U.S. Patent 2,754,018 could be employed

with satisfactory results following modification to include the improved control means that form the basis of the present invention.

The operation of the preferred arrangement illustrated schematically in FIGURE 6 will now be undertaken.

Accordingly, and noting first the electromagnetic valve means 32, it will first be noted that three sets of flexible conduits 13a, 13a, 14a, 14a and 15a, 15a extend therefrom for respective connection to the opposed ends of hydraulic cylinders or pistons 13b, 14b and 15b. All fluid under pressure will enter the valve means 32 through either the line 35 or 36 dependent upon the setting of the valve 34. Such fluid under pressure may then be directed into a selected conduit by the valve means 32 so as to effectuate flow of pressurized fluid to a given load manipulating device.

Accordingly, and referring again to FIGURE 6, it will first be assumed that the handle 10 is moved forwardly in the direction of arrow 40, which shows movement resulting in pivoting of the block 20 around shaft 22. This will result in a downward movement of the link arm 33 to thus open four-way valve 34 and direct fluid under pressure into the valve means 32.

In the position just described, pressurized fluid within the lines 35 and 36 will be directed by valve 32 into hydraulic communication with conduits 13a, 13a whereupon the pistons or cylinders 13b, 13b may be actuated to extend or retract the reach mechanism 13 dependent upon the setting of valve 34, with it being noted that the setting of valve 34 is changed by movement of handle 10 in the direction of either arrows 40 or 41 (FIGURE 1). In this regard it will be noted that no rotation in the direction of arrows 42 or 43 is required to operate the reach mechanism 13 with this arrangement being shown in the preferred form illustrated for the reason that the reach mechanism is the most frequently operated manipulating device and, therefore, should require minimum effort for operation. Also the movement of the reach mechanism is directly simulated by the handle 10 since forward (FIGURE 1) movement of the handle 10 will result in forward movement of the gripping means while reverse movement of the handle 10 will result in retracting or reverse movement of the gripping means 14.

Assuming that it is next desired to operate the gripping mechanism 14, it is first merely necessary that the operator rotate the handle 10 about the axis of shaft 23 in the direction of arrow 42. Such movement will result in contact between leg 28 and contact 30. The establishment of electrical contact as just described will actuate valve 32 so that the same will now direct the pressurized hydraulic fluid into communication with conduits 14a, 14a for operation of piston 14b, which in turn moves the gripping jaws of the gripping device 14. With selection made as just described, handle 10 must then be moved in the direction of arrow 40 to supply fluid to valve 32, with it being noted that compound rotation about the axis of shafts 22 and 23 is required to manipulate the gripping means 14 while mere pivotal movement of handle 10 around shaft 22 is required for manipulation of the reach mechanism 13.

It similarly follows that rotation of the control handle 10 in the direction of arrow 43 will result in contact between leg portion 27 and contact 31 to thus again change the position of the electromagnetic valve means 32 so that hydraulic fluid under pressure communicates with

lines 15a, 15a to thus operate the transverse shifting mechanism that has been previously designated generally by the numeral 15. It is again noted that compound rotation of the handle about the two axes of movement is required for operation of the shifting means 15 with rotation of the handle in the direction of arrow 43 merely positioning the valve to direct fluid to piston 15b while actual flow of fluid under pressure is achieved by movement of the handle in the direction of arrows 40 or 41.

It will be seen from the foregoing, how there has been provided a new and improved type of control mechanism that is characterized by shifting movement of a single control handle around two axes much in the nature of an airplane "joystick," with such compound movement controlling the flow of fluid as well as selecting the particular load manipulating device to be operated.

While a full and complete description of the invention has been set forth in accordance with the dictates of the Patent Statutes, it is to be understood that the invention is not to be limited to the specific embodiments herein shown, and, accordingly, modifications of the invention may be resorted to without departing from the spirit hereof or the scope of the appended claims.

What is claimed is:

1. In a combination of the class described, an industrial truck having a main frame, a lifting carriage moving vertically on said main frame, at least three load manipulating devices on said lifting carriage, a separate hydraulic motor for each of said three load manipulating devices, electromagnetic valve means on said carriage, a source of fluid pressure on said main frame, a first pair of flexible hydraulic lines through which fluid flows to and from said fluid source and said valve means in all vertical positions of the carriage relatively to the main frame, second pairs of flexible hydraulic lines through which fluid flows from said valve means in all vertical positions thereof to each hydraulic motor, a handle on the main frame, means mounting said handle on said main frame to pivot bodily in a fore-and-aft direction relatively to said main frame, means also mounting said handle for selective rotation about its longitudinal axis in opposed directions, a valve actuated by said fore-and-aft movement of said handle to effect flow through said first pair of lines to said electromagnetic valve means and to a particular one of said three hydraulic motors in one or the other of opposed directions, a pair of switches mounted on said handle adapted to control said electromagnetic valve means to direct said fluid to or from one or the other of said two other hydraulic motors while discontinuing flow of fluid to or from said particular one motor in any fore-and-aft position of said handle, and switch actuating means mounted for rotation with said handle to actuate one of said switches in any fore-and-aft position of said handle.
2. In the combination as claimed in claim 1, in which said valve means is a single electromagnetic valve.

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GERALD M. FORLENZA, *Primary Examiner.*

GEORGE F. ABRAHAM, *Assistant Examiner.*