Feb. 27, 1968 A. L. BURNETT 3,370,433

BLOCKING SYSTEM FOR DRY DOCKS

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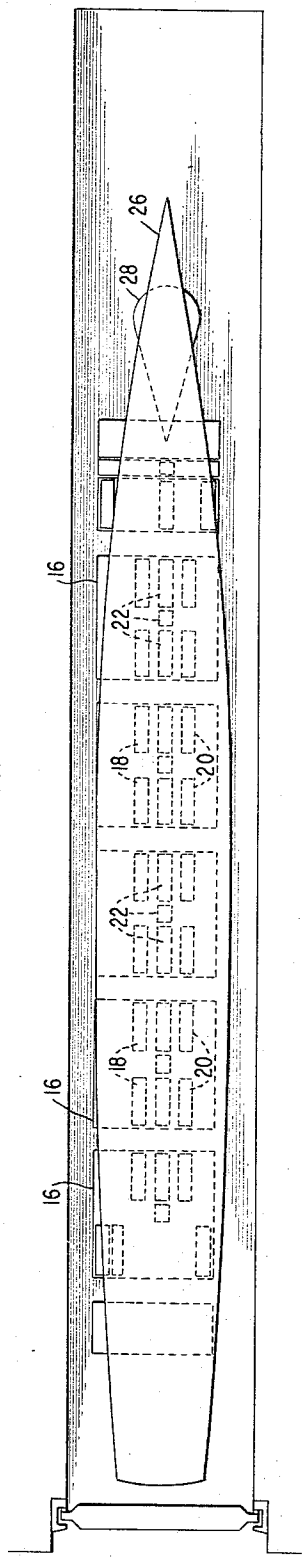


FIG. 1

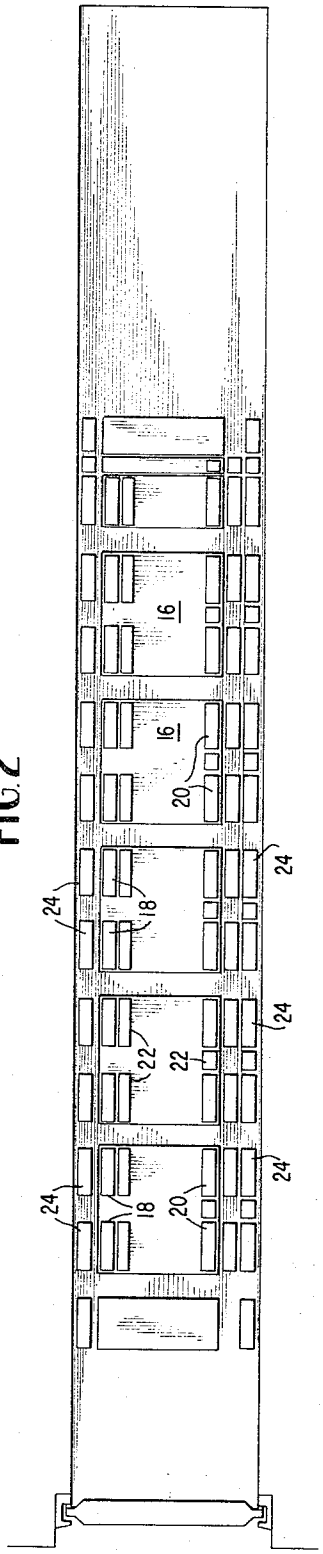


FIG. 2

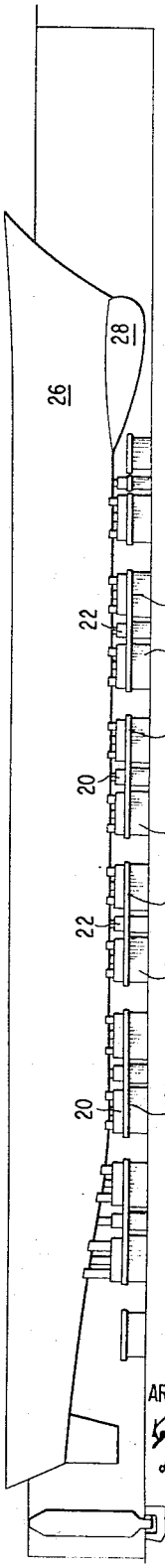


FIG. 3

INVENTOR
ARDEN L. BURNETT
Kyma, Palmer, Stewart & Estabrook
ATTORNEYS

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FIG. 4

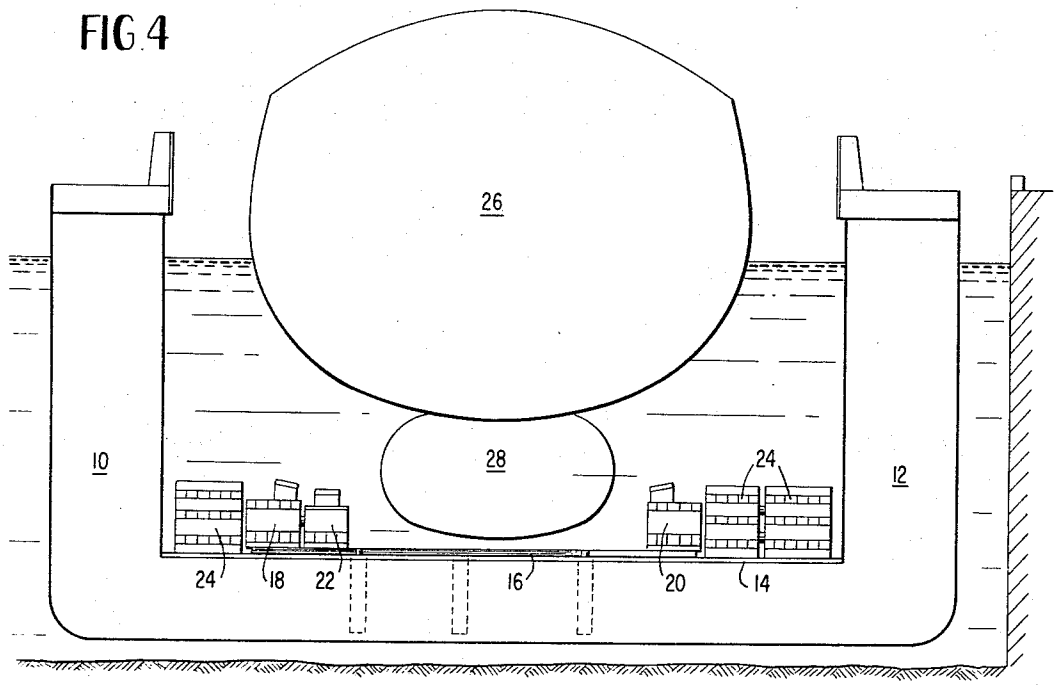
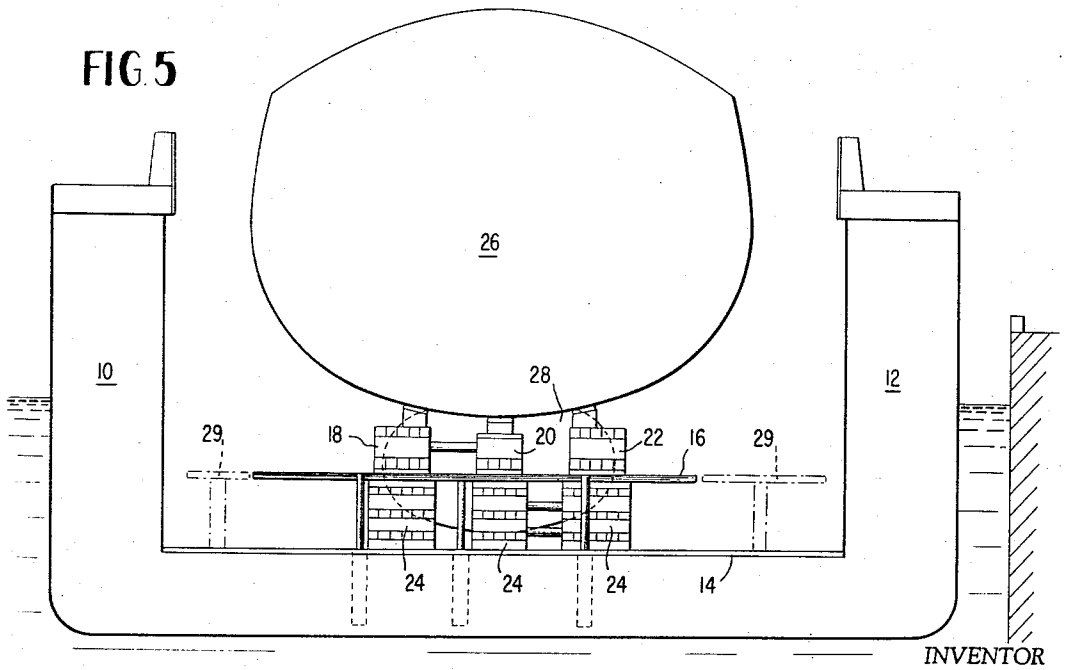


FIG. 5



INVENTOR

ARDEN L. BURNETT

BY Fennemore, Palmer, Stewart & Estabrook

ATTORNEYS

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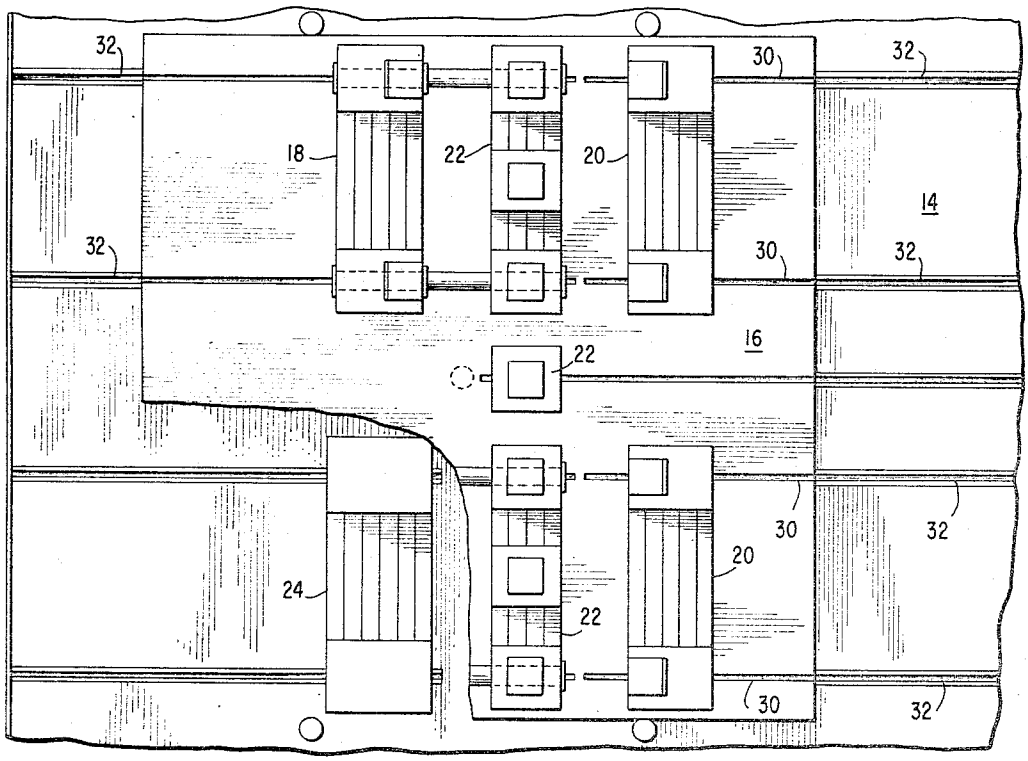


FIG. 6

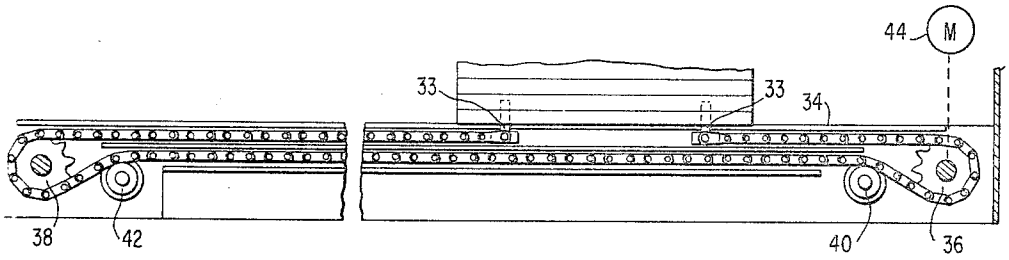


FIG. 8

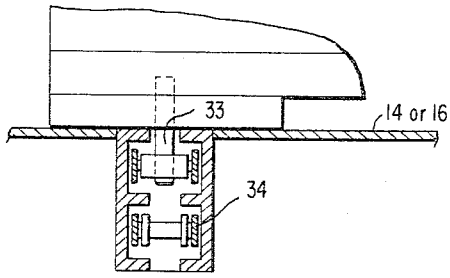


FIG. 7

INVENTOR
ARDEN L. BURNETT

BY Kenyon, Palmer, Stewart & Estabrook
ATTORNEYS

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BLOCKING SYSTEM FOR DRY DOCKS

Arden L. Burnett, 6301 Nicholson St.,
Falls Church, Va. 22044

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2 Claims. (Cl. 61—64)

ABSTRACT OF THE DISCLOSURE

For high block dry docking of ships in order to standardize on usable block heights and permit automatic and/or remote positioning of the blocks under water, such blocks are effectively cut substantially in half in their horizontal plane. The upper halves are movably supported on the upper surfaces of a series of elevatable platforms arranged on the dock floor and the lower halves are arranged for movement on the dock floor proper to support the platforms in their elevated positions.

Background of the invention

This invention relates to dry docks of either the floating or graving type, but more particularly it relates to a blocking system for dry docks. In my prior U.S. Patent No. 3,133,420 there is disclosed and claimed a means for superflooding of both graving and floating dry docks which permits a given dock to accommodate ships of substantially deeper draft than that for which the dock was originally designed. Also in my prior Patent No. 3,218,814 dated Nov. 23, 1965, there is disclosed and claimed a system for automatically moving the blocks along the floor of the dock. The present invention embodies the block moving principles of Patent No. 3,218,814 in a novel fashion so that when used in combination with the superflooding (raising the level of water within the dock above the level of water outside the dock) principle of Patent 3,133,420 the major deficiencies of present high block docking are corrected and an extremely versatile arrangement results.

In modern warships such as destroyers and the like, the sonar domes which are positioned substantially on the keel line at the bow of the ship have become increasingly large and have thus increased the draft of such ships to the point that most docks not equipped with the superflooding invention of my prior patent are no longer able to accommodate such ships for which they were originally designed. More recently, not only has the size of the sonar domes been increased, but the number has been increased and in general they are positioned in alignment with each other and spaced rearwardly along the keel line beginning at the bow. In an endeavor to accommodate such structures in existing docks, one expedient which has been tried is to excavate the floor of the dock around the area where the sonar dome would ordinarily lie in order to provide a depression in the dock floor which will accommodate the sonar dome. No sooner had some docks been excavated for this purpose, than a second dome was added to these ships centered on the keel line of the ship and spaced longitudinally aft of the first dome. This would then necessitate a further excavation of the dock floor to provide a large depression capable of receiving the two sonar domes. Another obstacle is the projection of the propellers of these ships which while less than the sonar dome, nevertheless must be taken into account.

In attempting to apply the teachings of my two prior

mentioned patents to solve the problem, certain difficulties were encountered in moving the blocks along the floor of the dock due largely to the increased height of the blocks necessary to support the ship at a height which would permit the sonar domes to clear the floor of the dock when the ship was finally supported on the blocks. These blocks are relatively massive structures and in these instances some of them reached heights of 12 feet so that mechanical means for moving such blocks on the floor of the dock were not practical. The block-moving apparatus of my prior Patent No. 3,218,814 is admirably suited however, for moving blocks of a size, for example, up to about 6 feet in height.

Accordingly, it is the principal object of the present invention to provide a blocking system for dry docks which permits remote control movement of the blocks on the floor of the dock in accordance with the teaching of my prior Patent 3,218,814 even for high block docking in which the ship may have to be supported as much as twelve feet above the floor of the dock.

A further object of the present invention is to provide a blocking system for dry docks which is extremely versatile in that it will accommodate ships regardless of the number of sonar domes which are attached to the keel line thereof.

A still further object of the present invention is to provide a blocking system for dry docks which when used in conjunction with the superflooding techniques of my prior Patent No. 3,133,420 and the block-positioning apparatus of my prior Patent No. 3,218,814 will permit the use of an existing dry dock for ships for which it was designed regardless of the number of sonar domes which are now carried by such ships and which would otherwise render the dock unusable for this purpose.

Summary of the invention

In general, the objects of the present invention are achieved as follows. A series of substantially rectangular platforms are disposed on the floor of the dock and spaced longitudinally therealong. Each of these platforms may be elevated from a position adjacent the floor of the dock to a second position which is approximately five or six feet above the floor of the dock. Each platform carries on its upper surface a plurality of bilge and/or keel blocks which are positionable on each platform by means substantially the same as that shown in my prior Patent 3,218,814. Positioned on the floor of the dock are a second series of blocks which will be termed shoring blocks for purposes of the following description. These shoring blocks are also positionable on the floor of the dock by means the same as or substantially the same as those for moving the bilge and keel blocks on each of the individual platforms. These shoring blocks may be positioned between the outboard edges of the platforms and the wing walls of the dock until such time as they are to be used. Once the platforms have been raised and the bilge and keel blocks positioned in ship-supporting position on each platform, then the shoring blocks may be positioned beneath the platforms in order to carry the entire load imposed by the ship on the platforms. In other words, the elevating means for the platforms need only be sufficient to raise the platforms and the blocks carried thereby. Once the platforms and their blocks have been appropriately positioned and the shoring blocks positioned beneath the platforms, then the elevating means for the platforms will be lowered to lower the platform onto the shoring blocks.

Brief description of the drawing

FIGURE 1 is a top plan view of a dry dock having a blocking system in accordance with the present invention and with the blocks positioned to support the ship above the floor of the dock;

FIGURE 2 is a view similar to FIGURE 1 but with the blocking arrangement positioned prior to entry of the ship into the dock and prior to superflooding thereof;

FIGURE 3 is a side elevation of the dock and blocking arrangement shown in FIGURE 1;

FIGURE 4 is a sectional view through a floating dry dock which embodies the blocking system of the present invention and showing a ship which has been warped into the dock prior to superflooding and prior to block-positioning to support the ship once the dock has been emptied of water;

FIGURE 5 is a view similar to FIGURE 4 but showing the blocking system in ship-supporting position with the water emptied from the dock;

FIGURE 6 is a top plan view of a portion of the dock floor and one platform with parts broken away showing one cluster of blocks positioned in ship-supporting position;

FIGURE 7 is a view showing a guide means in the floor of the dock receiving a guide pin projecting from the bottom of a block; and

FIGURE 8 is a side elevation in section of FIGURE 7 showing the chains for moving the blocks.

Detailed description

Referring now to the drawings and more particularly to FIGURES 4 and 5, there is shown a floating dry dock having wing walls **10** and **12** and a floor **14**. Resting on the floor of the dock is an elevatable platform **16**. Positioned on the upper surface of the platform **16** are a pair of bilge blocks **18** and **20** and a keel block **22**. Between the outboard edges of the platform **16** and the wing walls **10** and **12** of the dry dock, there are positioned a plurality of shoring blocks **24** which are resting on the floor **14** of the dry dock. The position of the various blocks and the platform as shown in FIGURE 4 is such as to permit a ship shown at **26** to be warped into the dock. A sonar dome **28** of the ship **26** comprises the lowermost point of the ship. Referring now to FIGURE 5 of the attached drawings, this shows the ship and the dry dock of FIGURE 4 but with the dock emptied of water and the blocks positioned to support the ship thereon. Starting with the position of the blocks and platform as shown in FIGURE 4, the bilge and keel blocks **18**, **20** and **22** are first positioned on the platform as they appear in FIGURE 5. The platform is then raised until the blocks carried thereby abut the underside of the ship. Next the shoring blocks **24** are moved from their positions adjacent the wing walls of the dock to the position beneath the platform as shown in FIGURE 5 where they directly underlie the bilge and keel blocks which are positioned on the upper side of the platform. Once the blocks have been placed in this position, then the platform is lowered until the underside of the platform rests upon the upper surface of the shoring blocks **24**. As soon as the blocks are so positioned, then the water is pumped out of the dry dock and the ship is allowed to settle on the blocks. Superflooding of the dock may be necessary prior to changing the position of the blocks from that shown in FIGURE 4 to that shown in FIGURE 5.

In order to provide a convenient access for workmen to the upper surface of the platform, a series of small lifts **29** may be provided between the outboard edges of the platforms and the wing walls of the dock.

FIGURES 1, 2 and 3 each show in top plan view and in side elevation partially in section the blocking arrangement (previously described with reference to FIGURES 4 and 5) for an entire dock of the graving type. In FIGURES 1 to 3, inclusive, it will be noted that there

are a plurality of platforms **16** which are distributed longitudinally along the floor of the dock. These platforms need not all be the same size and, in fact, the forwardmost platform shown in these figures is substantially half the size of the remainder of the platforms. This is to accommodate ships having a different number of sonar domes disposed on their forward keel line. In FIGURE 1, the ship is shown in the dock and resting upon the blocks while in FIGURE 2 only the dock itself is shown with the blocks in the position which they would occupy prior to entry of the ship into the dock. FIGURE 3 is merely a side elevation partially in section of the dock shown in FIGURE 1.

Referring now to FIGURE 6, this is a top plan view with parts broken away of the floor of a dry dock in accordance with the present invention having one of the elevatable platforms with its associated blocks positioned in ship-supporting position. Effectively, this view is an enlarged detail of a portion of FIGURE 2 but with the blocks shown in ship-supporting position. Indicated at **30** in this figure are the several tracks which are formed in the upper surface of the platform **16** in which a projection from the lower portion of the blocks engages for sliding movement over the surface of the platform. Similar tracks **32** are, of course, provided in the floor of the dock itself for positioning of the shoring blocks **24**, all in accordance with the teachings of my prior Patent No. 3,218,814.

Referring lastly to FIGURES 7 and 8, these show a block moving apparatus substantially similar to that disclosed and claimed in my prior Patent No. 3,218,814 and will not therefore be described in detail. Suffice to say, each block may have a downwardly projecting pin **33**, which extends into a slot **30** formed in either the platform or the dock floor. Chain means shown at **34** are connected to the pins **32** and train around sprockets **36** and **38** and idlers **40** and **42**. A motor **44** may be used to drive one of the sprockets as indicated.

From the foregoing description, those skilled in this art will recognize that what has been done is to effectively cut in half the total height of the blocks so that the upper half of the block will be positioned on the upper side of the platform while the lower half of the block is positioned on the floor of the dock beneath the platform. Since the total height of the block may be of the order of twelve feet, cutting it in half provides a number of distinct advantages. In the first place, the individual parts of each block become readily movable by automatic means positioned in the floor of the dock and on the platforms. Secondly, the use of the platforms and the split-block principle permits a great range of flexibility in any dry dock in order to accommodate ships of varying draft and having a varying number of sonar domes positioned on the keel line thereof. Thirdly, this permits standardization of block size to, for example, five feet regardless of the height of the sonar domes or propeller projections. This in turn reduces the height of the working area under the ship to the same distance. Other advantages will be apparent to those skilled in this art and while preferred embodiments of the present invention have been herein shown and disclosed, applicant claims the benefit of a full range of equivalents within the scope of the appended claims.

I claim:

1. A dry dock comprising in combination:

an elongated watertight basin including opposed wing walls, ends and floor and means for filling and emptying said basin of water;

a plurality of platforms spaced longitudinally from each other along said floor;

means for raising and lowering said platforms;

a plurality of bilge and keel blocks supported for sliding movement on said platforms;

means for moving said blocks from a first position on the outboard edges of said platforms to a ship-

supporting position on the center portion of said platforms;

a plurality of shoring blocks mounted for sliding movement on the floor of said basin;

and means for moving said shoring blocks from a first position between the outboard edges of said platforms and the wing walls of said basin to a second position underlying said platforms.

2. A dry dock as defined by claim 1 in which said

shoring blocks are substantially the same height as said keel and bilge blocks.

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UNITED STATES PATENTS

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JACOB SHAPIRO, *Primary Examiner.*