

July 30, 1968

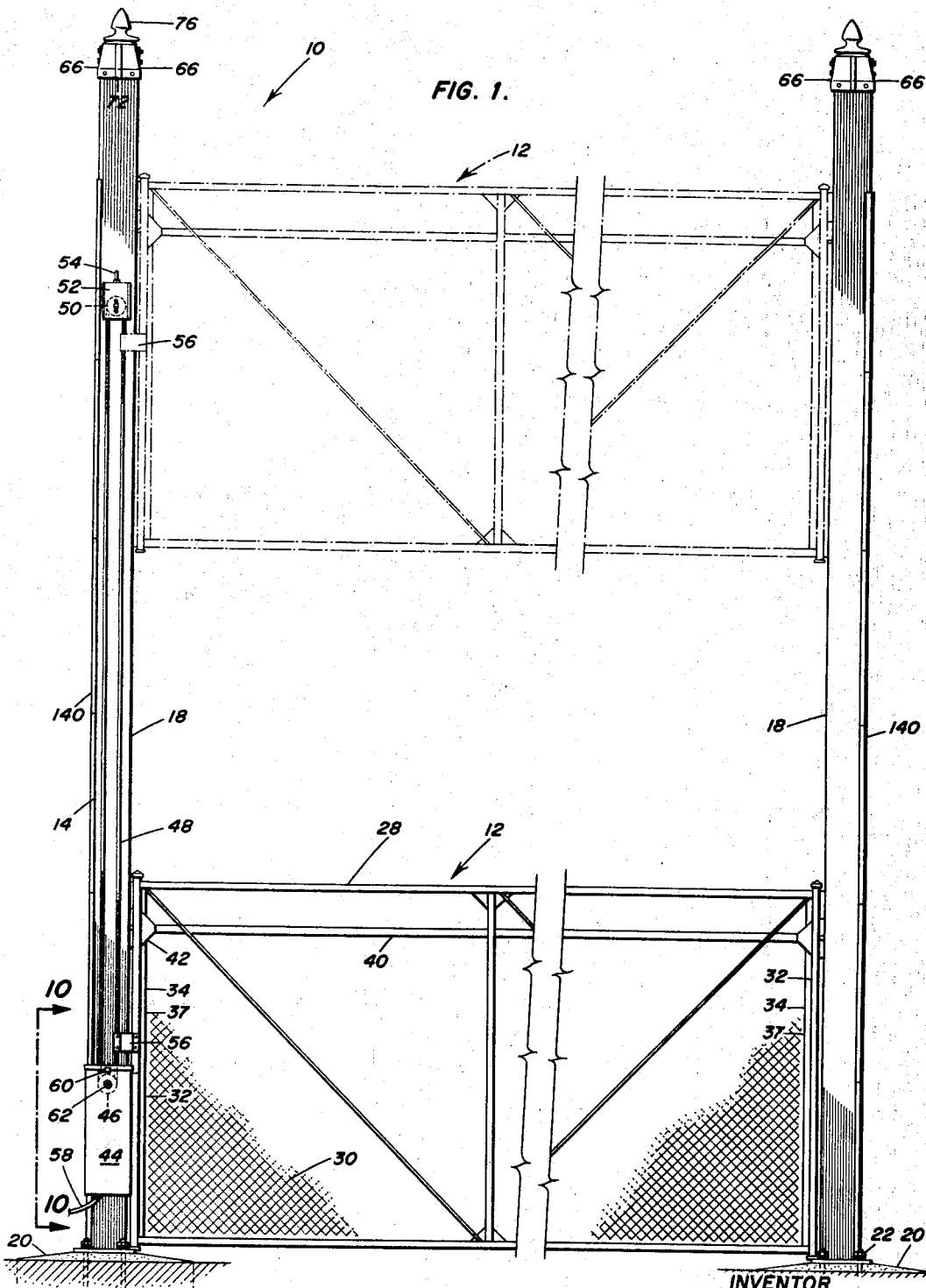
J. S. CASE

3,394,497

VERTICAL LIFT GATE

Filed June 13, 1966

4 Sheets-Sheet 1



BY

INVENTOR
JOHN S. CASE

Walter G. Finch
ATTORNEY

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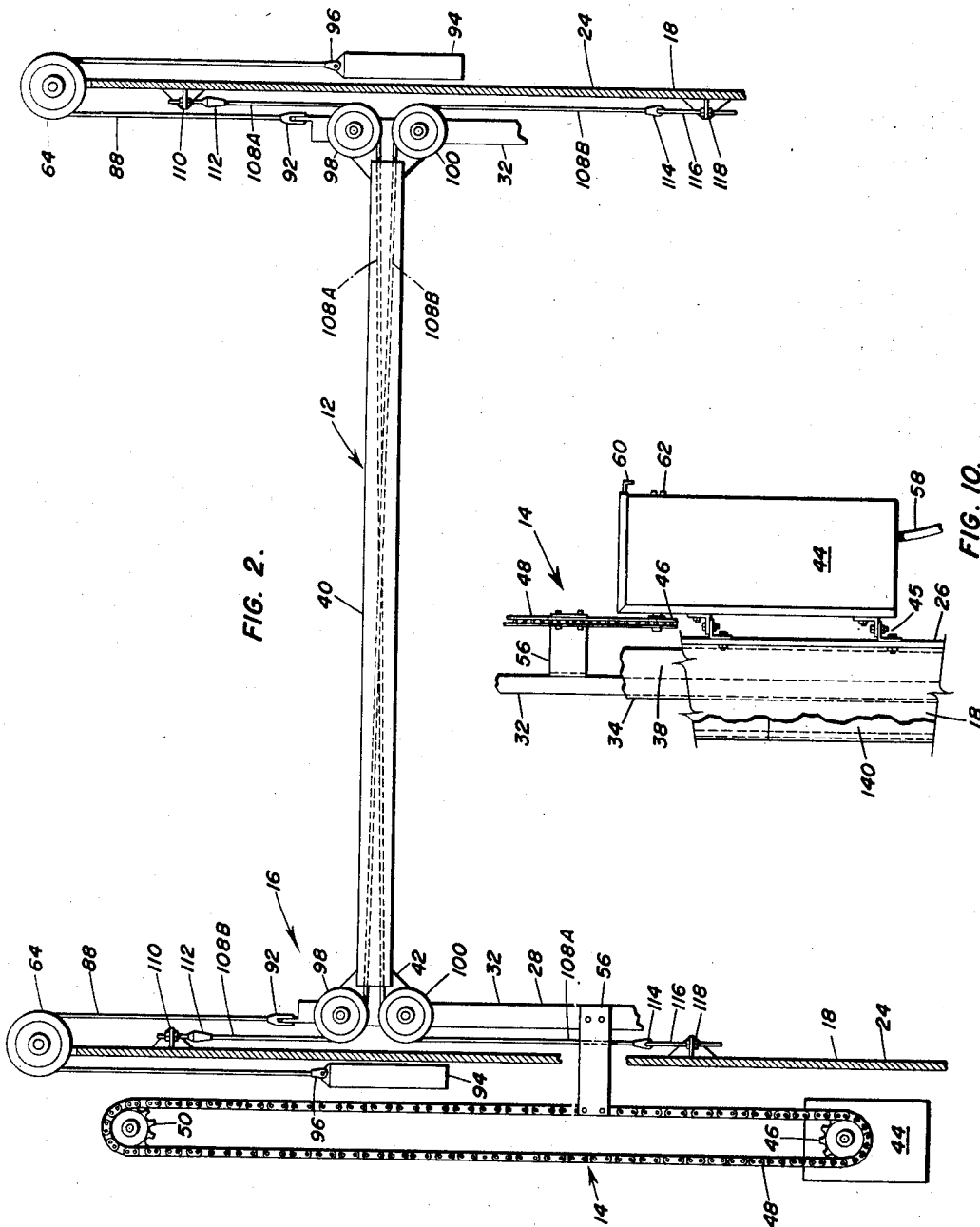
J. S. CASE

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INVENTOR
JOHN S. CASE

BY *Walter G. Finch*
ATTORNEY

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J. S. CASE

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4 Sheets-Sheet 4

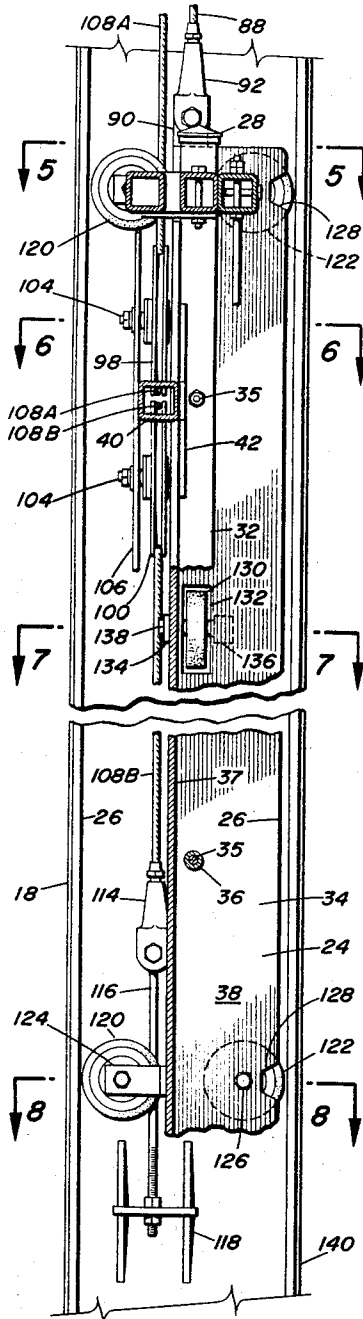


FIG. 4.

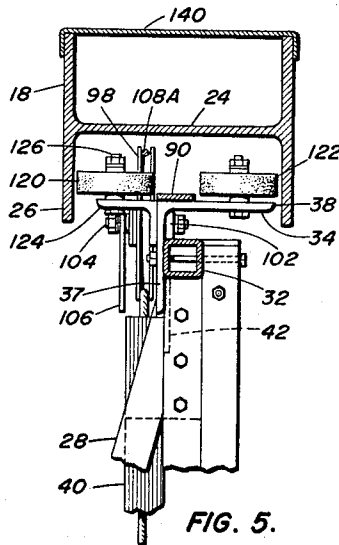


FIG. 5.

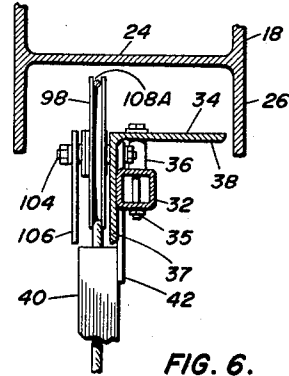


FIG. 6.

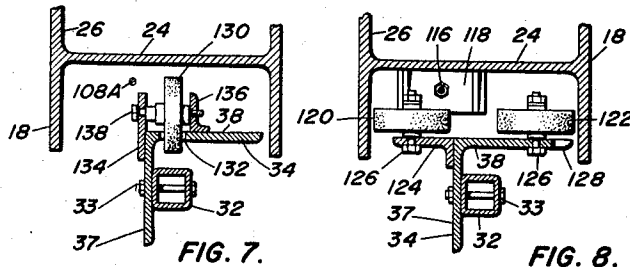


FIG. 7.

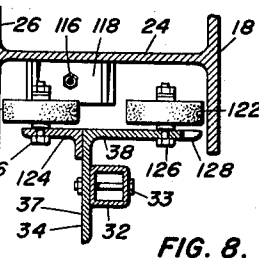


FIG. 8.

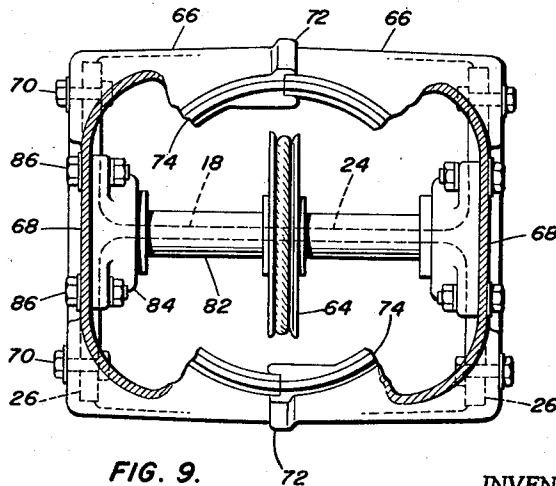


FIG. 9.

INVENTOR
JOHN S. CASE

BY *Walter G. Finch*
ATTORNEY

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3,394,497

VERTICAL LIFT GATE

John S. Case, Towson, Md., assignor to Anchor Post Products, Inc., Baltimore, Md., a corporation of New Jersey

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9 Claims. (Cl. 49—140)

ABSTRACT OF THE DISCLOSURE

A vertical lifting arrangement is described which is especially suited for very long gates. A lift chain mechanism operates within one tower post and a parallel-rule type of leveling cable system operates cooperatively in both with cross linkage reeved through the gate. Sway prevention rollers at right angles travel with the gate ends and bear against the inner surfaces of the tower posts. The cables of the parallel rule system are independently adjustable at each end by fittings on opposite gate ends. A counterweight arrangement is concealed in and functions in each tower post.

This invention relates generally to gates, and more particularly it pertains to lift gates.

Vertical lift gates have been troublesome, especially when of great length, having a tendency to rise unevenly and jam. The application of lifting force to both ends of the gate results in ungainly cross mechanism and/or costly duplication of synchronized elevating motors.

It is, therefore, an object of this invention to provide a vertical lift gate arrangement which will operate truly parallel with the ground at all times and which requires a lifting motor operator at only one end.

Another object of this invention is to provide a lift gate system wherein the lift and paralleling mechanism is of simple cable and link belt type which can be concealed within the gate and post structure, respectively, for more esthetic appearance and protection from weather.

Other objects and attendant advantages of the invention will become more readily apparent and understood from the following detailed specification and accompanying drawings in which:

FIG. 1 is a front elevation of a vertical lift gate system incorporating features of the present invention with the repetitive central portions of the gate structure broken away;

FIG. 2 is a schematic showing of the elevating and leveling arrangements for the vertical lift gate system of the present invention;

FIG. 3 is an enlarged fragmentary elevation, with certain elements broken away and others in section, of the lower half of the right hand column shown in FIG. 1;

FIG. 3A is a continuation of FIG. 3 illustrating the upper half of the same column;

FIG. 4 is a vertical section taken along line 4—4 of FIG. 3;

FIGS. 5, 6, 7 and 8 are a series of horizontal sections, taken along their respectively numbered lines 5—5, 6—6, 7—7, and 8—8 of FIG. 4;

FIG. 9 is a further enlarged view along line 9—9 of FIG. 3A with portions broken away and with a capping element removed; and

FIG. 10 is a fragmentary end elevation on an enlarged scale with certain elements broken away and viewed along line 10—10 of FIG. 1.

Referring now to the details of the invention as shown in FIG. 1, the improved gate arrangement 10 consists generally of a gate 12 supported for vertical lift between two columns 18 of an elevator 14.

The columns 18 are wide flange I-beams vertically sup-

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ported on footings 20 of poured concrete by means of studs and nuts 22.

A leveling system 16, as best shown in FIG. 2, is secured to the web 24 of one of the columns 18 and extends across the gate 12 where it is similarly secured to the web 24 of the other column 18.

The gate 12 is an elongated trussed-rectangular structure 28 covered with wire mesh fabric 30 and having tubular end posts 32. Bolts 33 secure a wide flanged angle 34 by its longitudinal flange 37 to each tubular end post 32 as best shown in FIGS. 3, 7 and 8. Other bolts 35 with bushings 36 further secure the tubular end posts 32 at other locations to the transverse flanges 38 of the angles 34 as shown in FIGS. 4 and 6.

A cable crossing rail or tube 40 of rectangular tubing is provided completely across the gate 12 as shown in FIGS. 1, 2, 4, 5 and 6 and it is secured by welding and gussets 42 to the structure 28.

As best shown in FIG. 10, a motor driven operator 44 is secured on mounting brackets 45 to the lower portion of one column 18. A sprocket 46 is provided from the operator 44 to drive an endless link belt 48 which extends up the column 18.

The upper end of the belt 48 passes over an idler sprocket 50 which is journaled in a housing 52 secured near the top of the column 18 and which incorporates a take-up adjustment 54. A coupler bracket 56 attaches the link belt 48 to the structure 28 of gate 12 as best shown in FIGS. 1, 2, and 10.

Wiring 58 is provided which extends from the operator 44 to the usual power supply and controls not shown for opening, closing and stopping the gate 12.

A clutch release 60 and a socket 62 for a manual crank are conveniently located on the operator 44 for manual cranking of the gate 12 in case of power failure or for servicing.

Elevating sheaves 64 are located at the top of both columns 18 in mated housing halves 66 as shown best in FIGS. 3A, and 9. These halves 66 are each secured by their end walls 68 to the flanges 26 of the columns 18 with bolts and nuts 70.

The halves 66 are made weather tight by means of a cooperating tongue and groove arrangement 72 at their sides where they join together and by a circular flange 74 at their common top which accommodates a cap 76 having a flange 78 and a fastener setscrew 80 as shown best in FIG. 3A.

The elevating sheave 64 is mounted on a shaft 82 which is centered directly above the web 24 of column 18 and journaled in a pair of bearing carriers 84 which are secured on the halves 66 with bolts and nuts 86. Thus, it will be noted the elevating cables 88 extend over sheave 64 and down opposite sides of the web 24.

A lifting tongue 90 is welded to the top of each end flange angle 34 of the gate 12 as shown in FIGS. 3, 4, and 5. A clevis fitting 92 is provided to secure one end of cable 88 at this location. After passing over the sheave 64, the other end of cable 88 is attached by a fitting 96 to a lead filled counterweight 94.

A doubler plate 102 is welded to the longitudinal flange 37 of each end angle 34 of the gate 12 opposite the open ends of the cable crossing tube 40. Each plate 102 is arranged to carry an upper and lower leveling pulley 98 and 100, respectively, on shafts 104 as best shown in FIGURES 3 and 6. A cover plate 106 is secured over these pulleys 98 and 100 and it is mounted on the same shafts 104 at their free ends.

As best shown in FIG. 2, the webs 24 of each column 18 have an upper cable terminating bracket 110 which are welded thereto as well as a lower cable terminating bracket 118. One leveling cable 108A is secured to the

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upper bracket 110 of the right hand column 18 by a fitting 112 and it is reeved down and around first the upper right hand leveling pulley 98, then through the cable crossing tube 40 of the gate 12, around lower pulley 100 at the left to terminate in a fitting 114 which joins to lower bracket 118 with an adjustable leveling rod 116.

The other leveling cable 108B is secured to the upper bracket 110 of the left hand column 18 in a similar fashion and it is reeved down and around first the upper left hand leveling pulley 98, then through the cable crossing tube 40, around lower pulley 100 at the right of gate 12 to terminate similarly in adjusting rod 116 which is attached to the right hand column 18 at bracket 118. The cables 108A, 108B are maintained under constant tension by the leveling rods 116.

As shown in FIGS. 4, 5, and 8, lateral sway of the gate 12 is prevented by means of rollers 120 and 122 which are mounted on shafts 126 extending from a bracket 124 and on the transverse flange 38, respectively, of each gate end angle 34. A notch 128 in the flange 38 gives access to the grease rollers 122.

Other rollers 130 to prevent longitudinal sway of the gate 12 are mounted in slots 132 in the flanges 38 upon brackets 134, 136 and shafts 138. These rollers 130 bear against the web 24 of the column 18 while the former rollers 120 and 122 bear against the flanges thereof.

Cover plates 140, as shown in FIGS. 1 and 5, close the columns 18 on their outer sides for appearance and weather protection.

Obviously many modifications and variations of the present invention are possible in light of the above teachings. It is, therefore, to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. A vertical lift gate arrangement, comprising, a pair of vertically arranged first and second spaced guide posts, a gate structure positioned between said guide posts and arranged for vertical movement, means including first upper and lower pulleys spaced vertically on one end of said gate structure, means including second upper and lower pulleys spaced vertically on the other end of said gate structure, means including a first tensioned cable secured to and descending from an upper portion of said first guide post around said first upper pulley and around said second lower pulley and downwardly to affix to a lower portion of said second guide post, and means including a second tensioned cable secured to and descending from an upper portion of said second guide post around said second upper pulley and around said first lower pulley and downwardly to affix to a lower portion of said first guide post, whereby the attitude of said gate structure can be maintained constant during vertical movement thereof.

2. A vertical lift gate arrangement as recited in claim 1, and means coupled to said gate structure for elevating and lowering said gate structure.

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3. A vertical lift gate arrangement as recited in claim 2, and additionally motor driven operator means for operating said means for elevating and lowering said gate structure.

4. A vertical lift gate arrangement as recited in claim 3, and additionally means including a clutch release for said motor driven operator and a socket for a manual crank located on said motor driven operator for manual cranking of said gate structure in case of power failure.

5. A vertical lift gate arrangement as recited in claim 1, and means positioned at the opposite ends of said gate structure to prevent lateral sway of said gate structure.

6. A vertical lift gate arrangement as recited in claim 1, and means positioned at the opposite ends of said gate structure to prevent longitudinal sway of said gate structure.

7. In a vertical lift gate arrangement having a pair of vertically arranged first and second spaced guide posts and a gate structure positioned between said guide posts and arranged for vertical movement, a self-leveling system for maintaining a constant attitude of said gate structure during vertical movement thereof, said leveling system comprising means including first upper and lower pulleys spaced vertically on one end of said gate structure, means including second upper and lower pulleys spaced vertically on the other end of said gate structure, means including a first tensioned cable secured to and descending from an upper portion of said first guide post around said first upper pulley and around said second lower pulley and downwardly to affix to a lower portion of said second guide post, and means including a second tensioned cable secured to and descending from an upper portion of said second guide post around said second upper pulley and around said first lower pulley and downwardly to affix to a lower portion of said first guide post, whereby said attitude of said gate structure can be maintained constant during vertical movement thereof.

8. In a vertical lift gate arrangement as recited in claim 7, and means coupling to said gate structure for elevating and lowering said gate structure.

9. In a vertical lift gate arrangement as recited in claim 8, and additionally a motor driven operator for operating said elevating and lowering means.

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DAVID J. WILLIAMOWSKY, *Primary Examiner*.

DENNIS L. TAYLOR, *Assistant Examiner*.