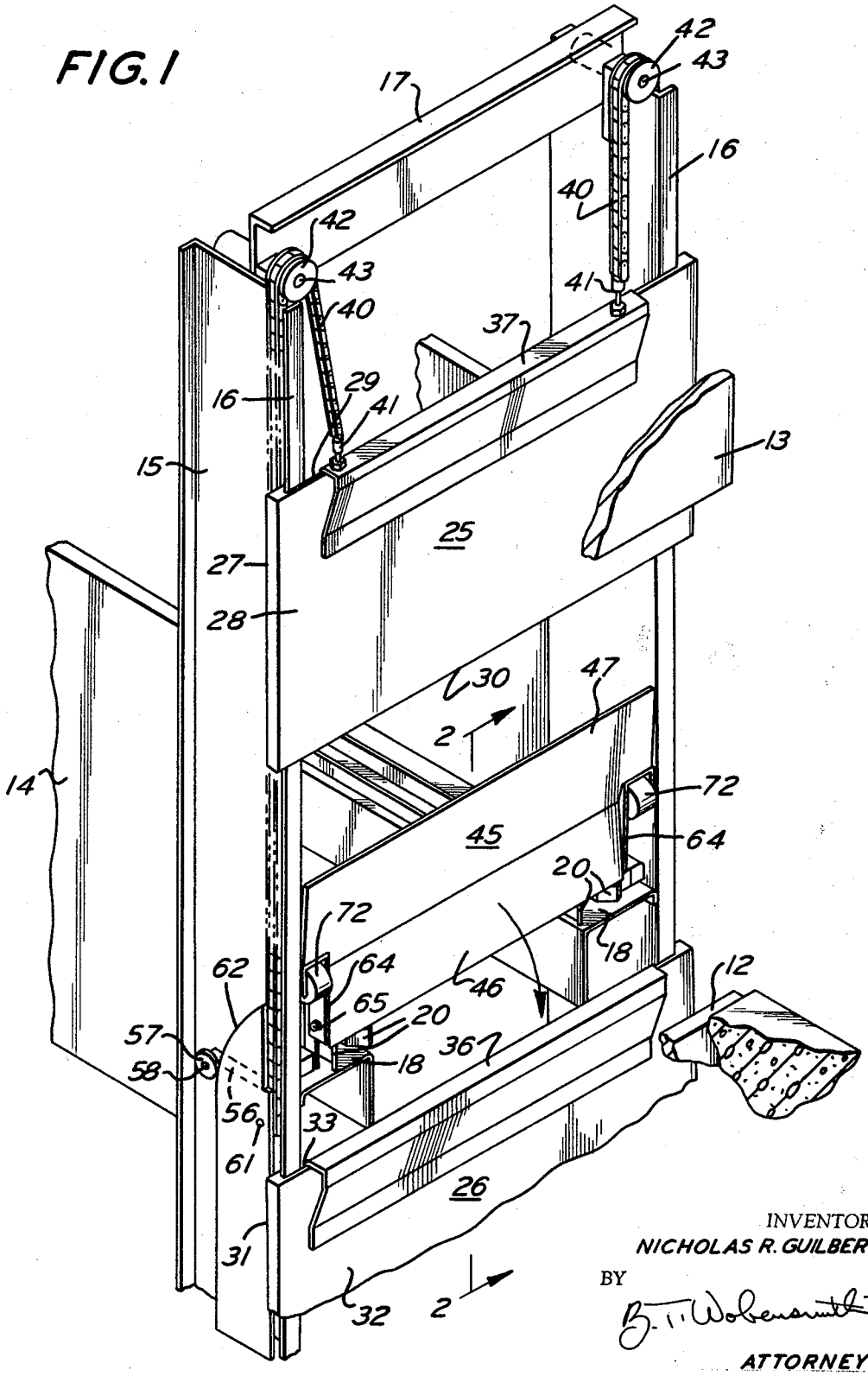
Aug. 13, 1968 N. R. GUILBERT, JR 3,396,822

DRAWBRIDGE

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FIG. 1



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FIG. 2

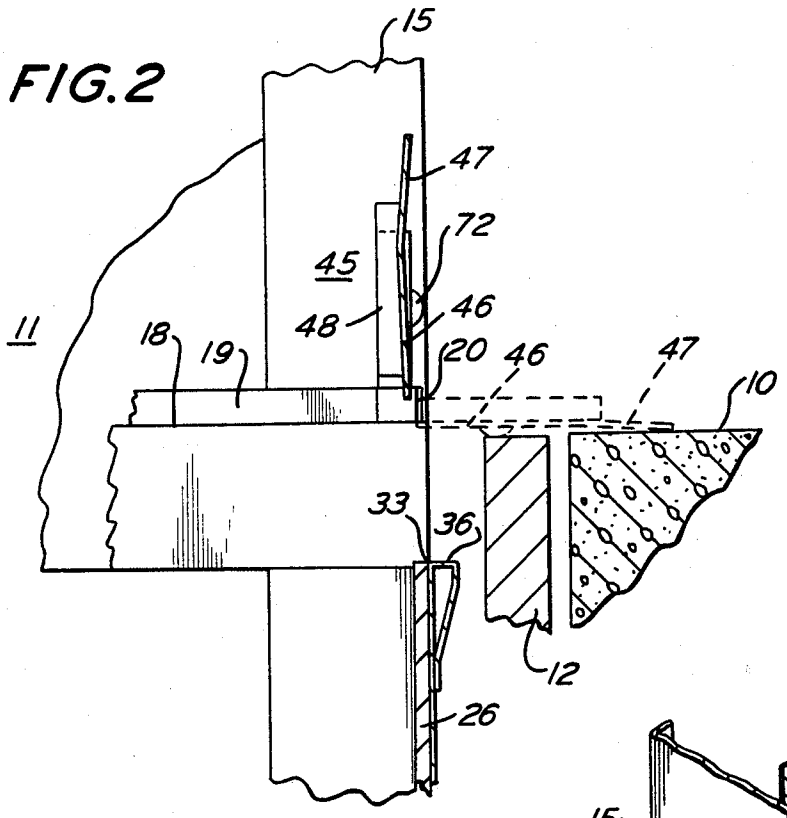
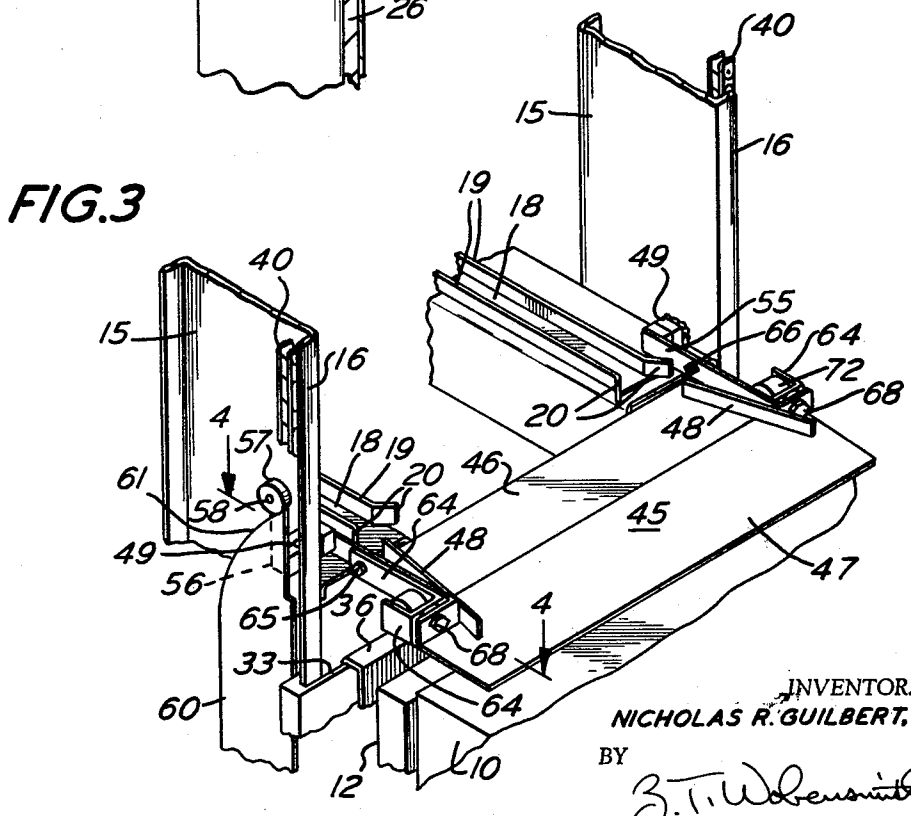


FIG. 3



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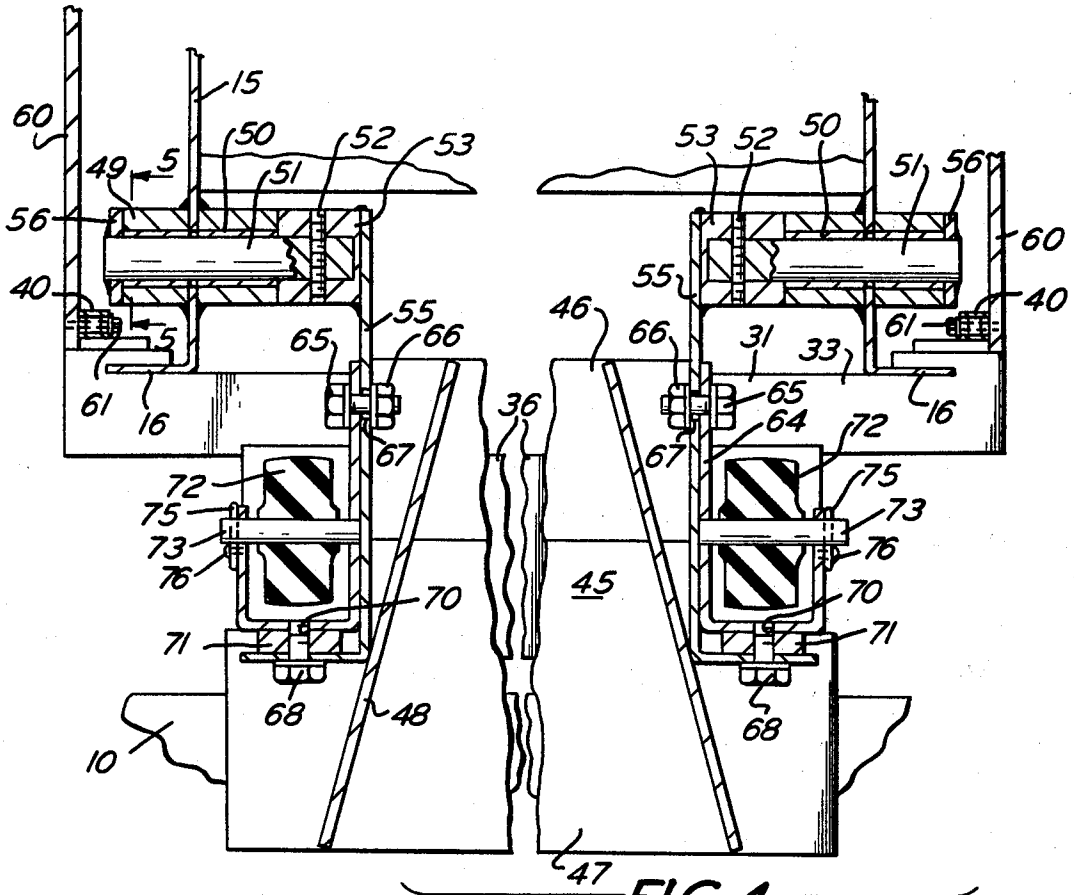


FIG. 4

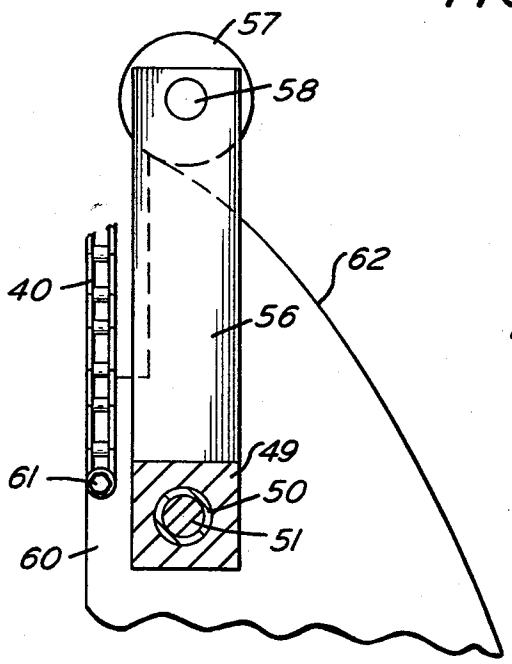


FIG. 5

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DRAWBRIDGE

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9 Claims. (Cl. 187—98)

ABSTRACT OF THE DISCLOSURE

A drawbridge for dumbwaiters and elevators hingedly carried by the car with positive cam control on the car for elevating the drawbridge and auxiliary elevating and closing rollers on the drawbridge for car door engagement.

Field of the invention

This invention relates to drawbridges for the cars of dumbwaiters and elevators, and more particularly to apparatus for effecting bridging of the edges of the car and hatchway doors in open position to facilitate the removal and entry of wheeled vehicles.

It has heretofore been proposed to provide swingable bridges for the cars of dumbwaiters and elevators but these lacked positive control of the operation thereof or had other shortcomings.

Summary of the invention

It is the principal object of the present invention to provide a drawbridge swingable from an out of action position to a position for use in bridging relation above upper margins of shaftway and car doors in the open position of such doors and with controlled movement of the drawbridge.

It is a further object of the present invention to provide a drawbridge having a simple but effective cam control preferably actuated by the movement of one of the car doors and with a booster action provided by one of the car doors.

Other objects and advantageous features of the invention will be apparent from the description and claims.

Brief description of the drawing

The nature and characteristic features of the invention will be more readily understood from the following description taken in connection with the accompanying drawings forming part thereof, in which:

FIGURE 1 is a view in perspective of the entrance of a dumbwaiter or elevator car illustrating the drawbridge of the present invention in closed position;

FIG. 2 is a fragmentary vertical sectional view taken approximately on the line 2—2 of FIG. 1;

FIG. 3 is a fragmentary perspective view of a portion of the structure shown in FIG. 1 but with the drawbridge in open position;

FIG. 4 is a horizontal sectional view, enlarged, taken approximately on the line 4—4 of FIG. 3; and

FIG. 5 is a fragmentary sectional view, enlarged, taken approximately on the line 5—5 of FIG. 4.

It should, of course, be understood that the description and drawings herein are illustrative merely, and that various modifications and changes can be made in the structure disclosed without departing from the spirit of the invention.

Like numerals refer to like parts throughout the several views.

Description of the preferred embodiment

Referring now more particularly to the drawings, in which a preferred embodiment of the invention is illustrated, a portion of a vertical hatchway for an elevator or dumbwaiter is illustrated with one of a plurality of floors **10** to which the car **11** is moved.

The hatchway can be provided at each floor access opening with pairs of hatchway doors of conventional type, and a lower hatchway door **12** is shown in lowered and open position. The details of the upper hatchway door **13** and of the operating mechanism for the doors **12** and **13** are well known and are not necessary for an understanding of the invention.

The dumbwaiter car **11** preferably is provided with a frame **14** to which are secured vertical frame channels **15**. The channels **15** have front flanges **16** and are connected at the top by a horizontal frame member **17**. Horizontal trackways **18** secured to the channels **15** and providing supports for a wheeled vehicle (not shown) to be moved by the car **11** may have upright spaced guide flanges **19** with flared ends **20** for guiding the wheels of the vehicle.

The car **11** is provided with car doors movable therewith, the car doors preferably each comprising an upper panel **25** and a lower panel **26** respectively movable vertically along and retained against displacement by their sliding engagement on the flanges **16** of the frame channels **15**.

The panels **25** and **26** can be of conventional type. As illustrated, the panel **25** preferably has inner and outer flat faces **27** and **28** and upper and lower marginal edges **29** and **30**. The panel **26** preferably has inner and outer flat faces **31** and **32** and upper marginal edges **33**.

The lower door panel **26** preferably has a bridging extension **36** along its upper edge **33** for reducing the clearance between the panel **26** and the hatchway door **12** in open position and a similar bridging extension **37** can be provided on upper door panel **25**.

The panel **25** is preferably movable upwardly and the panel **26** is preferably movable downwardly for access to and from the car **11**, the panels **25** and **26** in closing relation to the car having their edges **30** and **33** in engagement.

The car door panels **25** and **26** are preferably connected in counterbalanced relation and for this purpose chains **40** can be connected to the panel **25** by adjustable length connectors **41** engaged with the extension **37**. The chains **40** extend over pulleys **42** which are rotatably carried on shafts **43** mounted on the horizontal frame member **17**. The chains **40** are preferably connected at their lower ends to opposite ends of the door panel **26**, as hereinafter explained.

A drawbridge **45** is provided having inner and outer floor plates **46** and **47** and side cart wheel guide flanges **48** in outwardly diverging relation beyond the end flares **20**. The drawbridge **45** is pivotally mounted with respect to the frame channels **15**. Bearing holders **49** welded to the channels **15** have bearing sleeves **50** and carry drawbridge pivot pins **51**. The pins **51** are secured, such as by set screws **52** in connector sockets or extension blocks **53** to which drawbridge mounting arms **55** are rigidly connected. The arms **55** can be secured to the drawbridge **45** in any desired manner, such as by welding.

The pins **51** at their outer ends have secured thereto in any desired manner, such as by welding, actuator roller arms **56**. The arms **56** have cam engaging rollers **57** on shafts **58** mounted thereon for engagement with plate cams **60**.

The cams **60** are preferably secured to the inner face **31** of the lower panel **26**, and have the ends of the chains **40** secured thereto by bolts **61**.

The cams **60** each have arcuate cam edges **62** with which the rollers **57** engage, the edges being shaped as shown in FIGS. 1, 3 and 5. The cam edges **62** impel the rollers **57** to positions shown in FIG. 1 in which the drawbridge **45** is held in elevated position and to positions as

shown in FIGS. 3 and 5 permit the drawbridge **45** to be lowered.

The drawbridge mounting arms **55** have roller brackets **64** adjustably mounted by bolts **65** and nuts **66**. The openings **67** in the arms **55** through which the bolts **65** extend have very loose clearances to permit clamping the brackets **64** as desired. The roller brackets **64** are also held by bolts **68** engaging in internally threaded openings **70**.

Shims **71** on the bolts **68** of the desired thickness for a preferred adjustment are inserted between the mounting arms **55** and the roller brackets **64**.

The roller brackets **64** have rollers **72** mounted therein on shafts **73**. The shafts **73** can be held in position in any desired manner such as by external cotter pins **75**. Screws **76** may be employed to retain the cotter pins **75** in place. The rollers **72** are positioned to assist in the elevation of the drawbridge **45** and retention in an elevated position and for this purpose may engage the upper edge **33** of the panel **26** and also may engage the inner face **31** of the panel **26**.

The mode of operation will now be pointed out.

When the hatchway doors **12** and **13** and the upper and lower panels **25** and **26** are in their open positions the drawbridge **45** is in its lowered position (see FIG. 3) for movement of the vehicle wheels (not shown) in either direction across the floor plates **47** and **46** and along the trackways **18**, guided by the guide flanges **19**, to position the vehicle for movement with the car **11** to the desired floor or for removal of the vehicle from the car.

The lower hatchway door **12** and lower panel **26** are effectively bridged by the drawbridge floor plates **46** and **47**.

It will be noted that the rollers **57** are positioned with respect to the cam edges **62** to permit the lowering of the drawbridge **45**.

If now the upper and lower panels **25** and **26** are moved toward each other for closing by conventional panel operating mechanism (not shown), the panel **26** moves upwardly, carrying with it the plate cams **60** on each side.

As the plate cams **60** move upwardly, the rollers **57** in engagement therewith and first with the curved cam edges **62** and then with the cam plates **60** therebeyond through the roller arms **56** and the pivot pins **51** swing the drawbridge **45** upwardly to a substantially vertical position and out of the path of movement of the panel **26** and hatch door **12**. This lifting movement occurs and is completed before the panels **25** and **26** meet in their closed positions.

As the panel **26** moves upwardly also, and if the drawbridge **45** has not been lifted or moved out of the path of the panel **26** by the plate cams **60**, the panel **26** by its engagement with the rollers **72** completes the upward movement of the drawbridge **45**.

Upon the panels **25** and **26** by their respective upward and downward movement, the drawbridge **45** upon sufficient downward movement of the panel **26** is permitted to fall from its upright position to a position for vehicle wheel travel thereover determined by the engagement of the rollers **57** with the plate cams **60**. This is a reverse of the lifting operation of the drawbridge **45**.

It will thus be seen that simple but effective apparatus is provided for attaining the objects of the invention, with the drawbridge **45** raised ahead of the car door panel **26** so that it will not impede the upward motion of the hatchway door **12**, and is lowered in such manner as not to interfere with the motion of the hatchway door **12**.

I claim:

1. In combination:

a movable car having a lower vertically movable door panel with an upper edge,

a drawbridge carried by said car having a hinged mounting with a pivot at a fixed location on said car and movable between a lowered position in bridging relation to said door panel upper edge and an upwardly disposed position, and

members carried by and moved with said car and controlled by the positioning of said door panel controlling the position of said drawbridge free from impedance of movement of said door panel,

said members including a cam member movable with said door panel, and

a cam follower member connected to said door panel in operating relation and engaged with said cam member.

2. A combination as defined in claim **1** in which:

said cam follower member includes a lever connected to said hinged mounting and carried by said pivot.

3. A combination as defined in claim **1** in which:

said car has horizontal trackways thereon, and

said drawbridge is mounted at an end of said trackways and in upwardly disposed position obstructs said end of said trackways, and

said drawbridge is held in said position by engagement of said cam follower member with said cam member.

4. A combination as defined in claim **1** in which:

said cam member is a plate with a curved margin and is secured to said door panel,

said pivot of said hinged mounting includes hinge pins,

said cam follower member includes a lever connected to one of said hinge pins and has a cam follower roller engaged with said cam member,

an upper vertically movable door panel is provided connected in counterbalanced relation to said lower door panel by flexible connectors,

said car has horizontal trackways thereon, and

said drawbridge is mounted at an end of said trackways and in upwardly disposed position obstructs the said end of said trackways, and

said drawbridge is held in said position by engagement of said cam follower member with said cam member.

5. A combination as defined in claim **1** in which:

said cam member is secured to said door panel.

6. A combination as defined in claim **5** in which:

said cam member is a plate with a curved margin.

7. A combination as defined in claim **1** in which:

said drawbridge has rollers carried thereby engaging an inner face of said door panel in raised position of said panel.

8. A combination as defined in claim **1** in which:

said pivot of said hinged mounting includes hinge pins, and

said cam follower member includes a lever connected to one of said hinge pins.

9. A combination as defined in claim **4** in which:

said cam member is at one side of said lower door panel,

a second cam member is provided at the other side of said lower door panel, and

a second cam follower member is provided having a cam follower roller engaged with said second cam member and in operating relation to said drawbridge.

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