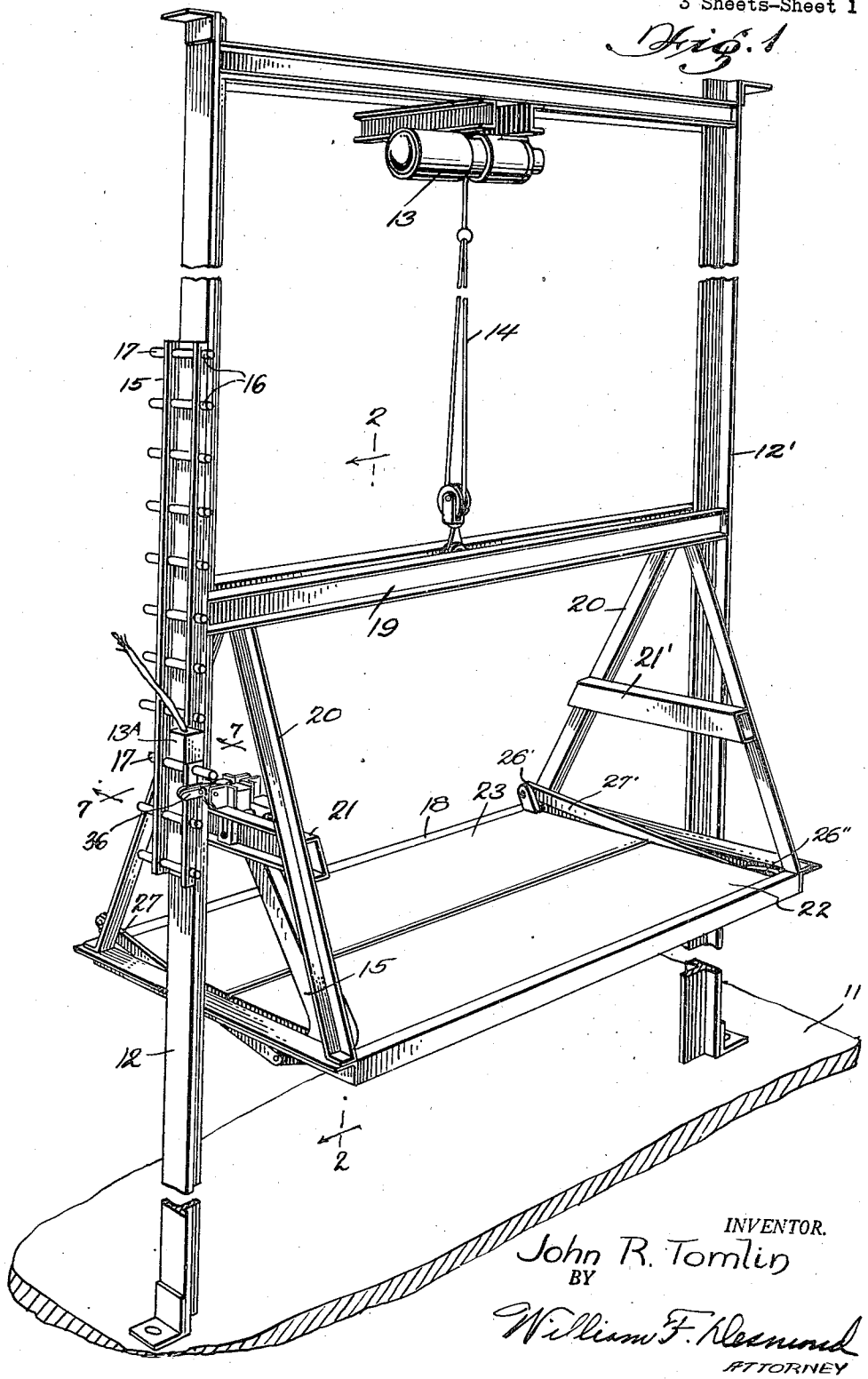
Oct. 26, 1948. J. R. TOMLIN 2,452,084

DROP-TESTING DEVICE

Filed June 1, 1945 3 Sheets-Sheet 1

Fig. 1



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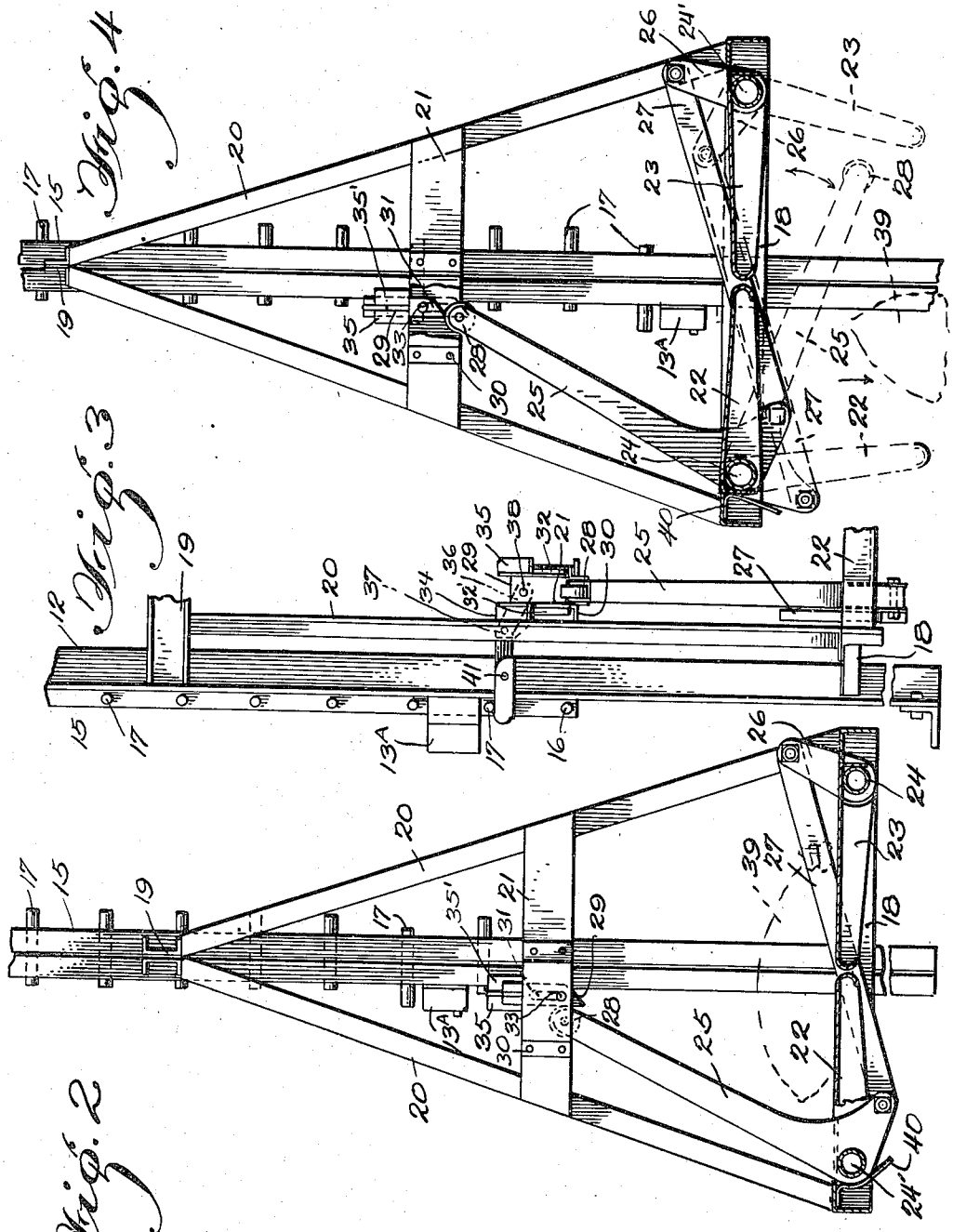


Fig. 4

Fig. 3

Fig. 2

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Fig. 4

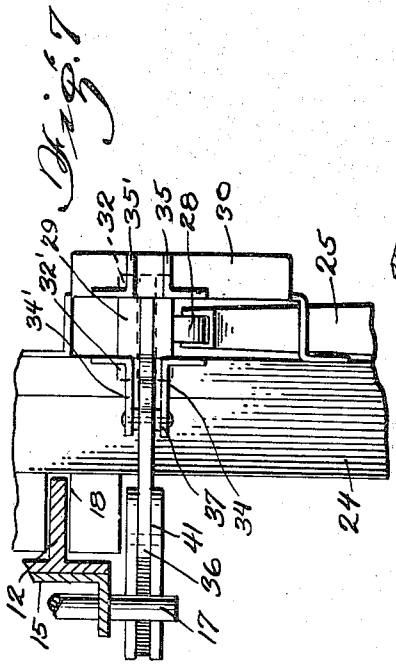


Fig. 5

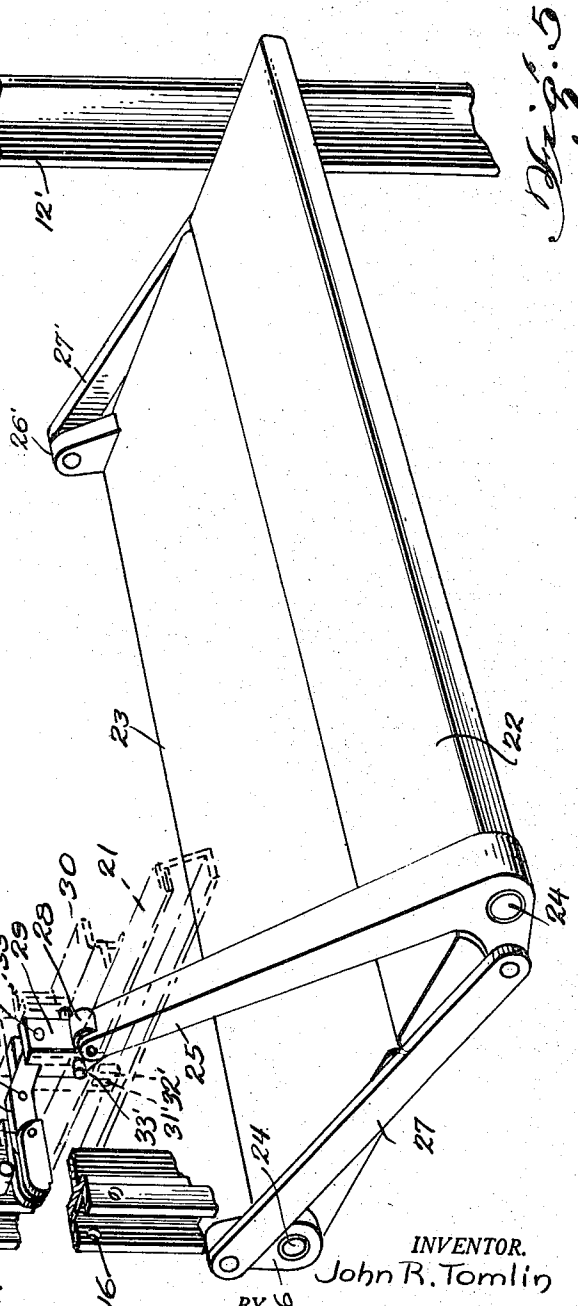
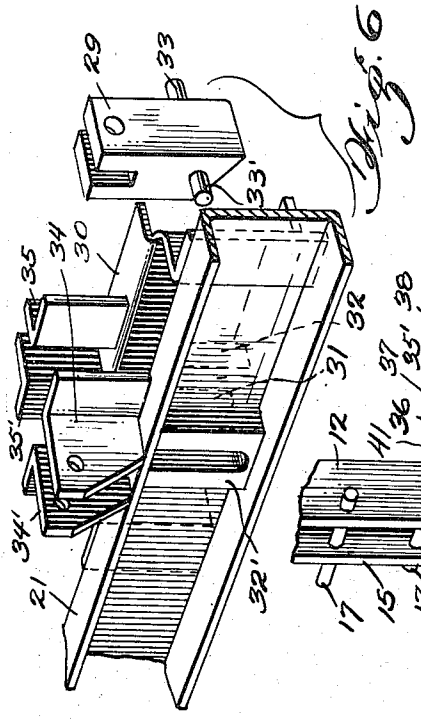


Fig. 6



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Patented Oct. 26, 1948

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UNITED STATES PATENT OFFICE

2,452,084

DROP-TESTING DEVICE

John R. Tomlin, Arlington, Va.; Ralph E. Remington administrator of said John R. Tomlin, deceased

Application June 1, 1945, Serial No. 597,054

14 Claims. (Cl. 73—12)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

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This invention described herein, if patented, may be manufactured and used by or for the Government for governmental purposes, without the payment to me of any royalty thereon.

This invention relates to a machine for testing materials by dropping them from a predetermined height, and more particularly to a device which releases the object automatically after it has been lifted to the desired height, and permits it to drop vertically to the bottom.

Crates, bags, and other containers and objects are customarily tested by dropping them repeatedly from an elevated plane. The quality of the object is then determined by the number and height of drops which it is able to withstand before breaking. Difficulties in this method of testing have been encountered when dropping the object from elevated platform, because of lack of precision of the releasing means which frequently cause the object to deviate from a straight vertical path. In the conventional drop-testing device of the elevator type it is necessary to arrest the platform after it has reached the predetermined height and then by a separate manipulation release the object therefrom; this is time-consuming and a source of inaccuracies.

It is an object of my invention to provide a drop-testing machine which automatically releases the test object when the elevator platform reaches a predetermined height on its upward travel.

Another object of my invention is to provide load-releasing means which cause the test object to drop in an accurate vertical path.

Still another object is to provide a drop-testing machine capable of accomplishing the foregoing objects by simple mechanical means.

A further object is to provide an arrangement causing the platform to revert automatically to load-supporting position after discharge of the load.

A further object of my invention is to provide an elevator platform and automatic releasing means therefor, which can be economically constructed from low-priority materials, and can be easily incorporated in conventional drop-testing machines of the winch-operated elevator type.

It is also an object of this invention to provide a drop-testing device of generally improved construction whereby the device will be simple, durable and inexpensive in construction, as well as convenient, practical, serviceable and efficient in its use.

With the foregoing and other objects in view, which will appear as the description proceeds, the invention resides in the combination and arrangement of parts, and in details of construction hereinafter described and claimed, it being understood that various changes in form, pro-

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portion, and minor details of construction may be made within the scope of the claims without departing from the spirit or sacrificing any advantages of the invention.

For a complete disclosure of the invention, a detailed description of it will now be given in connection with the accompanying drawings forming a part of the specification, wherein:

Figure 1 is a perspective view of a drop-testing machine in accordance with my invention.

Figure 2 is an elevational view of the elevator platform forming part of the machine illustrated in Figure 1, viewed from line 2—2 on Figure 1.

Figure 3 is an edge view corresponding to Figure 2. Figure 4, which corresponds to Figure 2, shows in elevation the elevator platform at the instant of load release (in solid lines) and immediately after load release (in broken lines).

Figure 5 is a detailed perspective view of the movement synchronizing and platform locking and releasing means of the machine illustrated in Figure 1.

Figure 6 shows in perspective view the load locking and releasing latch and the bracket mounting therefor, and Figure 7 is a top view of the assembled load locking and releasing means, as viewed from line 7—7 of Figure 1.

The principle of the load release in accordance with my invention consists of an elevator platform formed by two trap doors opening at the center of the platform, a link connection between the two doors for opening them simultaneously, and a release latch actuated by a trip pin protruding from an elevator upright at a predetermined height.

The preferred embodiment of my invention comprises an elevator base 11, two upright guide members 12, 12', an electric winch hoist 13, controlled by a hand operated limit switch 13A, and a wire cable 14. One guide member 12 is provided with a vertical element 15 having spaced apart holes 16 at intervals of one half foot or other predetermined intervals. In slidable frictional engagement with each hole 16 is an obstruction in the form of a horizontal retractable trip pin 17. When in non-operative retracted position, the trip pins 17 are flush with the front of the element 15 and protrude from the rear of the element. To release the load from the desired height, the pin corresponding to that selected release height is pushed outward by hand or with the aid of a pointer stick (not shown) or other suitable means. A vertically slidable obstruction (not shown) or other equivalent means may be substituted for trip pins 17.

The elevator platform comprises a frame 18 suspended from cross beam 19, which slides in guide members 12, 12', by hangers 20 which are spaced apart by a pair of cross braces 21, 21'. The floor of the platform is formed by load-sup-

porting members or platform decks, 22, 23, hingedly connected to frame 18 by a pair of rods 24, 24', the ends of which are sunk in frame 18. When released, the decks or doors open from the center of the platform, thus forming a double trap door. A bell crank lever 25 has its fulcrum portion rigidly secured to the door 22 or its pivot rod 24. An arm 26 is rigidly secured to the door 23, and it is operably connected with the short arm of bell crank lever 25 by an interposed link 27 for the purpose of synchronizing the movements of doors 22 and 23. A linkage consisting of short arms 26' and 26'' and link 27' braces decks or doors 22, 23 at the side opposite lever 25, arm 26, and link 27. The outer terminal of the long arm of bell crank lever 25 operably supports a roller 28, and extends upwardly to the level of cross brace 21 when decks or doors 22 and 23 are closed. In this position the roller 28 rests against load locking and releasing latch 29. The latch 29 is attached to cross brace 21 by means of bracket 30, and is adapted to slide vertically in slots 31, 31' of said bracket 30. Slots 31, 31', are preferably reinforced by slotted backing plates 32, 32'; and a pair of studs 33, 33' protruding from latch 29 serve as guides in said slots 31, 31' and backing plates 32, 32'. Latch 29 has vertical sliding movement within an open guide housing defined by lugs 34, 34' and 35, 35' mounted on the upper surface of bracket 30 above slots 31, 31'. A lever 36 is suitably located between lugs 34 and 34', and this lever fulcrums around pin 37. The ears of lugs 34, 34' form supports or bearings for pin 37. The short arm of lever 36 is connected with the upper end of latch 29 by a connecting pin 38. The long arm of lever 36 extends substantially horizontally beyond the cross brace 21 and beyond holes 16.

When the elevator platform travels upward, the non-retracted protruding trip pin 17 engages the long arm of lever 36 when the platform reaches the desired height, causing the short arm of lever 36 to lift latch 29, and thereby release the long arm of bell crank lever 25. The weight of the load bearing on decks or doors 22, 23 causes the upper end of bell crank lever 25 to swing downwardly in an arc as shown in Figure 4, and decks 22 and 23 open up to the position illustrated in broken lines of Figure 4, causing the load 39 placed thereon (Figure 2) to drop in a vertical path onto the base 11.

After the load 39 has been released, a spring 40, bent at right angles, and secured to frame 18 bears against the short arm of bell crank lever 25 near its fulcrum, thus forcing decks 22 and 23 back towards their normal horizontal position. A helical spring or counterweights (not shown) may be substituted for flat spring 40. The complete closing of decks 22 and 23 takes place when they come in contact with base 11. Simultaneously the long arm of lever 25 swings upwardly, the roller 28 traveling past the bevel-shaped lower portion of latch 29, and returns towards the locked position.

The long arm of lever 36 consists of two parts joined by an elbow or rule joint 41, which permits the outer end to tilt upwardly when encountering an obstacle, thus enabling lever 36 to travel past trip pin 17 during the downward travel of the elevator platform.

The base 11 is provided with a cut-out or recess (not shown) for the reception of the portion of the link structure 25, 27 which extends below the lower level of decks 22 and 23.

It will be understood from the foregoing description that a drop testing machine equipped with automatic platform locking and releasing means in accordance with my invention is capable of modifications in addition to those illustrated, all within the spirit of my invention. The scope of my invention is therefore deemed to be limited by the appended claims only.

I claim:

1. In a drop testing machine of the type comprising an elevator platform, uprights, and means for raising and lowering said platform between said uprights: two platform decks pivoted at opposite sides of said platform, movement synchronizing means between said platform decks, and platform locking and load releasing means comprising an arm rigidly secured to one platform deck, a latch engaging said arm, and latch releasing means comprising selectively retractable trip pins spaced apart on one of said uprights and a pivoted latch arm to be actuated by a retractable but non-retracted trip pin.

2. In a drop testing machine of the type comprising an elevator platform, uprights, and means for raising and lowering said platform between said uprights: a plurality of vertically spaced, selectively retractable obstructions horizontally supported parallel to one of said uprights, a pair of pivoted decks forming the floor of said platform, synchronizing means permitting said decks to swing downwardly at the center of said platform, means for locking said platform decks in load supporting position, and release means for said platform decks actuated by a retractable but non-retracted obstruction placed in the path of said last-named means at a predetermined height.

3. In a drop testing machine of the type comprising an elevator platform, uprights, and means for raising and lowering said platform between said uprights: a plurality of vertically spaced, selectively retractable obstructions horizontally supported parallel to one of said uprights, a pair of pivoted decks forming the floor of said platform, synchronizing means permitting said decks to swing downwardly at the center of said platform, means for locking said platform decks in a horizontal position, release means for said platform decks actuated by a retractable but non-retracted obstruction, and means urging said decks towards the horizontal position when said decks are swung downwardly.

4. In a drop testing machine of the type comprising an elevator platform, uprights, and means for raising and lowering said platform between said uprights: a pair of pivoted decks forming the floor of said platform, means for synchronizing a central downward swinging movement of said decks, said synchronizing means comprising two arms, each arm being rigidly secured to one of said decks, and a link connecting said arms, and means for locking and releasing said decks, said means comprising a latch releasably engaging one of said arms, and a plurality of vertically spaced members selectively positionable in the path of said latch at predetermined heights relative to the vertical path of said elevator platform and adapted to engage and actuate said latch for releasing said decks.

5. In a drop testing machine of the type comprising an elevator platform, uprights, and means for raising and lowering said platform between said uprights: a plurality of vertically spaced, selectively retractable obstructions horizontally supported parallel to one of said uprights, a pair of swinging decks forming the floor of said platform, an arm rigidly secured to and extending

upwardly from one of said decks, a latch releasably engaging said arm, and latch releasing means to be actuated by a retractable but non-retracted obstruction placed in the path of said last-named means at a predetermined height.

6. In a drop testing machine of the type comprising an elevator platform, uprights, and means for raising and lowering said platform between said uprights: a retractable obstruction associated with one of said uprights, a pair of swinging decks forming the floor of said platform, an arm rigidly secured to and extending upwardly from one of said decks, a vertically slidable latch engaging said arm, and a pivoted lever engaging said latch and extending outwardly to a point permitting contact with said obstruction.

7. A device according to claim 6, wherein said lever comprises an outer and an inner section and a connecting elbow joint permitting upward tilt of said outer section.

8. In a drop testing machine of the type comprising an elevator platform, uprights, and means for raising and lowering said platform between said uprights: spaced parallel retractable obstructions associated with one of said uprights, a pair of swinging decks forming the floor of said platform, a bell crank lever rigidly secured at its fulcrum to one of said decks, a latch releasably engaging one end of said bell crank lever, latch releasing means to be actuated by a protruding one of said obstructions, an arm rigidly secured to the other deck, and a link connnecting said arm and the other end of said bell crank lever.

9. In a drop testing machine of the type comprising an elevator platform, uprights, and means for raising and lowering said platform between said uprights: a plurality of vertically spaced, selectively retractable obstructions horizontally supported parallel to one of said uprights, a platform frame, a pair of downward swinging decks forming the floor of said platform, linkage means between said decks, a bell crank lever rigidly secured at its fulcrum to one of said decks, a latch releasably engaging one end of said bell crank lever, latch releasing means to be actuated by a retractable but non-retracted obstruction, and spring means secured to said frame urging said bell crank lever towards its latch-engaged position when said decks are swung downwardly.

10. In a drop testing machine of the type comprising an elevator platform, uprights, and means for raising and lowering said platform between said uprights: a pair of pivoted decks forming the floor of said platform, synchronizing means permitting said decks to swing downwardly at the center of said platform, means for locking said platform decks in load supporting position, a plurality of vertically spaced, retractable obstructions selectively positionable at predetermined heights relative to the vertical path of said elevator platform, said obstructions being horizontally supported by one of said uprights and release means for said platform decks actuated by a retractable but non-retracted obstruction placed in the path of said release means at a predetermined height.

11. In a drop testing machine of the type comprising an elevator platform, uprights, and means for raising and lowering said platform between said uprights: two platform decks pivoted at opposite sides of said platform, movement synchronizing means between said platform decks, and platform locking and load releasing means comprising an arm rigidly secured to one platform deck, a latch for engaging said arm, and latch releasing means comprising a trip member associated with one of said uprights and a pivoted latch arm to be actuated by said trip member.

12. In a drop testing machine of the type comprising an elevator platform, uprights, and means for raising and lowering said platform between said uprights: a plurality of vertically spaced retractable obstructions selectively positionable at predetermined heights relative to the vertical path of said elevator platform, said obstructions being horizontally supported by one of said uprights, a pair of pivoted decks forming the floor of said platform, synchronizing means permitting said decks to swing downwardly at the center of said platform, means for locking said platform decks in a horizontal position, releasing means for said platform decks actuated by a retractable but non-retracted obstruction placed in the path of said releasing means at a predetermined height, and means urging said decks towards the horizontal position when said decks are swung downwardly.

13. A drop testing machine including a vertically movable elevator, separate load-supporting members pivotally supported on the elevator and movable about their pivots from load-supporting position to load-releasing position, means for synchronizing the movement of the load-supporting members, means for locking the said supporting members in load-supporting position, means for releasing the said locking means, and a plurality of vertically spaced members selectively positionable in the path of said releasing means at predetermined heights relative to the vertical movement of the elevator and adapted to engage the said releasing means, whereby the load-supporting members are released to drop the load at a selected height.

14. In a drop testing machine of the type comprising an elevator platform, uprights, and means for raising and lowering said platform between said uprights: a retractable obstruction associated with one of said uprights, a pair of swinging decks forming the floor of said platform, an arm rigidly secured to and extending upwardly from one of said decks, a vertically slidable latch releasably engaging said arm, said latch being beveled opposite its arm-engaging face to permit the return of said arm from a released position to an arm-engaged position, and a pivoted lever engaging said latch and extending outwardly to a point permitting contact with said obstruction.

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