Feb. 16, 1960 L. D. SANDERS 2,925,150

PARKING APPARATUS

Filed Aug. 6, 1958 3 Sheets-Sheet 1

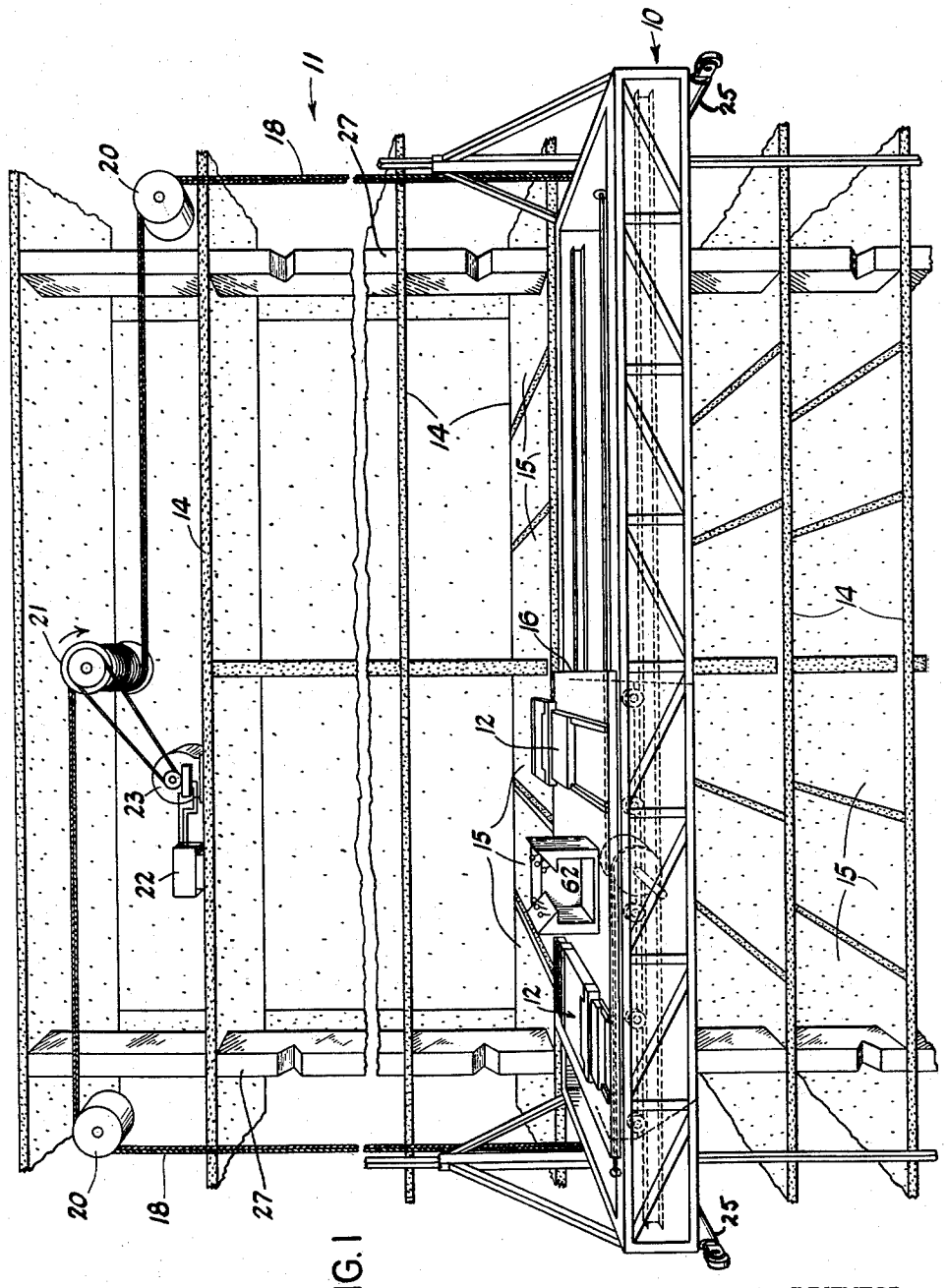


FIG. 1

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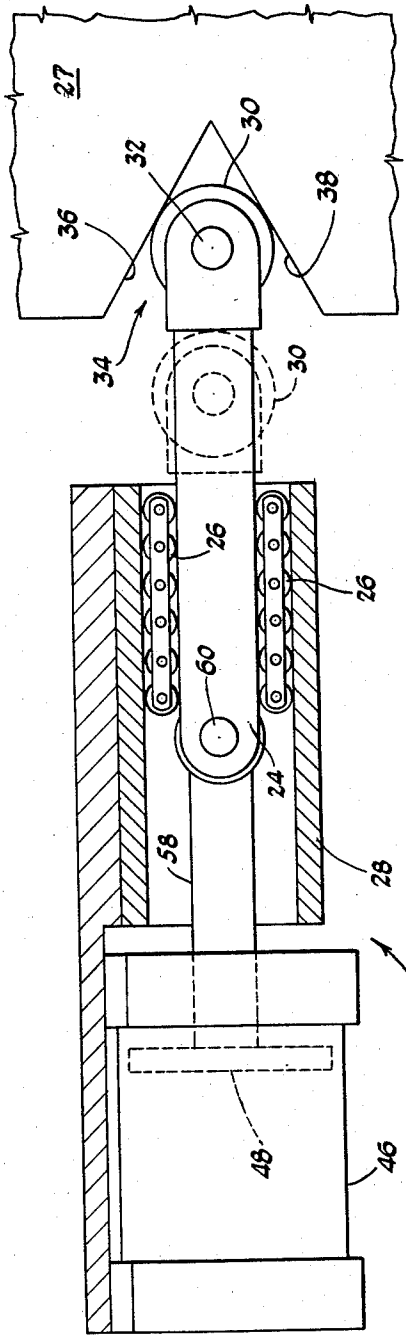


FIG. 4

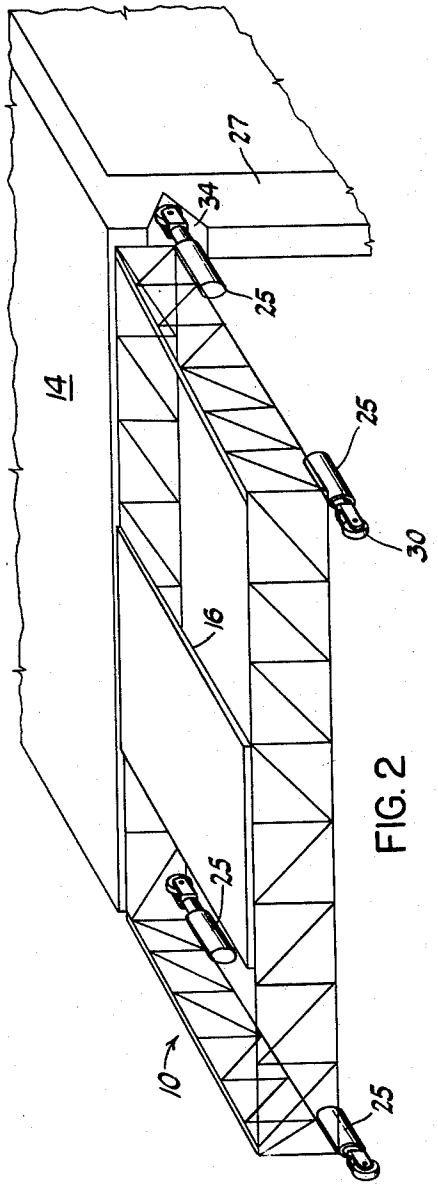


FIG. 2

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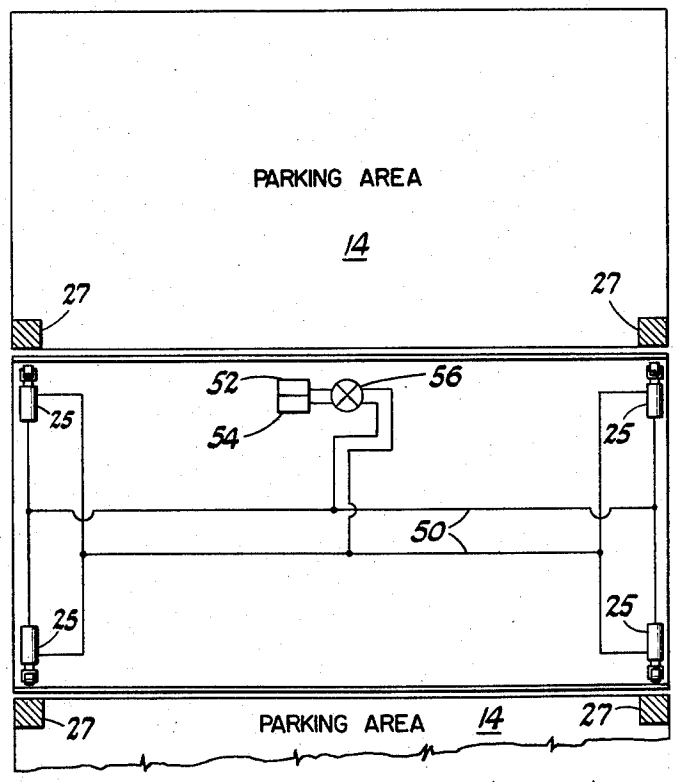


FIG. 3

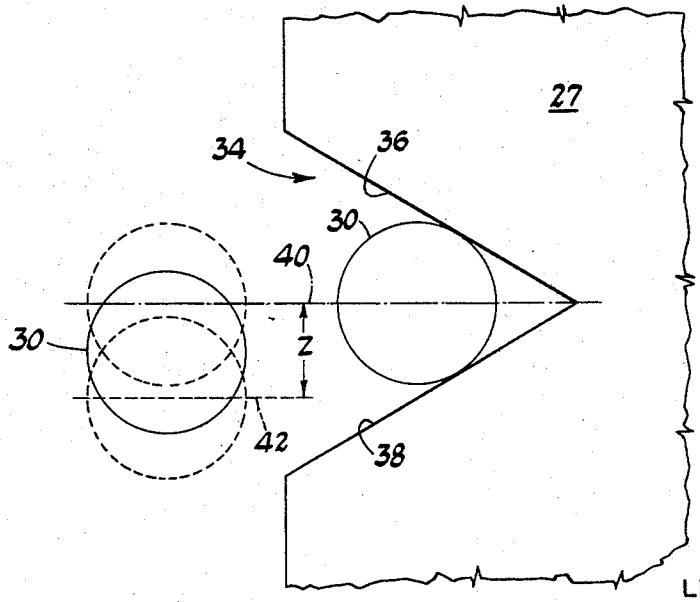


FIG. 5

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2,925,150

PARKING APPARATUS

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Application August 6, 1958, Serial No. 753,494

1 Claim. (Cl. 187—76)

This invention relates generally to material storage facilities such as those employed in parking automobiles and has a particular relation to such a facility employing an elevator for transporting the material or vehicles to and from the vertically spaced floors of a multistory storage building.

Objects and advantages of the invention will be obvious herefrom, or may be learned by practice with the invention, the same being realized and attained by means of the instrumentalities and combinations pointed out in the appended claims.

The present invention has for an object the provision of an improved material storage or parking facility, utilizing an elevator to transport the material or vehicles to and from the various floors of a storage building. A further object is to provide in such a facility an elevator supported by cables and having a mechanical material transfer device that necessitates that the elevator be level with the various floors to or from which material is transferred with there being provided means to insure that the elevator is level with the floor and remains level therewith during the transfer operation. Another object is to provide with such an elevator means for automatically leveling the elevator to within a predetermined zone adjacent any particular floor and additional mechanical means operative within this zone to precisely level the elevator with the floor and releasably lock it in place. Still another object is to provide such an elevator wherein the precise leveling of the elevator is accomplished through a camming action by motor operated laterally movable members attached to the elevator and receivable in recesses provided in the shaftway to cam the elevator to its level position and support and lock it in this position. Another object is to provide an elevator organization wherein assurance is had that the elevator will be stopped at and remain at a level position with the floor of the building as required during loading and unloading of heavy material such as automobiles notwithstanding that the elevator is suspended from stretchable cables, yet with this organization being relatively simple in operation and construction.

In accordance with the present invention there is provided a multistory storage building having an elevator for transporting the vehicles or material to and from the vertically spaced floors of the building. The elevator is conventionally supported by wire ropes or cables that are connected to or associated with a suitable drive whereby the elevator is moved vertically to and from the various floors of the building. Mounted on and forming part of the elevator is suitable transfer mechanism for transferring the vehicles or material from the elevator onto the floors of the building and from the floors onto the elevator. This mechanism includes a motor operated dolly that rolls to and from the elevator onto and from the floors of the building. It is necessary that the elevator be precisely leveled with the particular floor of the building to and from which

material is being transferred in order for this transfer device to be operated since if this level condition does not prevail operation of the transfer device will be greatly hampered or prevented. Accordingly, there is provided mechanism for positively insuring that the elevator is precisely level with the particular floor of the building and is effectively locked in this level position during the transfer operation.

As embodied, the drive for the elevator which acts through the cable supports, includes a zone leveling feature or device which is automatically operative to level the elevator to within a certain zone that extends a predetermined distance immediately below each of the floors. However, this in itself is insufficient for the reason that it does not precisely level the elevator with the floor and since the cables are stretchable their length will vary as a heavy load such as an automobile is loaded onto or removed from the elevator. Accordingly, in addition to this zone leveling feature there is provided mechanical apparatus for positively leveling the elevator in a precise manner with each of the floors of the building and for releasably connecting the elevator with the shaftway in the building so as to effectively lock it in this level position. This mechanical apparatus includes motor operated members mounted on the elevator and which are laterally extendable to and from an extended and a retracted position. The building is provided with means forming part of the elevator shaftway to receive these members when in the extended position and these laterally extendable members and these means coact to provide a camming action when the members are moved from and retracted to their extended position to vertically cam the elevator throughout the extent of the zone within which the zone leveler positions the elevator. When in the extended position these members are received in the means of the shaftway so as to lock the elevator in its level position.

There are sufficient laterally extendable members on the elevator to provide a stable support for the elevator and these members are simultaneously actuated through a suitable motor operating system. With the elevator locked in its level position by means of this mechanism free and unhampered manipulation of the transfer dolly is permitted and safe operation of the storage facility is assured.

The invention consists in the novel parts, constructions, arrangements, combinations and improvements herein shown and described.

The accompanying drawings, referred to herein and constituting a part hereof, illustrate one embodiment of the invention and together with the description, serve to explain the principles of the invention.

In the drawings:

Figure 1 is a fragmentary vertical sectional view showing the elevator that embodies the present invention mounted in a shaftway in a multistory storage building;

Figure 2 is a diagrammatic perspective view, fragmentary with regard to the elevator platform and the building, illustrating more clearly the mounting of the leveling devices at the four corners of the elevator;

Figure 3 is a somewhat diagrammatic view in the nature of a plan view and showing the fluid pressure supply and exhaust conduits as connected to the fluid pressure motors for operating the leveling devices;

Figure 4 is a sectional view of one of the leveling or camming devices associated with the V-block or recesses formed in the wall of the shaftway, and;

Figure 5 is a diagrammatic representation showing the extent of the leveling zone immediately below each floor of the building and the relative position of the leveling device and the V-block or recess with this zone.

Referring now to the drawings, wherein like reference

characters are used throughout to designate like elements, the illustrative and preferred embodiment of the invention depicted therein comprises an elevator **10** that is mounted within a suitable shaftway in multistory storage building **11** and is adapted to move vertically in this shaftway in order to take material to and remove material from the various floors of the building. While the storage facility of this invention and particularly elevator **10** is adapted to and may be employed for the handling of any desired material it is particularly well suited for the parking of automobiles with elevator **10** having a pair of motor operated transfer devices **12** that form part of the elevator and that are effective to transfer the vehicles to and from the elevator and the various floors **14** of the building. These vertically spaced floors **14** extend from both sides of the elevator, as shown in Figure 3, and each of the transfer devices includes a dolly that rolls from the carriage **16** of the elevator onto these floors to and from oposite sides of the elevator to transfer the vehicles. This dolly is motor operated and is constructed as shown and described in detail in my copending application, Serial No. 727,938, filed April 11, 1958. The various floors of the building are divided into parking stalls **15** and carriage **16** is movable longitudinally of the elevator in order that the two transfer devices **12** may be positioned opposite and accordingly serve the several stalls on each floor.

Vertical movement of elevator **10** is provided through the support cables **18** which are connected with each end of the elevator as shown and are trained over pulleys **20** with these cables being connected to a suitable motor drive device such as the motor driven drum **21** driven from motor **23**. The cables **18**, which, as is conventional, may be of the twisted wire type, are stretchable so that under varying load conditions the length of the cables will vary. Thus when automobiles or similar heavy objects or materials are loaded onto the elevator the cables will lengthen somewhat and when they are removed from the elevator the cables will slacken. However, in order for the dolly to be moved from the floor of the carriage **16** onto the floor of the building from which the automobile is to be removed or on which it is to deposit the automobile it is essential that the floor of the carriage be precisely level with the floor of the building. If this is not so, the dolly which rolls from the carriage onto the floor of the building cannot be actuated. It is therefore necessary that the elevator be precisely leveled with the various floors of the building and that it be maintained in this level position while vehicles or whatever material is being handled are removed from or disposed on the elevator.

The elevator is provided with a conventional leveling mechanism that is operative to level the elevator with relation to each of the floors within a particular zone extends from the floor a predetermined distance below the floor, as for example one inch. This mechanism which forms a part of the elevator drive is diagrammatically illustrated as **22**.

In addition to this conventional leveling organization there is provided, in accordance with the present invention, additional mechanism that is operative when the elevator is within this predetermined zone to precisely level the elevator with the particular floor and to releasably lock it in its level position. This additional mechanism comprises a number of motor actuated mechanical devices that are carried by the elevator and are effective to releasably interconnect the elevator with the shaftway and to raise the elevator within the limit of said zone to the position where it is level with the floor and the transfer dolly may freely roll to and from the carriage **16** and the floor **14**. These devices, which are identified generally as **25**, and are preferably mounted at the four corners of the elevator, comprise an elongated member **24** that is mounted between vertical thrust bearings **26** that are disposed within the housing **28** with member **24** being horizontally or laterally movable between a retracted position indicated in dotted lines in Figure 4 and an extended position indicated in solid lines in this figure and also indicated in Figure 2. Member **24** is received between bearings **26** in a manner that prevents axial rotation of this member and for this purpose member **24** may be rectangular in transverse section and the interior of housing **28** may likewise have a rectangular transverse configuration. At the outer end of member **24** is mounted the horizontally disposed roller **30** which is received within the arms of the bifurcate provided at the end of member **24**, tihs roller having its mounting shaft **32** rotatably journaled in these arms. In the retracted position member **24** is free of the columns **27** that define the elevator shaftway while in the extended position the outer end of this member is received within the V-block or recess in the elevator shaftway with this recess being identified as **34** and being formed with outwardly diverging upper wall **36** and lower wall **38**.

Figure 5 indicates the relation of the leveling device **25** (only roller **30** of this device being shown), with the leveling zone and the V-blocks or recesses. The leveling zone, indicated as Z and which may have a heighth as for example of one inch, extends downward from the level position of the elevator where the top of the platform is level with the floor of the building. The level position is indicated by the dot dash line **40** with this line being the horizontal center line of V-block or recess **34** so that when member **24** is in its extended position with roller **30** engaging the upper and lower walls of the recesses the elevator is precisely level with the floor and the center of the roller is on line **40**. The device **25** is effective to raise the elevator by a camming action throughout the heighth of zone Z with the dotted line **42** of Figure 5 representing the center line position of the roller when the elevator is at the lower extremity of this zone and the dot dash line **40** showing the position of roller **30** when the elevator is in its level position. When member **24** is moved laterally outward and the elevator is at the lower extremity of a particular floor the roller **30** will engage the lower inclined wall **38** of recess **34** and will roll up this recess carrying the elevator with it and raise the elevator to its level position with the floor.

Operation of the several devices **25** is had by a suitable motor operator which may be of any suitable construction with a fluid pressure motor being here shown. As embodied this motor comprises a cylindrical housing **46** within which is disposed piston **48** with fluid pressure being supplied to and exhausted from each side of this piston by means of the supply and exhaust lines **50** which are connected with a source of fluid pressure **52** and an exhaust chamber **54** through a suitable control **56**. Piston **48** is connected with elongated member **24** by piston rod **58** through pin **60** with movement of piston **48** thereby affecting movement of elongated member **24** and accordingly movement of the roller **30** into and out of the recesses **34**.

The control **56**, which is one of several controls that is mounted on the control booth or housing **62** on carriage **16**, is effective to simultaneously move the several devices **25** to and from their extended and their retracted positions. It will be understood that there is a V-block or recess **34** in the elevator shaftway at each of the floors for each of the four devices **25** and the simultaneous actuation of these devices causes the elevator to be evenly cammed or raised through the leveling zone Z into its level position and when the mechanisms are in their extended position with rollers **30** engaging the upper and lower surfaces of the recesses the elevator is locked in its level position so that the transfer dolly may be freely moved to and from the elevator and the adjacent floor. The devices **25** effectively support the elevator

when they are in their extended position and they are positioned about the elevator to provide a stable support therefor.

In operation, the elevation is manipulated by the operator in the booth **62** so that it is leveled by the automatic leveling apparatus to within the zone Z of the floor. The carriage is moved laterally along the elevator **10** to its desired position and through control **56** the several devices **25** are simultaneously actuated by their motor drives so they are moved to the extended position with rollers **30** engaging the surface of lower wall of the V-block or recess and camming the elevator up within the zone Z to its level position, within which position it is locked as long as these members remain extended. The operator now actuates the motor driven transfer dollies to transfer vehicles or material to and from the elevator and the floor with the elevator remaining level with the floor during the transfer operation and accordingly with the dollies being freely movable. If a vehicle or other load is deposited on the elevator after it is leveled, then when control **56** is operated to retract the devices **25** the elevator will be lowered to the location in zone area where it originally stopped plus the downward movement of the cable stretch under this additional load; while if an automobile or other material was removed from the elevator after it was leveled by the devices **25** the elevator support cables would no longer be under the tension induced by this load thus upon retracting the devices **25** the elevator would rise a distance equal to the cable stretch or elongation originally resulting from this load less the distance that the cables were slackened by the lifting rolls. Thus, notwithstanding that the cables are stretched and slackened by adding and removing loads from the elevator the levelling organization of the present invention maintains the elevator level during the loading and unloading operations permitting the transfer apparatus to satisfactorily perform its functions.

The invention in its broader aspects is not limited to the specific mechanism shown and described but departures may be made therefrom, within the scope of the accompanying claim, without departing from the principles of the invention and without sacrificing its chief advantages.

What is claimed is:

In an organization of the type described an elevator shaftway having a plurality of vertically spaced laterally extending loading and unloading stations, an elevator generally rectangular in plan, mounted in said shaftway, cable drive means supporting said elevator in the shaftway and operative to move it vertically therein to and from said stations, said drive means including an automatic leveling device effective to approximately level the elevator at each station to within a predetermining zone extending immediately below each station, and additional means operative within said zones to precisely level the elevator with the respective floor of each station and releasably lock the elevator in this position, this additional means comprising mechanism disposed generally at each corner of the elevator, said mechanism including a housing secured to and carried by the elevator, a member horizontally reciprocably received in said housing for movement laterally of the elevator to and from engagement with the shaftway, said housing having a passage therein within which is received the elongated member with the transverse section of the passage and member being rectangular, rollable thrust bearings disposed above and below the elongated member between said member and the walls of said passage operative to prevent rotation between the two, the forward end of said member having an axially horizontal roller mounted thereon, said shaftway having a V-recess at each of said zones and opening toward said member, said recess firmly receiving the roller between its sloping surfaces when the member is in its extended position, and being disposed so the elevator is level with the particular floor when the roller is bound between the upper and lower surfaces of the recess with the lower surface extending vertically downward a sufficient distance so that the roller will engage this surface when the elevator is at the lower extremity of its zone in order to cam the elevator upward into its level position as the member is moved from its retracted into its extended position, said mechanism including a fluid pressure operated piston motor mounted on the elevator, the piston rod of said motor being pivotally connected to the rearward end of the horizontally reciprocable elongated member, and common control means mounted on and actuated from the elevator operative to effect simultaneous actuation of the mechanisms.

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