

1,081,040.

3 SHEETS—SHEET 1.



WITNESSES
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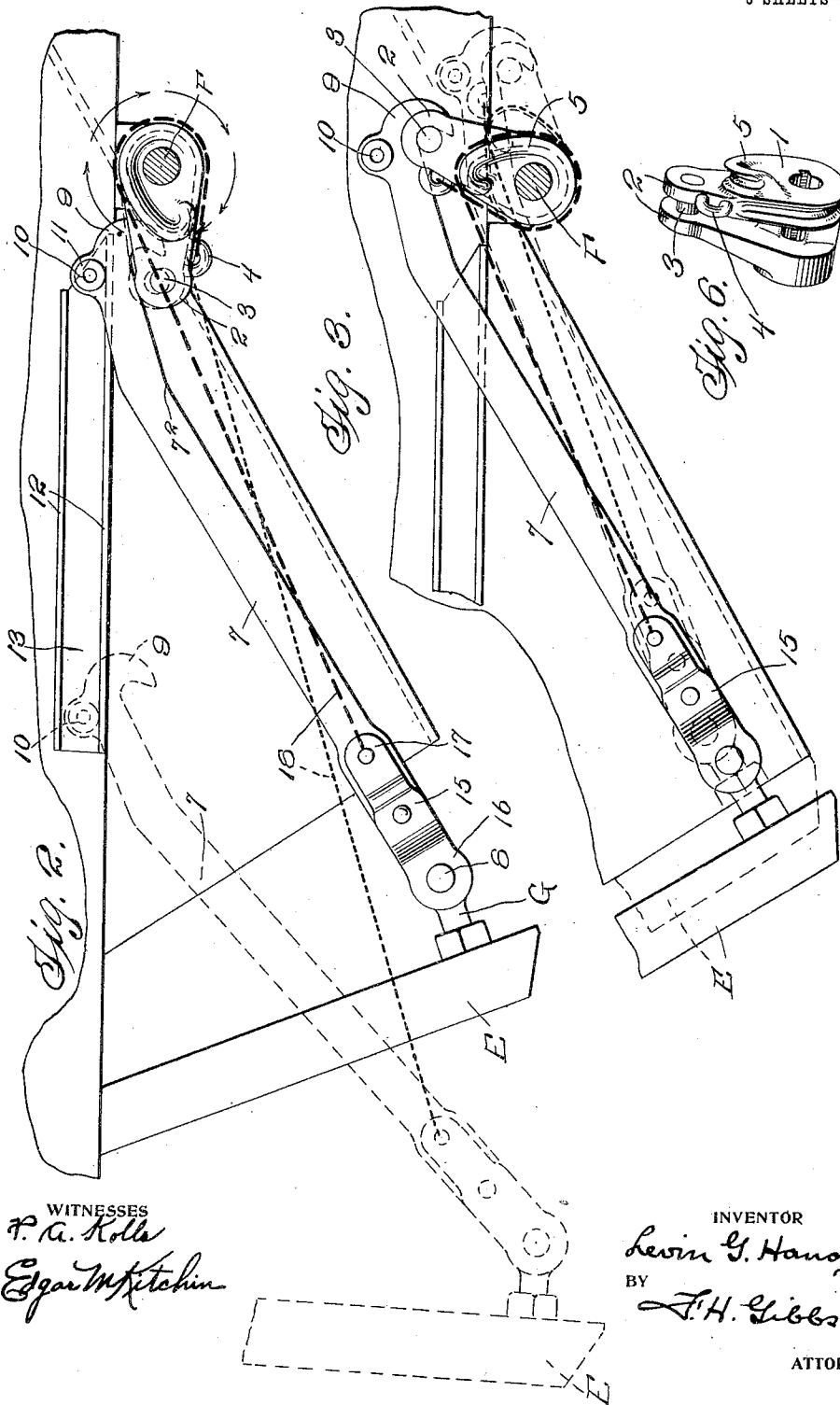
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L. G. HANDY.
HOPPER DOOR OPERATING DEVICE.
APPLICATION FILED JULY 11, 1910.

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Patented Dec. 9, 1913.

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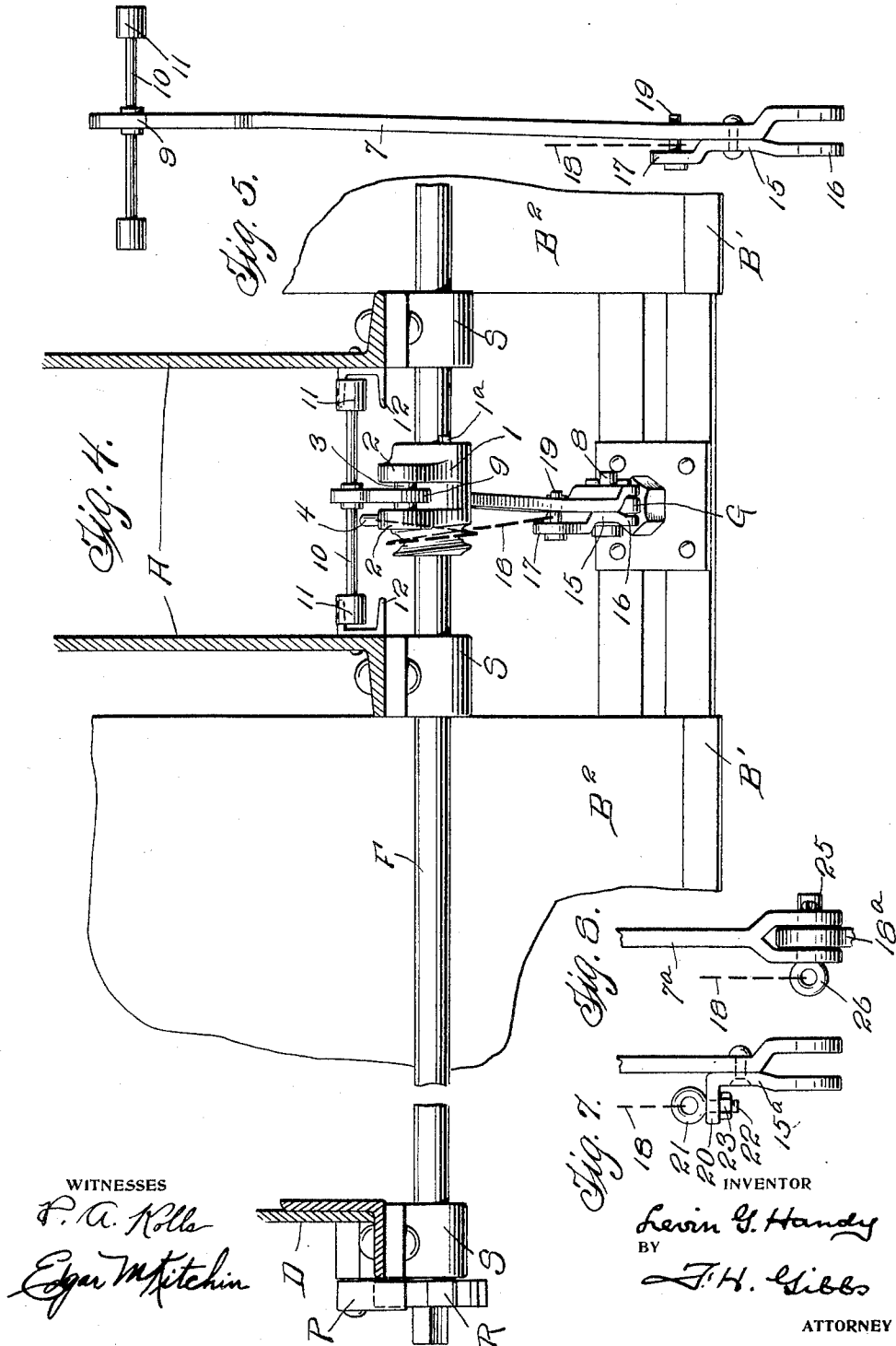


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3 SHEETS—SHEET 3.



UNITED STATES PATENT OFFICE.

LEVIN GOOSFORD HANDY, OF RUTHERFORD, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO WILLIAM H. WOODIN, OF NEW YORK, N. Y.

HOPPER-DOOR-OPERATING DEVICE.

1,081,040.

Specification of Letters Patent.

Patented Dec. 9, 1913.

Application filed July 11, 1910. Serial No. 571,429.

To all whom it may concern:

Be it known that I, LEVIN G. HANDY, residing at Rutherford, New Jersey, and being a citizen of the United States, have invented certain new and useful Improvements in Hopper-Door-Operating Devices, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which illustrate the preferred form of the invention, though it is to be understood that the invention is not limited to the exact details of construction shown and described, as it is obvious that various modifications thereof will occur to persons skilled in the art.

In said drawings: Figure 1 is a side elevational view of the device applied to a hopper bottom car, showing the door in closed position. Fig. 2 illustrates in dotted lines the device with the door in its fullest open position and in full lines illustrates the device in position during the closing movement of the door, with the rigid parts about to be inter-locked to carry the door to its closed position. Fig. 3 shows in full lines the rigid parts in a more nearly closed position than the full lines of Fig. 2 and in dotted lines shows the parts in position when the door is in its closed position. Fig. 4 is a transverse sectional view taken approximately on the line 4—4 of Fig. 1 looking in the direction indicated by the arrow. Fig. 5 is a plan view of the locking bar and its associated guiding rollers. Fig. 6 is an isometric perspective view of the combined crank arm extension and chain winding drum. Figs. 7—8 illustrate fragmental modifications of the device shown in Fig. 5.

The object of the invention is to provide simple and economical closing and locking means for the doors of hopper bottom cars, comprising a minimum number of parts so arranged and combined as to permit the application of maximum power to the closing of the door without undue strain of the parts, thereby avoiding the long levers, or crank arms, heretofore used in door operating devices for this purpose.

The invention comprises flexible and rigid closing means so combined that during the initial closing of the door, when but little power is required, the door is actuated by a

chain, or chains, while in its final closing and locking movement the door is positively actuated by a rigid engaging means so proportioned that maximum power may be applied to the closing of said door and lock the door in closed position without the intervention of supplemental locking devices. The device permits opening of the door under the influence of the rigid controlling means and of relieving the chain of tension until after the door has assumed such relatively open position that the maximum stress incidental to the load is relieved, owing to the engagement of the hook 9 with the pin 3 during initial opening movement of the door, thus forming a greater or less discharge of said load through the hopper during the engagement of the rigid controlling means at the time of the initial movement incident to opening of the door.

As the device is intended to be applied to hopper bottom cars built of metal and of well known construction only such parts of the car are shown as are necessary to understand the position and operation of the device forming the subject matter of this invention.

Referring to the parts:—A indicates one center sill, it being understood that said sill is duplicated; B and C represent parts of the hopper crown; D side sheets of a car; E a hopper door; F a winding shaft; G an adjusting screw; H—H lock nuts and I the screw socket. B' is the usual stiffening angle at the bottom of the inclined hopper plate B², and S—S are the hangers for the winding shaft F, all of which are of well known construction.

Fixed on the shaft F is the combined winding drum and crank extension 1 which is provided with offset arms 2 carrying the engaging pin 3, the eye 4 and the chain winding drum 5, which latter is preferably partly eccentric to the shaft F for purposes hereinafter explained.

Connected with the door E through the usual swivel connection comprising the parts G and H, is the pivoted locking arm 7 connected by the pin 8 thereto at one end and provided at its opposite end with a hooked extension 9, adapted to be engaged by the pin 3 before referred to. The member 7 shown in detached view in Fig. 5 also carries the transversely extending shaft 10 provided with rollers 11 on its opposite ends

which rollers are guided between inwardly projecting flanges 12 of a channel shaped member 13, which is secured by rivets to the inner faces of the center sills A, during a part of its movement.

The locking arm 7 is capable of various modifications and for convenience, some of these modifications are illustrated.

In Fig. 5, the arm 7 has secured to it a side piece 15 provided with offset portions 16—17, the offset portion 16 being provided to receive the eye 18^a extending from the adjusting screw G and the offset portion 17 being provided so that the operating chain 15 may be connected with the pin 19, which extends through said portion 17 and the coöperates to take up the slack in the chain, is connected with the chain loop 4 before referred to.

In the modification shown in Fig. 7 there is provided side piece 15^a, which is given a right angular bend 20, carrying the eye bolt 21 which is provided with an adjusting screw threaded portion 22, with which the nut 23 coöperates to take up the slack in the chain, when desired.

A more simple construction is also illustrated in Fig. 8, wherein the arm 7^a is bifurcated at its lower end and the pin 25, which engages the eye 18^a is provided at one end with an eye bolt 26 with which the chain 18 may be connected.

It is evident that the necessary adjustment of the parts shown in Figs. 5 and 8 must be secured through the adjusting screw G shown in Fig. 1, while the chain is independently adjustable with the device shown in Fig. 7.

It will be noted that the locking arm 7 is secured at one end only, the lower end, while its upper end swings freely with the movement of the door until it engages the pin 3, carried by the crank arms 2. The combined crank arms and winding drum are secured to the winding shaft F by a suitable key 1^a.

The operation of the device will be apparent from the accompanying drawings and commencing with the dotted lines of Fig. 2, it is evident that rotation of the shaft F in the direction indicated by the arrows for nearly a complete rotation of said shaft F will wind the chain 18 on the chain drum 5 and at the same time carry the locking arm 7 from the position shown in dotted lines in Fig. 2 to the position shown in full lines in said figure, where hooked end 9 of the locking arms 7 will be in position to be engaged by the pin 3 carried by the arms 2. Continuing the rotation of shaft F the parts will engage positively and be carried to the position shown in full lines of Fig. 3, in which position the eccentricity of the winding drum becomes effective to take up the slack of chain 18 which would occur if it

were not for this eccentric disposition of the chain way of said winding drum 5. Continuing the rotation of shaft F, the parts will be carried to the position shown in dotted lines in Fig. 3, wherein the crank arms 2 and pin 3 occupy a position relatively below the alinement of the pin 8 and the winding shaft F, this being accommodated by the bend 7² of the locking arm 7, thereby bringing the parts into positively locked position wherein the weight of the load may be supported without danger of rotation of the winding shaft F and incidental opening of the door, in which position the parts will be finally locked until the shaft F is rotated in the opposite, or contra-clockwise, direction. During the initial movement of the locking arms 7, the rollers 11 will travel between the flanges 12 of the channel 13 but after the parts have progressed in closing beyond the position shown in full lines in Fig. 2, it will be observed that the inner end of the locking arm is carried upwardly, as shown in full lines of Fig. 3, and for this reason the top flange 12 at least, of channel 13 should be cut away as indicated in Figs. 1, 2, and 3 of the drawings, thereby providing clearance for the rollers 11 in their upward movement. In opening, it will be observed that the door E is supported entirely by the locking arm 7 and its engaged connection with the crank arms 2 until said crank arms assume a position intermediate the two positions illustrated by full lines Figs. 2 and 3, in which position the door E has been opened sufficiently for providing a partial discharge of the load, thereby relieving the door and closing means of the maximum stress and it is to be observed that up to this point the rigid parts are in engagement. Continuing the operation of opening the door by continued rotation of the shaft F, the locking arm will move from the position just described to the position shown in dotted lines of Fig. 2. The winding drum, continuing rotation and permitting the chain to slacken, will allow the door to assume its fullest open position.

While the channel 13 is shown, it is evident that the weight of the locking arm 7 will be sufficient under normal conditions to hold the hooked end down so that the rollers 11 will travel on the bottom flange 12 of said channel 13 and the top flange may be omitted, if desired, though it is shown as an auxiliary guide and may, or may not, be used. Obviously the center sills may be reversed so that the lower flanges thereof may be utilized in lieu of the member 13. In addition to the natural tendency of gravity to swing the hooked end of the arm 7 downwardly, it will be noted that the engagement of the chain with the pin 19 on said arm will operate to draw the end of the arm downwardly and into parallelism with said chain

as is clearly apparent from the dotted position in Fig. 2.

The shaft 10, with its rollers 11 traveling between the channels 13 or between the center sills A A, where said channels are omitted, serve to guide the locking arms 7 centrally of the device so as to always carry the hooked end 9 of the locking arm vertically above the pin 3 so as to insure contact of these parts. It will be evident that a considerable variation in the length of the chain may be had without detracting from the efficiency of the device; the paramount essential in this particular being that the end of the hooked portion 9 shall be drawn entirely across the circular path of movement of the engaging pin 3. Said end may be drawn from one to perhaps three inches or more beyond the pin 3, according to the relative eccentricity of the winding drums 5, without destroying the proper operation of the parts. Owing to the possible length of the chain 18 the doors E may be allowed to move to a more widely opened position than is possible with present door operating devices, which depend for locking and closing means upon cranked extensions or crank arms equal to approximately one half the distance of movement of the doors.

It is evident that the degree of eccentricity of the winding drum or chain way depends upon the length of the crank arms 2. Short arms 2 will require but little, or no, eccentricity of the chain way 5 and will provide a more powerful door closing means, whereas longer arms 2 will provide more latitude of movement of the parts, in which event it is well to provide a chain way 5 of sufficient eccentricity to take up the slack in the chain 18 as the parts assume the position shown in full lines in Fig. 3.

What I claim is:

1. In a device of the character described, an operating shaft, a door and means for closing and locking said door in closed position comprising a crank arm, a locking arm separably connected therewith when the parts are in predetermined positions, and a track for guiding said locking arm to engaging position.

2. The combination of a pair of sills, a hinged door, a sliding rigid connection between the free edge of said door and said sills, and means disengaging said connection from said sills to lock said door in position.

3. In a device of the class described, a shaft having a fixed axis of rotation, a door, a flexible connection between said shaft and door adapted to support said door during its initial closing movement, a rigid means supporting said door in its final closing movement, and an eccentric drum carried by the shaft for taking up the slack in said

flexible connection during said final closing movement.

4. In a device of the class described, a door, a locking arm pivoted to said door and having a free end, a rotating shaft, a crank pin carried by said shaft, adapted to engage said free end and thereby to carry said arm into position to rest on said shaft.

5. In a device of the character described, spaced apart supporting members, a door, an arm pivoted to said door, a transversely extending shaft centering said arm between said supports, a locking mechanism including an actuating shaft supported from said members adapted to engage said arm to close said door.

6. In a device of the character described, a shaft, a crank pin carried by said shaft, a door lifting and locking arm having a hooked free end adapted in certain positions thereof to be engaged by said pin to draw the arm across the path of movement of said pin to position said arm on said shaft.

7. In a door closing and locking device, the combination comprising an operating shaft, a door, a chain-winding drum and crank arm on said shaft, a locking arm attached to the door having a free end adapted to be engaged by said crank arm to close said door, and a chain normally connecting said drum and said locking arm remote from said free end and adapted to be wound on said drum, thereby to bring said locking arm into position to be engaged by said crank arm.

8. In a door closing and locking device, the combination comprising an operating shaft, a door, a combined chain drum and crank arm on said shaft, means adapted to raise said door including a chain adapted to be wound on said drum, and including a locking arm connected with said door at one end and having a free hooked end adapted to be guided by a fixed support during the raising of the door into position to be engaged by said crank arm.

9. In a door closing and locking device, the combination comprising an operating shaft, a door, a combined winding drum and crank arm on said shaft, a flexible connection between said drum and said door, a hook-shaped locking arm permanently connected with said door at one end having its opposite end supported independent of the crank arm and adapted to be longitudinally actuated by said crank arm when brought by said chain within the radius of said crank arm.

10. In a device of the character described, the combination comprising a winding shaft, a door, a door locking arm connected to said door and disconnected from said shaft when the door is in open position, and a chain adapted to be taken up on said shaft and connected to said door to raise the same, and

a guide controlling said locking arm and adapted to bring said arm into position to be locked on said shaft.

11. In a device of the character described, 5 the combination comprising a winding shaft, a door, a door locking arm connected with said door at one end and separable from said shaft at its opposite end when the door is in open position, a chain adapted to be 10 taken up on said shaft and connected with the door to raise the same, and a guide controlling said locking arm to bring said arm into position to be locked on said shaft.

12. In a device of the character described, 15 a rotatably mounted continuous shaft, a door, a combined eccentric drum and crank arm extending in the same direction from said shaft constituting part of the door lifting and locking means, a flexible connection 20 between said door and eccentric drum, and an arm attached to the door and adapted to be engaged by said crank arm.

13. In a device of the character described, 25 a supported crank shaft, a crank pin actuated by said shaft, a door, an arm pivoted to said door and having a free end disconnected from said shaft when the door is opened and adapted to be engaged by said crank pin to bring the arm into locking position 30 lapping the crank shaft when the door is closed.

14. In a device of the character described, a guide, a door, a rotatable shaft, a crank carried by said shaft, a flexible connection 35 between said door and shaft, and a supplemental connection having one end pivoted to said door and having its opposite end supported in said guide and adapted to be engaged by said crank in predetermined positions of the same. 40

15. In a device of the character described, a support, a door, an arm having one end pivoted to said door and the opposite end slidably mounted on said support, and means 45 adapted to engage said arm to raise the same from the support and to lock said door.

16. The combination of a pair of center sills, a hinged door, a rigid connection having one end pivoted to the door and having 50 the opposite end slidably mounted between said sills and supported by the same when the door is in open position.

17. In a device of the character described,

a door, an operating shaft, a crank arm and a chain drum on said shaft and means for 55 closing and locking said door in closed position comprising a chain, and a locking arm connected with the door and adapted to engage the crank arm when the parts are in predetermined positions, and a track for 60 guiding said locking arm to engaging position.

18. The combination of a pair of sills, a hinged door, a slidable locking arm between said door and said sills, and means adapted 65 to disengage said arm from said sills to lock said door in position.

19. In a device of the character described, spaced center sills, a door, an arm slidable relative to said sills and pivoted to said 70 door, means centering said arm between said sills, and locking mechanism including an actuating shaft supported from said sills adapted to engage said arm to close said door. 75

20. In a device of the character described, a shaft, a crank extension movable with said shaft, a door locking arm having a releasable hooked free end adapted in certain positions thereof to be engaged by said extension 80 to draw the arm across the said shaft.

21. In a door closing and locking device, the combination comprising an operating shaft, a door, a chain drum and crank arm on said shaft, a chain adapted to raise 85 said door, said chain being adapted to be wound on said drum, and a locking arm connected with said chain and having a free end adapted to be guided by a fixed support during the raising of the door into position 90 to be engaged by said crank arm.

22. In a device of the character described, the combination comprising a supporting member, a crank shaft having a fixed axis of rotation, a door lifting means actuated by 95 said shaft, a door, a rigid door locking means, and a guide on said supporting member for positioning a part of said rigid locking means to be actuated from said shaft. 100

In witness whereof I have hereunto set my hand in the presence of two witnesses.

LEVIN GOOSFORD HANDY.

Witnesses:

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FRANK V. COOPER.