

(No Model.)

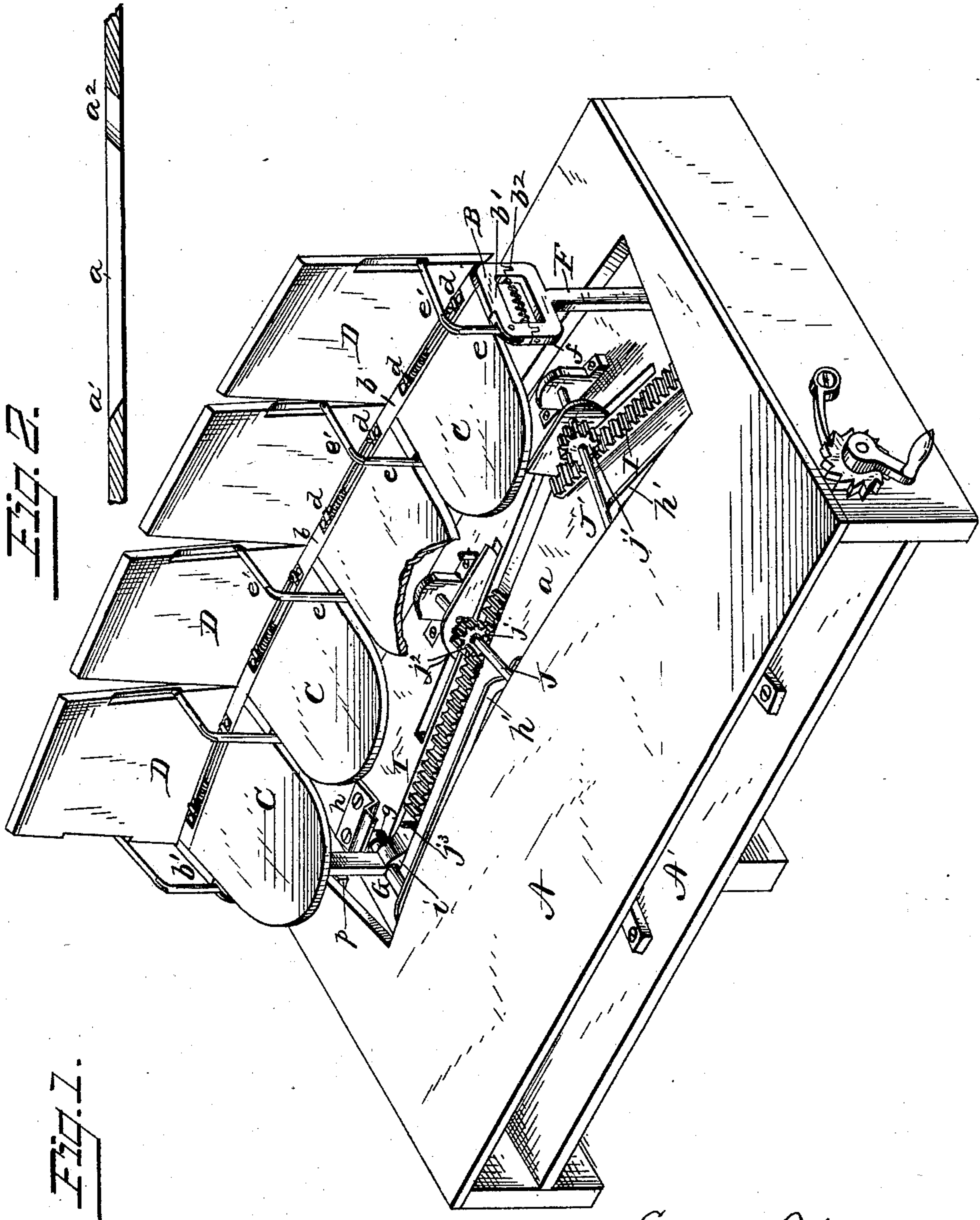
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E. F. UNDERHILL & V. F. LAKE.

FOLDING SEATS FOR THEATERS AND PUBLIC HALLS.

No. 268,154.

Patented Nov. 28, 1882.



WITNESSES
Frank L. Ourand
R. M. Smith.

Edward F. Underhill
Vincent F. Lake
INVENTORS,

by A. L. Smith

Attorney

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3 Sheets—Sheet 2.

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Fig. 3.

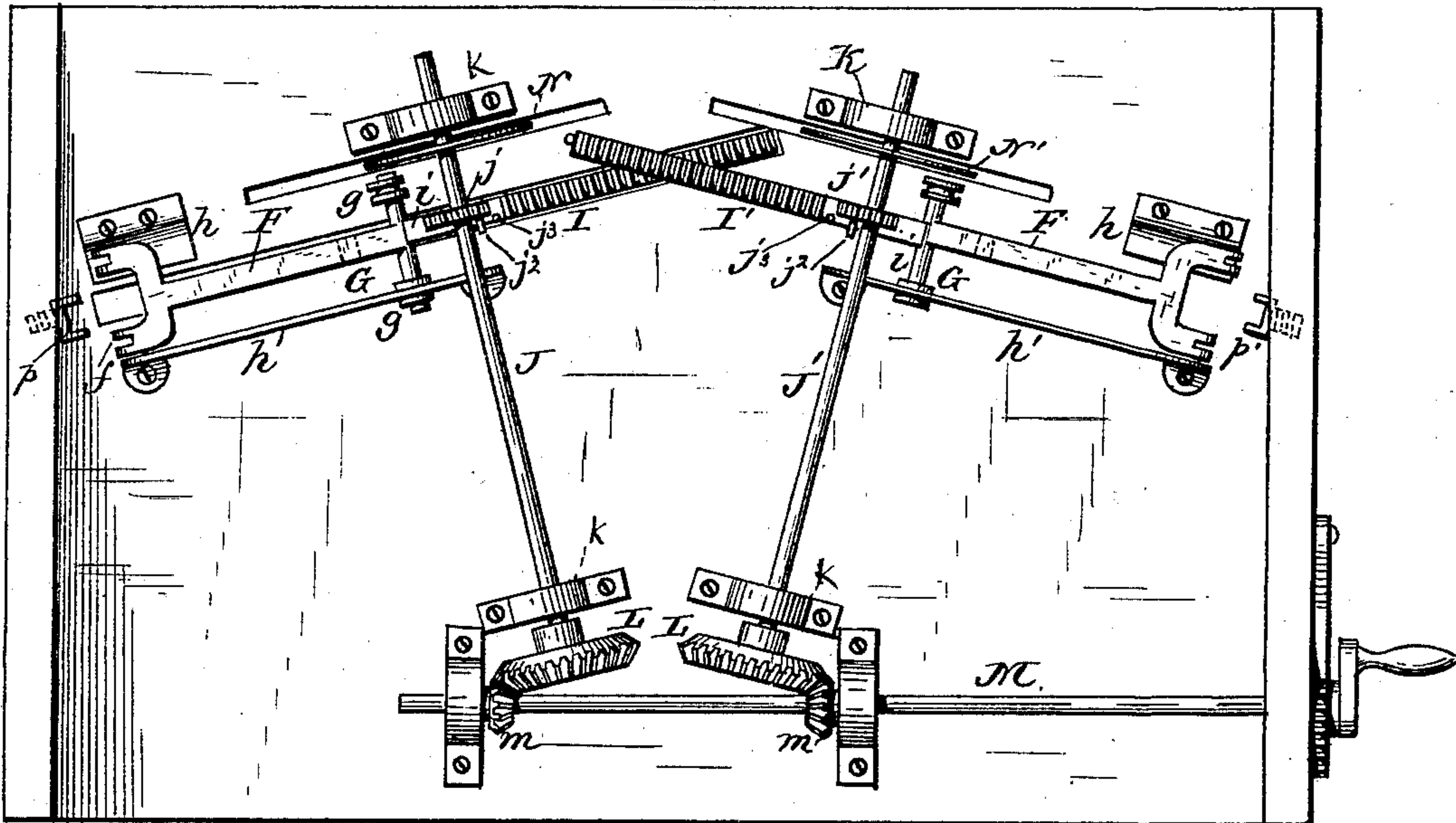
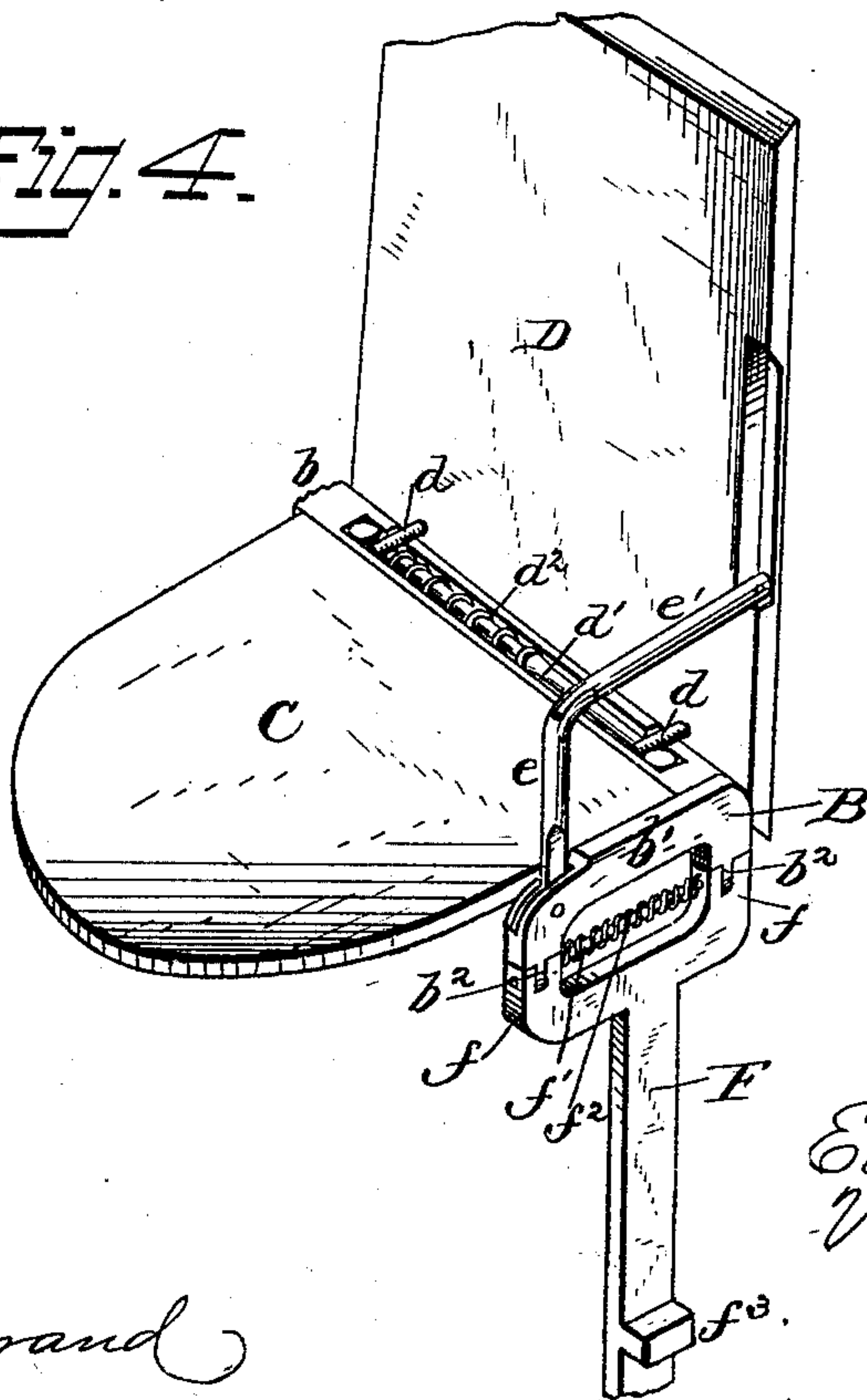


Fig. 4.



WITNESSES
Frank L. Ourand
R. Smith.

Edward F. Underhill
Vincent F. Lake
INVENTORS.

by A. L. Smith
Attorney

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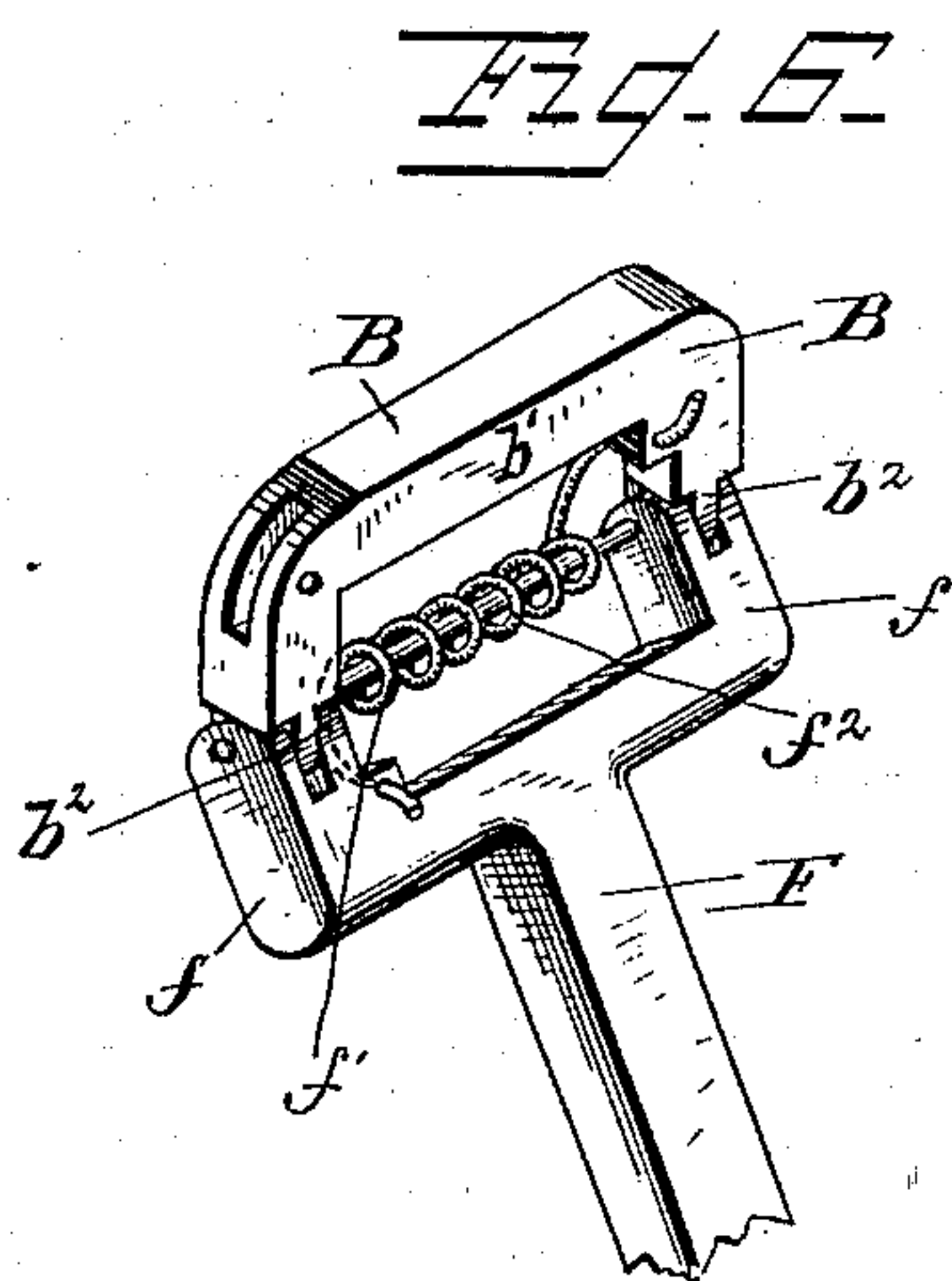
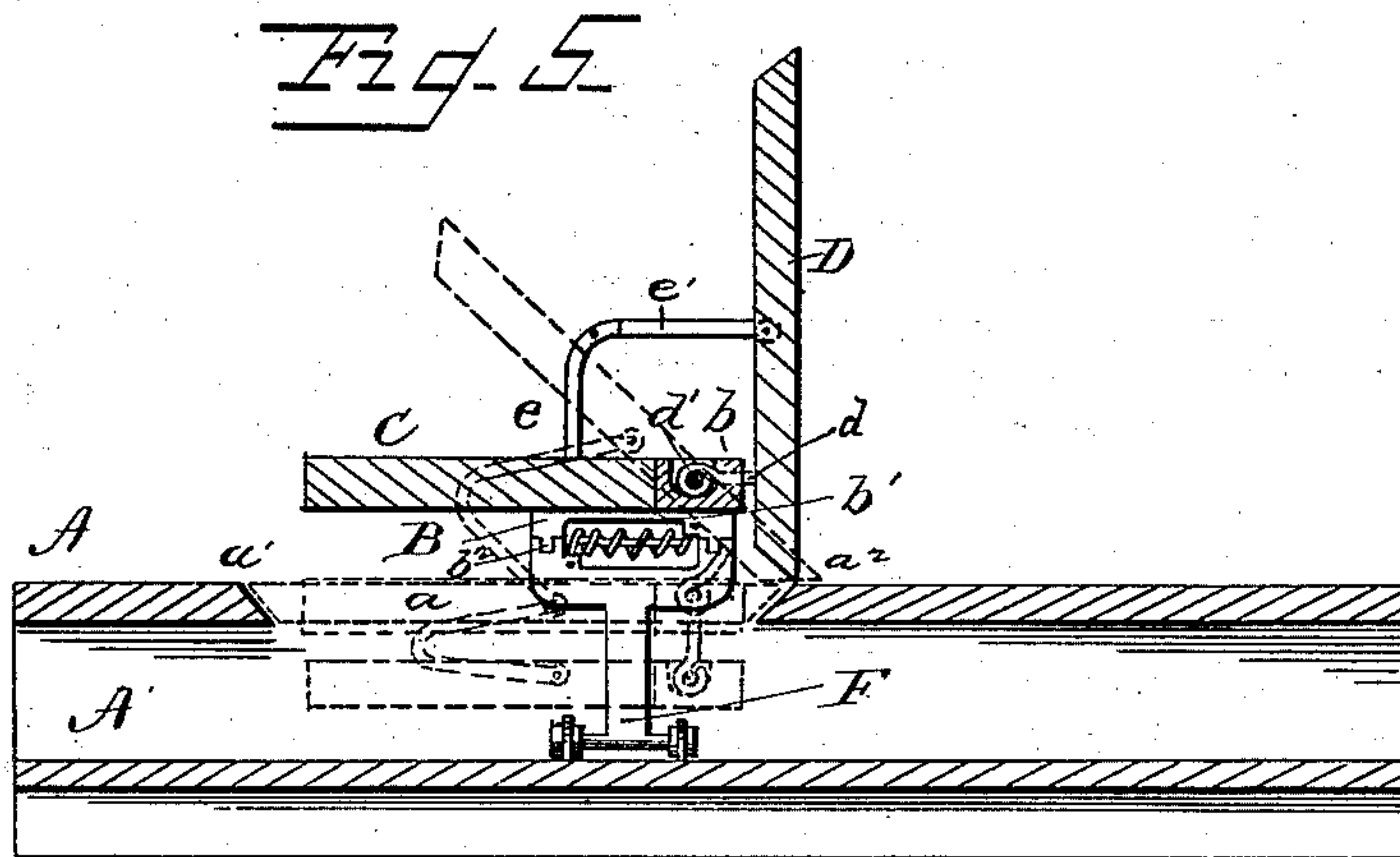
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UNITED STATES PATENT OFFICE.

EDWARD F. UNDERHILL AND VINCENT F. LAKE, OF NEW YORK, N. Y.

FOLDING SEAT FOR THEATERS AND PUBLIC HALLS.

SPECIFICATION forming part of Letters Patent No. 268,154, dated November 28, 1882.

Application filed April 10, 1882. (No model.)

To all whom it may concern:

Be it known that we, EDWARD F. UNDERHILL and VINCENT F. LAKE, both of New York, county of New York, State of New York, have invented new and useful Improvements in Folding Seats for Theaters and Public Halls, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a perspective view of a portion of a recessed floor with a row of seats applied and in position for use. Fig. 2 represents a transverse section through a portion of the recessed flooring, showing the form of the opening through the upper portion thereof. Fig. 3 is a plan view of the mechanism for adjusting and raising and lowering the seats. Fig. 4 is a perspective view enlarged of one of the seats and a portion of one of the supports therefor. Fig. 5 is a vertical section through the seat and a portion of the recessed flooring, showing in full and dotted lines different positions of the back in folding and unfolding and the relation of said back to the recessed floor; and Fig. 6 is a perspective view, showing the joint between one end rail of the seat-frame and its supporting-standard with the spring applied thereto.

My invention relates to that class of folding seats employed in connection with a recessed floor or platform and adapted to be folded into recesses therein; and it consists in a novel construction of the seats and of the folding backs thereto for giving a curved form to the sections or rows of seats and to the recesses in the floor for their reception; in a novel means for effecting the adjustment of the seats; in a novel means for automatically raising or unfolding the hinged backs of the seats when the seats are raised out of the recesses in the floor, and for automatically folding them when the seats are lowered, and in certain details of construction and arrangement, hereinafter described.

In the accompanying drawings, A A' represent a recessed or double floor, A representing the upper portion having recesses or openings *a*, provided for the passage of the seats through it, and A' the lower portion in flooring, forming the supports for the seats and the bottom

of the recesses therefor. The recess or opening *a* is represented as curved longitudinally for giving a curved or so-called "circular" form to the rows of seats, and some of the features hereinafter described have particular reference or applicability to this arrangement of the seats, while others of them, it will be seen, will be found to be equally applicable to seats in which the rows are arranged in right lines instead of in curved lines.

B represents a seat-frame composed of a rear curved bar or rail, *b*, conforming to the curvature of the slot or opening *a*, and rigidly connected to side bars, *b'* *b'*, and intermediate bars arranged between the seats and forming supports for the seats C, pivoted therein.

D are the backs, connected by short arms *d* with pivot-pins *d'*, let into the upper faces of the rail *b*, and surrounded by spiral springs *d*², arranged to exert their tension to lift the backs D into position for use. (Shown in the drawings) These backs are pivoted or hinged separately to the curved back rail, *b*, conforming to the curvature of the latter, and, being hinged thereto to adapt them to fold forward and down upon the seats, they are necessarily made to taper from their lower hinged ends or edges to their swinging ends, the taper being such as to adapt them, when folded down upon the seats, to rest snugly in contact one with another at their sides and together to exactly fill the recess or opening *a* in the floor. The springs *d*² are designed to have sufficient force to automatically raise the backs D into position for use when the seats are raised out of the recess *a*.

By the use of the short arms or ears *d* forming levers, through which the seats are pivoted to the rear rail, *b*, the lower edges of the backs, as the latter are raised, are carried back of and rest against the rear face of the rail *b*, which is thus made to act as a stop, limiting the throw or backward movement of the backs and holding them in the required position for use. This eccentric arrangement of the backs to their pivots also serves to cause them when raised to overhang the floor A in rear of the opening *a* in such manner that when the seats are lowered into said recess the lower edge of the backs are brought into contact with the floor, when the further descent of the seats

causes the backs to be rocked forward and folded upon the seats, closing the opening a and forming a flooring over the seats. The front and rear walls, a' a^2 , of the opening are made flaring and the upper and lower edges of the backs D are made of corresponding form, so as to snugly fill the opening and to rest upon the beveled front and rear walls thereof, the weight of the seats serving to hold the backs snugly down thereon. The backs are connected with the bars at the sides of and between the seats by jointed links e e' , which serve as arms to the seats when the latter are raised, and the upright portions e thereof, working against stops on the arms, as described in another application, not only serve to assist in limiting the backward throw of the backs, but also, in connection with the arm portion e' , to materially aid in supporting or bracing the backs in the desired position for use. The end bars, b' , are provided with pendent perforated lugs or ears b^2 , matching or fitting between corresponding ears f f' on standards F at the ends of the seat-frame and connected therewith by through-pins or pivots f' surrounded by spiral springs f^2 . The standards F are provided, each at its lower end with a transverse rod, G , having friction-rollers g g on its ends, said rollers resting and moving on the floor A' either directly, as shown, or in suitable ways thereon and underneath guiding-brackets h and h' , secured thereto for guiding their movements and preventing forward and backward vibration of the supports or standards F , and of the seats secured to and upheld thereby.

I I' are rack-bars arranged at right angles to the seat ends upon which they operate respectively, and working in suitable guideways upon or grooves in the floor A' . Where the rows or sections are short and the rack-bars cross each other obliquely, as indicated in the drawings, they will be arranged necessarily in different horizontal planes, as shown; but where the rows are of sufficient length to obviate the crossing of the racks, they may be arranged in the same horizontal plane. These rack-bars are provided on their outer opposite ends with expanded crescent-shaped heads i , having each a semi-cylindrical socket on its outer face in which the cross-heads or rods G on the supports F rest.

J J' are shafts arranged to cross the vertical planes of the rack-bars I and I' at right angles, respectively, and provided with pinions j j' for operating the same. These shafts J and J' are mounted in suitable bearing-brackets k k' and under the arrangement of the seats in curved rows, as shown, have an oblique relation converging toward their forward ends, where they are provided with bevel-wheels L L' , engaging with corresponding wheels m and m' on a transverse shaft, M , arranged to impart a rotary movement in opposite directions to the shafts J and J' .

Motion may be imparted to the shaft M in

any convenient manner and from any convenient motor for raising and lowering the seats. The seat-supports F are not fastened to the rack-bars I and I' , and consequently are free to remain in an upright position for supporting the seat when the rack-bars are operated for lowering the seat, this arrangement allowing any row of seats to remain elevated in case of obstruction and until the obstruction is removed. When the seat-standards are lowered and the rack-bars I and I' are entirely withdrawn the latter are released from the pinions j j' and rest over blank spaces on the rack-bars, this arrangement leaving the seats entirely free to rest by gravity in the receptacle in the floor. In order to give the seats a start upward, the rear ends of the shafts I and I' are provided with cam-plates N and N' , rigidly secured to said shafts and arranged underneath the seat-frame bar or rail b , the rounded cam-faces of the plates acting thereon, when the frame is down, for giving it the first movement or start upward as the shafts J and J' are rotated. The pinions j and j' are provided each with a laterally-projecting pin, j^2 , near its periphery, which, as the shafts J and J' are rotated for raising the seat, engage with pins j^3 on the rack-bars for drawing the latter into engagement with the pinions j and j' , so that by the time the cam-plates have ceased to act on the seat-frame the rack-bars are brought into action for completing the work of raising the seat.

By the construction and arrangement described it will be seen that the seat-standards being disconnected from the rack-bars, the seat cannot only remain up when the rack-bars are operated for lowering them, but they are free from any pressure from the rack-bars when the seats are down.

The standards F are provided on their outer faces with spurs f^3 , which, as the seats are raised, pass between the ears of flange-brackets p p' , secured to the side timbers, A^2 , of the sockets or recesses a . These brackets are represented as provided with threaded shanks, adapting them to be screwed into place and to be adjusted in the side walls or timbers of the recesses; but they may be applied in any convenient way, and serve to prevent forward and backward vibration of the seat-supports F and of the seats connected therewith. They also serve to hold the standards slightly removed from the side walls of the recess, and so prevent interference of the latter with the folding supports.

The springs f^2 upon the pivot connecting the seat-standard F with the seat-frame are so applied as to exert their tension, when the seats are up, to fold the supports under the seat, and when folded to exert their tension to aid in supporting the weight of the seat, with an intermediate neutral point, in such manner as to assist in starting both in folding and in raising the seat.

One form of this spring is shown in Fig. 6,

where it is shown wrapped in spiral form upon a hinge-pin, *f'*, between the lugs *ff* of the folding seat-standard, with its ends passed one through an eye in the end rail of the seat-frame and the other through an eye in the standard, the spring being in its neutral or normal position when the standard is partly folded under the seat. Any movement of the standard in either direction from said position, in folding or unfolding it, causes the spring either to wrap the pivot-pin more closely or to unwrap it, and thus to create a tension upon the spring, acting to assist in starting to either fold or unfold the seat. Other arrangements of the spring than that shown may be employed, if preferred.

By the construction of the standards *F*, in connection with the arrangement of means for adjusting them, above described, we are enabled to dispense with the jointed toggle-links or lazy-tongs described in our former application, and thereby to secure a steadier support for the seats when in position for use.

Having now described our invention, what we claim as new is—

1. The combination, with a recessed floor and a seat connected therewith and folding into a recess in said floor, of supporting-standards hinged to the seat-frame and reciprocating racks for operating said standards, substantially as described.

2. The combination, with a recessed floor and seats arranged in curved rows connected therewith and folding into recesses in said floor, of folding backs arranged to conform to the curvature of the rows of seats, and made tapering to adapt them to fold over said seats and snugly cover the recesses in the floor, substantially as described.

3. The combination, with a recessed floor and

seats connected therewith and folding into recesses in said floor, of the hinged backs to said seats connected to their hinge-pins by short arms or levers, adapting the backs, when raised, to overhang the rear walls of the recesses, and the rear walls of the recesses operating, in connection with said arms, to automatically fold the backs when the seats are lowered into the recesses.

4. The combination, with a recessed floor, of seats connected to said floor and folding into recesses therein, folding backs hinged to said seats by lever arms, adapting said backs, when raised, to overhang the rear walls of the recesses, springs for automatically raising the backs, and the portion of flooring overhung by said raised backs for automatically folding said backs, substantially as described.

5. The combination, with a recessed floor and a seat connected therewith and folding into a recess in said floor, of supporting-standards hinged to said seat, and springs attached at the pivotal connection of the supports with said seat for assisting to start the seat in both raising and lowering the same, substantially as described.

6. The combination, with the recessed floor and a seat connected therewith and folding into a recess therein, of the hinged supports to said seat, and adjustable stops for preventing forward and backward vibration of said supports when the seats are raised into position for use.

In testimony whereof we have hereunto set our hands this 3d day of April, A. D. 1882.

EDWARD F. UNDERHILL.

VINCENT F. LAKE.

Witnesses:

ROBT. HASTINGS,

W. H. MCINTIRE.