

H. BATES.
Steam Gage.

No. 18,272.

Patented Sept. 29, 1857.

Fig. 3.

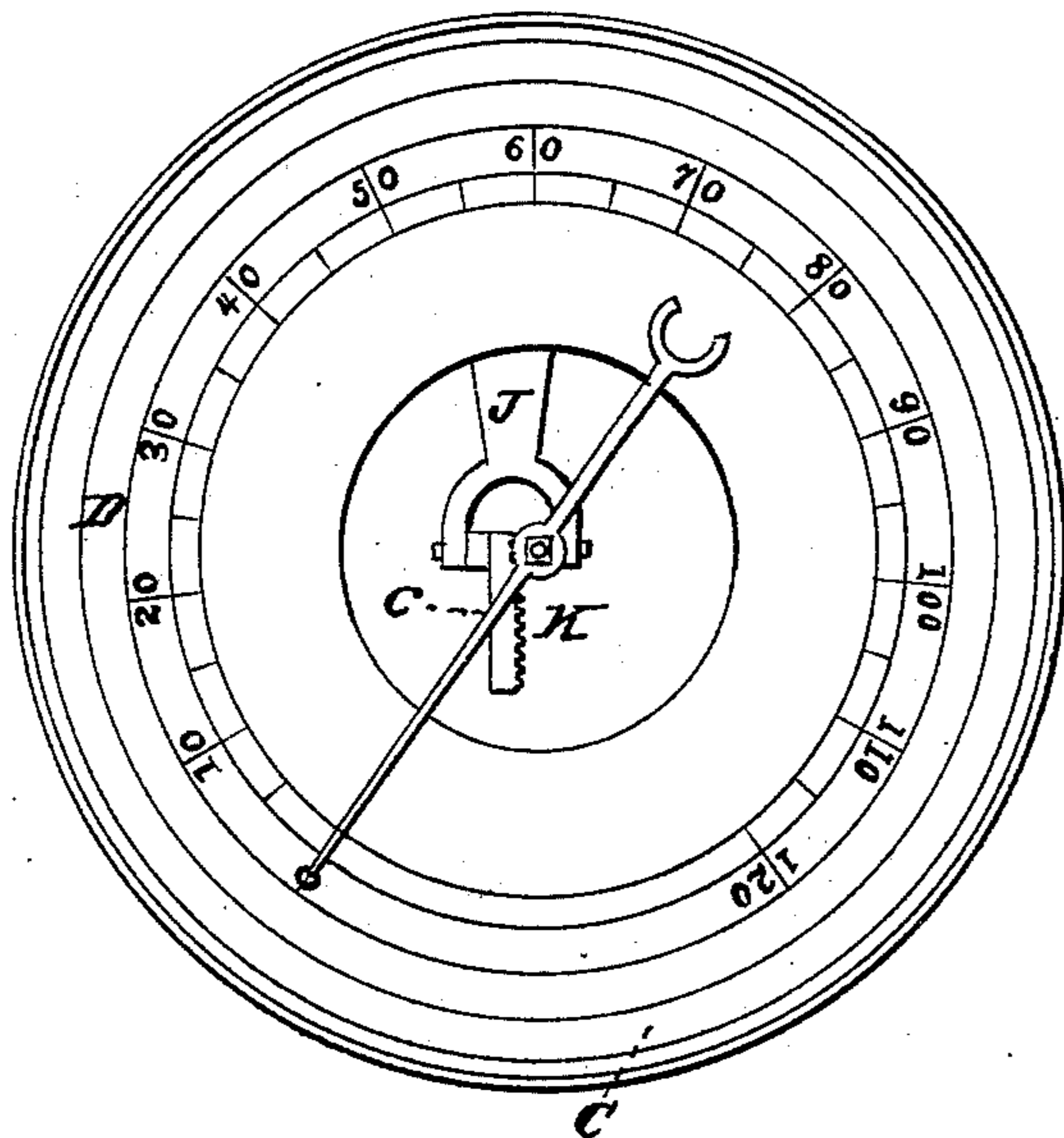


Fig. 2.

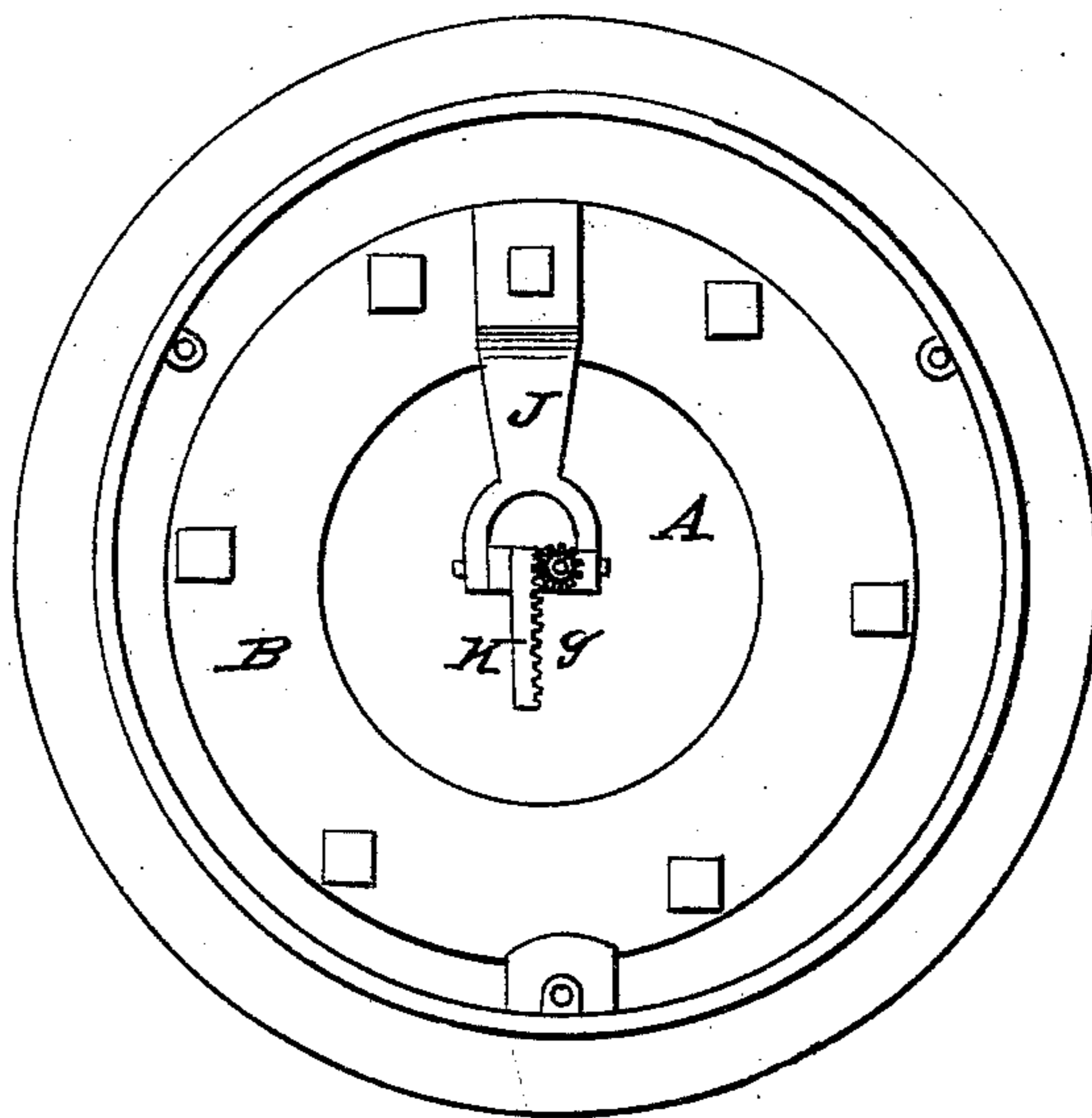
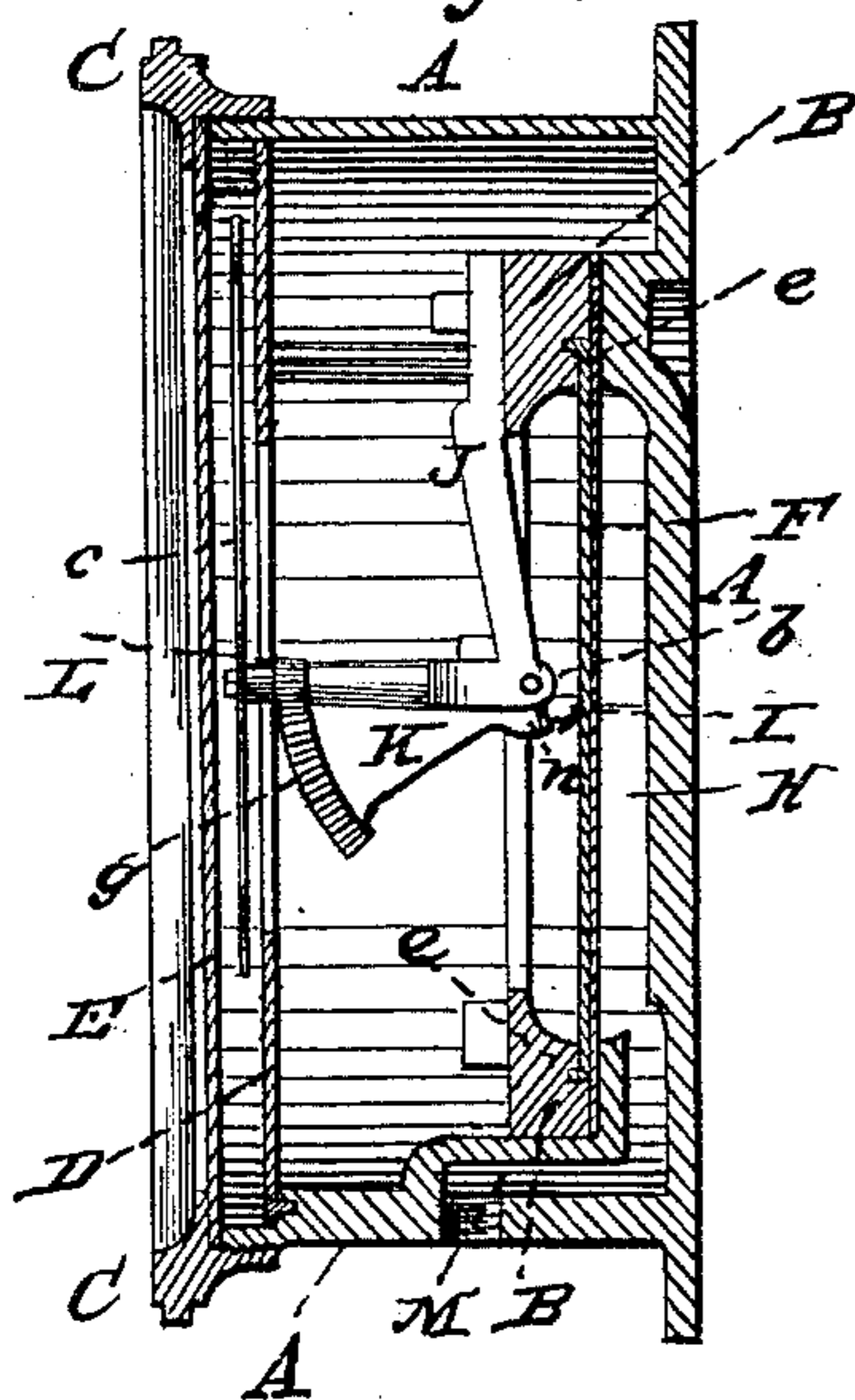


Fig. 1.



UNITED STATES PATENT OFFICE.

HENRY BATES, OF NEW LONDON, CONNECTICUT.

STEAM-PRESSURE GAGE.

Specification of Letters Patent No. 18,272, dated September 29, 1857.

To all whom it may concern:

Be it known that I, HENRY BATES, of New London, in New London county and State of Connecticut, have invented a new and useful Improvement in the Steam-Gage; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, making part of this specification.

The nature of my invention consists in the arrangement of the sector, with teeth on its side face and a radial bearing projection near its axis, on an axis which is at right angles to the shaft of the pinion that actuates the pointer and in proper relation, for united action, to said pinion, and to a controlling stud I, which terminates in an eccentric curve, as hereinafter specified. By this arrangement, the necessity of employing a spring to return the sector and pointer to their original or starting positions, when pressure is withdrawn is avoided, as the sector returns by its own gravity. Another advantage is also secured, to wit, a compensation is provided for the decreasing specific action of the sector on the pointer under increased pressure, as the bearing projection changes its point of bearing, and thereby lengthens the leverage and increases the movement of the dial simultaneously and correspondingly with the increase of pressure of steam, and the decrease in movement of the disk, and thus all inaccuracies which arise from the disk not yielding equally in proportion to the different degrees of pressure, but requiring, as the pressure increases, a greater amount of additional pressure, owing to its capability of being extended, to produce a movement of the pointer to a position which will tell the true pressure of the steam.

Figure 1 represents a vertical section of the improved gage perpendicular to its face. Fig. 2 is a front view without the graduated face and index. Fig. 3 is a front view with the face and index.

A A A Fig. 1 is a disk like form or case made of cast iron to which the different parts are attached. B, B, is a ring of the same material.

C C is a ring of brass or other suitable metal for the casing in its front.

D D is the graduated ring or dial plate.

E is a glass front.

F is a disk of steel as a manometer spring to sustain and indicate the pressure of steam.

G is a lining of india rubber to protect the steel disk from the steam and to furnish a bed or packing where it is in contact with the ledge *a* and covering the steam chamber H.

I is a stud of hardened steel fixed firmly to the disk.

J is an arm holding a sector K, at its center of motion *b*, at the elbow, and the pinion L on the hub of which the index *c* is placed at the wrist, of the said arm. The sector and pinion are shown in proper view and not in section.

M is a steam passage or port, to admit steam to the chamber H.

The disk plate F is composed of sheet steel in a circular form and having its edge turned or raised as shown at *e*, by being forced into or through dies or otherwise. This edge is then turned in a lathe, so as to be perfectly true or circular, and a corresponding groove is then turned in the ring B, in which this is fitted accurately and ground in with emery, so as to form a perfectly fitting joint, after being tempered very hard, so as not to suffer it to contract in dimensions by pressure so as to become set or changed in its elasticity by swelling it permanently in the center, as might be done if its circumference could be at the same time reduced.

The sector K consists of brass with a segment *g* of side gear, which acts in the pinion L. This sector is suspended at the center pin *b*, and rests or bears by its lip *n* on the stud I. The face of contact of the sector with the stud is of hardened steel, and is radial relative to the center of motion *b*. The gravity of the sector always tends to keep it in contact with the stud I. Hence it will be seen that whenever the disk plate F is forced outward by the pressure of steam in the chamber H, the stud I attached thereto acts on the sector, and elevates the link which turns the pinion and index; and this action is proportional to the deviation of the face of the disk from its normal state. But since the disk does not yield equally in proportion to the different degrees of pressure, but requires a greater amount of additional pressure to produce any specific movement of the disk and index as the pressure is increased, and also as the angle of contact of

the radial steel face of the sector, with the stud I varies with the swelling of the disk by pressure, so that the rotary movement imparted to the sector and thence to the index is not uniform for specific degrees of the prolation, of the disk, or of the pressure, the face would require to be graduated with constantly decreasing divisions as the pressure is increased, and the face of each gage can be graduated only by experiment or by trial comparing it with some other properly graduated gage, at all the different states of pressure. But to compensate for the decreasing specific action under increased pressure and in order to make the graduated divisions on the dial plate nearly uniform I so curve the end of the stud I as to act on the radial steel face in contact therewith on the sector that it shall change its points of contact successively by change of pressure and position, and act thereon at different radial distances from the center of motion *b*, of the sector. This curve may be formed experimentally or by trial, and when once formed will serve as a model for others of the same construction, but each gage to insure accuracy should be graduated separately and by trial, in connection with a properly graduated standard.

The disk plate or spring as above described consists of a plain surface with a raised edge; but it may have circular corrugations about its center if preferred; but I prefer a plain disk fitted as described especially when extreme pressure is to be applied; for when the flange *e* of the disk is accurately and firmly fitted in a groove in the cast iron ring B, it can not contract by central pressure and prolation of the disk, but if held only by screws to the bed in the usual way, without a rim *e*, it might do so, and become set or changed; and a corrugated disk would yield more readily to extreme pressure, and by its freedom of action might for the same reason become changed in its elastic character, by extreme pressure.

I am aware that steam gages have been constructed with disks both plain and corrugated, for monometer springs; and that such

have been made to act through the medium of gears, on an index, to exhibit the degree of pressure sustained by the disk; but such disks have in all cases been made without a flange or rim *e*, and have always been held in their bed by screws or have been clasped between the case A and ring B, so as to be susceptible of possible contraction by pressure on the face of the disk; and for this cause they often become strained or set, so as not to return fully to their original state when free from pressure.

When the monometer spring or disk has heretofore been made to act on gears by contact, as by the action of the stud I, on the sector K, the contact has been effected and secured by a spring acting on the gear; or a lever or arm connected therewith; so that when moved or carried forward by the pressure, and yielding of the monometer spring, the index would return to zero and the gear would return to its original position on the removal of pressure, by the action of the said spring. But in the present case this action is effected by the gravity of the sector alone.

Having thus fully described my invention, I wish it to be understood that I do not claim an elastic disk for actuating the gearing which gives motion to the pointer. Neither do I claim a sector for actuating the pointer except it be arranged to return to its original position by its own gravity without the aid of a spring, but

What I do claim as my invention and desire to secure by Letters Patent, is—

The arrangement of the sector with teeth on its side face and radial bearing projection near its axis, on an axis which is at right angles to the shaft of the pointer pinion and in proper relation for united action, to said pinion and to a controlling stud which terminates in an eccentric curve, substantially as and for the purposes herein specified.

HENRY BATES.

Witnesses:

N. SCHOLFIELD,
H. M. SCHOLFIELD.