

(No Model.)

2 Sheets—Sheet 1.

R. M. BECK.

DEVICE FOR OPERATING STEAM ENGINE INDICATORS.

No. 398,686.

Patented Feb. 26, 1889.

Fig. 2.

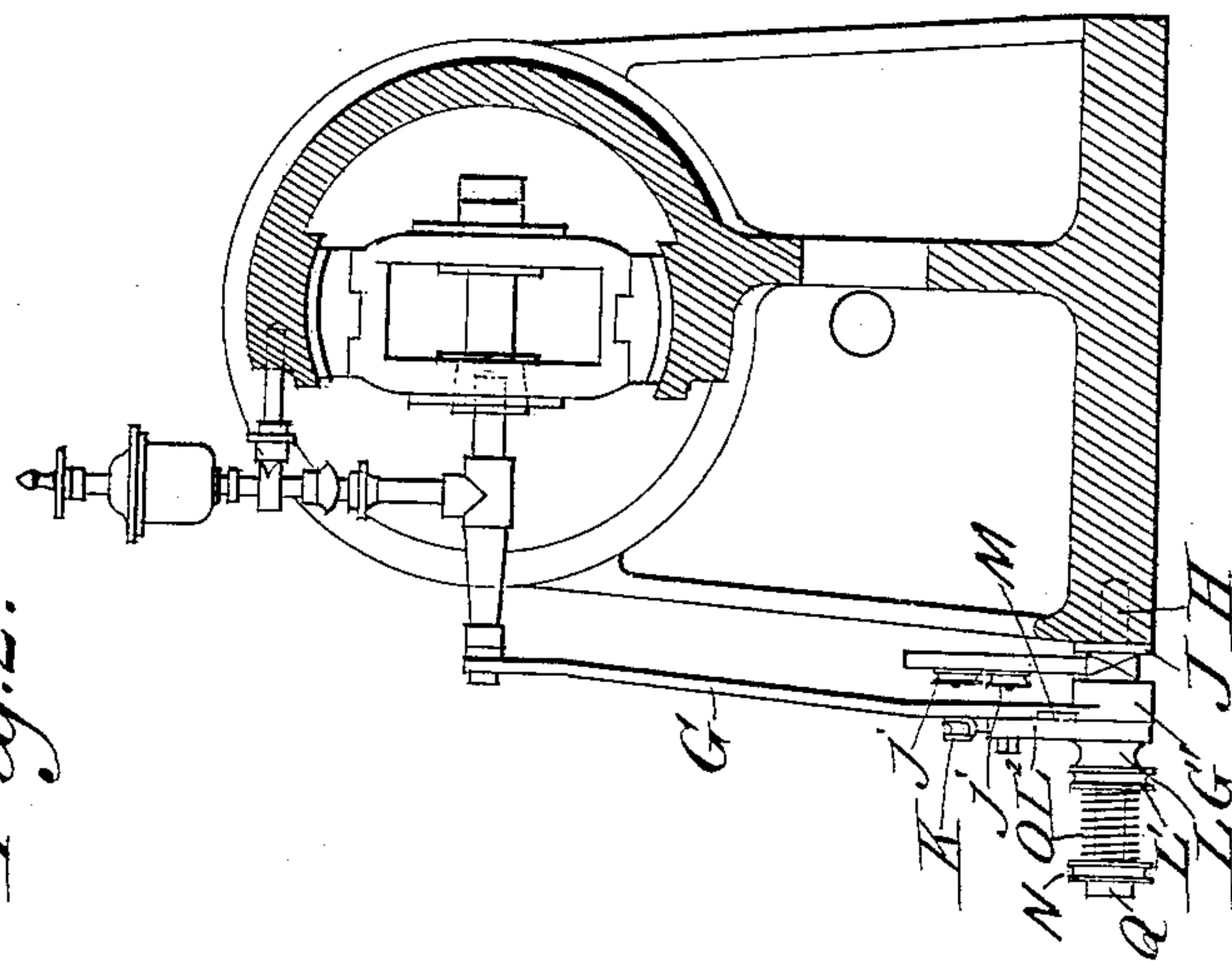
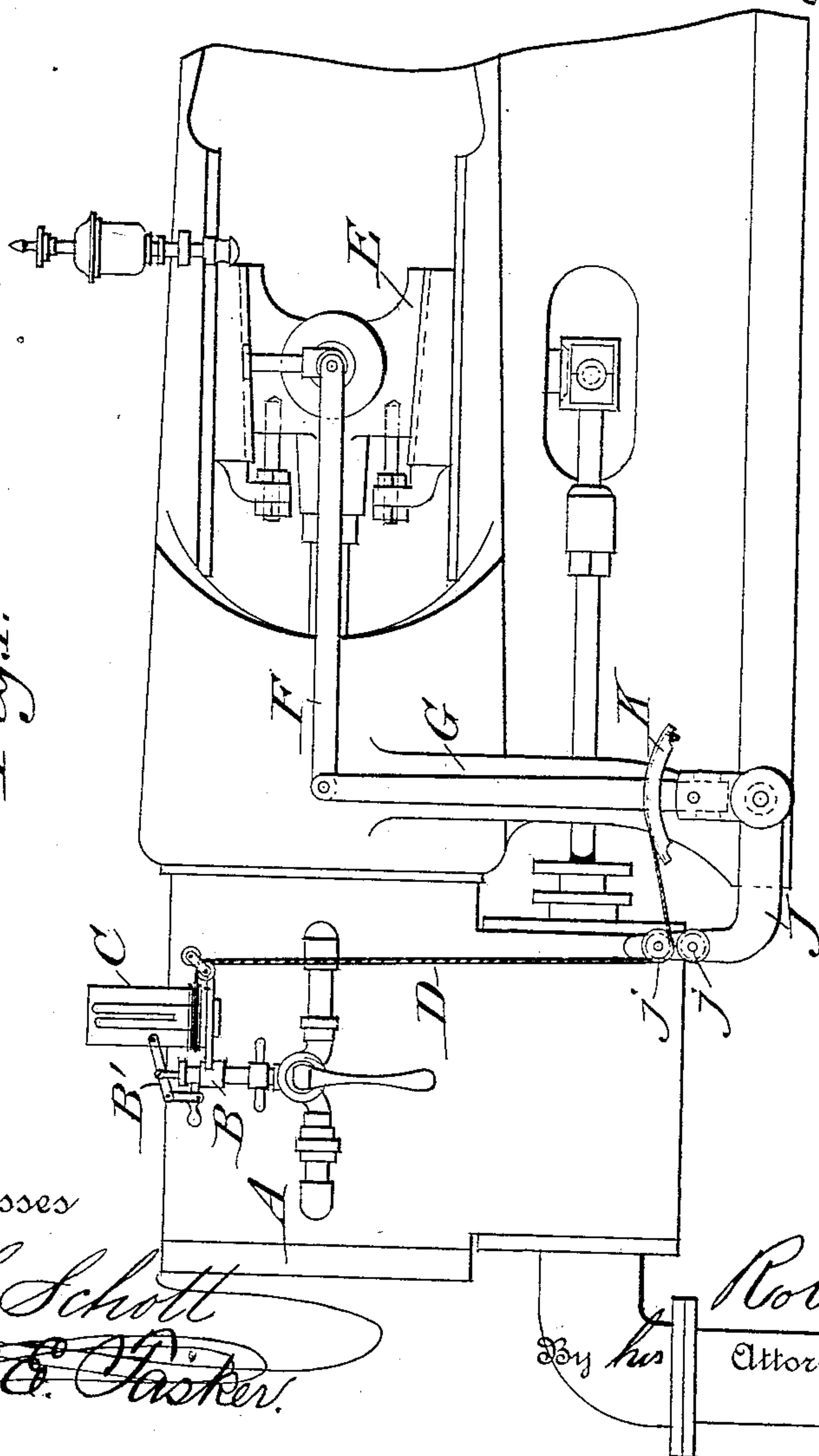


Fig. 1.



Witnesses

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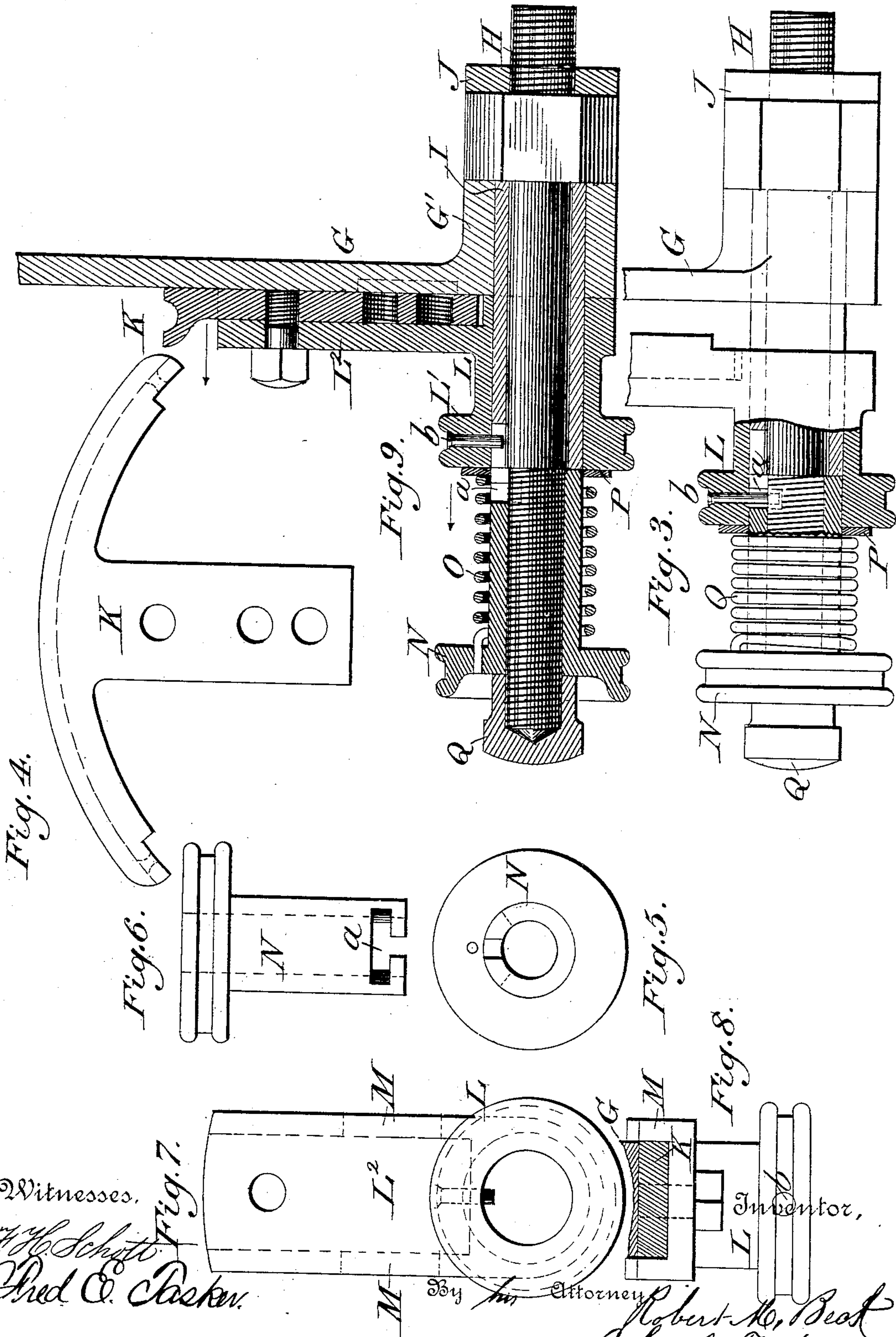
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DEVICE FOR OPERATING STEAM-ENGINE INDICATORS.

SPECIFICATION forming part of Letters Patent No. 398,686, dated February 26, 1889.

Application filed April 26, 1888. Serial No. 271,950. (No model.)

To all whom it may concern:

Be it known that I, ROBERT M. BECK, a citizen of the United States, residing at Chambersburg, in the county of Franklin and State of Pennsylvania, have invented certain new and useful Improvements in Devices for Operating Steam-Engine Indicators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to a device for operating recorder-indicators for steam-engines, said indicators being of that class which consists of a paper or card carrying cylinder arranged to be oscillated by connection with some moving part of the engine—such as the cross-head—and then retracted by a retracting-spring after each oscillation, and also a cylinder in communication with the main steam-cylinder of the engine, which cylinder contains a piston that actuates a lever having a pencil or marker which records upon the paper-carrying cylinder the pressure of steam within the main steam-cylinder.

The object of the invention is to provide means whereby the mechanism which oscillates the oscillating cylinder may be disengaged or thrown out of motion without stopping the engine, so that the paper or cards on the oscillating cylinder may be changed; and to this end the invention consists, essentially, in the disengaging mechanism for the operating-cord, substantially as will be specified, and, further, in the construction, arrangement, and combination of parts, substantially as will be hereinafter described and claimed.

In the accompanying drawings, illustrating my invention, Figure 1 is a front elevation of a steam-engine cylinder, a cross-head, and adjacent parts, the whole being provided with a recorder-indicator and my improved means for operating the same. Fig. 2 is a right-hand sectional end elevation of the same. Fig. 3 is an enlarged detail view of the clutch or disengaging mechanism, whereby the cord which operates the oscillating cylinder is thrown out of connection with the moving cross-head, the parts being shown in the position taken when the cord has been stopped.

Fig. 4 is an enlarged detail view of the quadrant or arc to which the indicator-cord is attached. Fig. 5 is an end view, and Fig. 6 a plan view, of the threaded nut which forms a part of the clutch mechanism. Fig. 7 is an end and Fig. 8 a plan view of the armed sleeve which constitutes a part of the disengaging mechanism. Fig. 9 is a vertical sectional view of the whole of the disengaging mechanism on an enlarged scale, the parts being shown in the position that they occupy when the oscillating cylinder is in operative connection with the cross-head of the engine.

The same letters of reference designate the same or like parts throughout all the different figures.

A denotes a steam-cylinder; B, a smaller steam-cylinder located in connection with cylinder A, and containing a steam-piston which actuates the pencil-carrying lever B'.

C indicates the oscillating cylinder, which carries paper or card-board, on which the pencil held by lever B' is permitted to register its marks, for the purpose of indicating the steam-pressure in the steam-cylinder. The cylinder C is oscillated by means of a cord, D, and a retracting-spring returns it to position after each oscillation.

The parts just enumerated are in common use, and I lay no claim to them. They are represented and mentioned here by way of explanation merely in order to show the class of recorder-indicators to which my invention has reference.

E denotes the reciprocating cross-head of the engine. To it is pivoted a rod or link, F, which is also pivoted to the upper extremity of a vertical lever, G, the lower end of which is formed as a sleeve, G', to receive a horizontal projecting stud, H, on the lower portion of the engine-frame. Around the said stud, for a portion of its length, is located a steel bushing, I, which is driven tight into the lower sleeve end, G', of the rock-lever G. A horizontal guide-arm, J, carrying guide-rollers *j j* for the indicator-cord D, is securely fixed in place by being held between the engine-frame and a nut or collar on the stud H, in the manner shown in Figs. 3 and 9. It will be evident, therefore, that the cord D, af-

ter passing through small guide-rollers near the oscillating cylinder, to which it is attached, extends downward and between the guide-rollers *jj*. The end of this indicator-cord is fastened to a quadrant or arc, K, which is peripherally grooved to receive the cord. This quadrant is carried by an armed sleeve, L, having arm L^2 , to which said quadrant it is securely attached. Said sleeve surrounds the bushing I on stud H, and is adapted to oscillate on the bushing and stud. The arm of the quadrant is suitably provided with openings or apertures, so that bolts or screws can be passed through them and through corresponding apertures in the arm of the sleeve L, so as to effect a secure connection between the armed sleeve and the quadrant, and admits of increasing or diminishing the throw of the quadrant that affects the action of the indicator or recording cylinder, by which diagrams of any desired dimensions may be secured.

In Fig. 7 is shown an end or front view of the sleeve L, and in Fig. 8 a plan view of the same. From inspection of Fig. 8 it will be seen that the arm of the sleeve L is provided on each vertical edge with oppositely-located flanges or projections M M, which, when the said armed sleeve is located in its normal vertical position, will inclose the rock-lever G, as will be seen by looking at Fig. 9 and also Fig. 2, so that when the said lever G rocks upon its fulcrum the armed sleeve, and likewise the quadrant K, to which the indicator-cord is attached, will partake of a simultaneous and corresponding oscillation.

In order to keep the armed sleeve and the quadrant pressed close up against the lever G, so that the projections M M may inclose said lever in the manner just described, enabling the armed sleeve and quadrant and attached cord to receive movement from the said lever, I place upon the outermost portion of the stud H a sleeved nut, N, which is internally threaded to engage a screw-thread upon the stud. This sleeved nut is surrounded by a coiled spring, O, which is tensioned between the collar portion of the nut and a loose washer, P, that lies close against the armed sleeve L.

One end of the coiled spring O is inserted into a small orifice or opening in the collar portion of the nut N, so that it may be easily kept in position. The outer end of the stud H is furnished with a jam-nut, Q, which presses hard against the sleeved nut N. The sleeved nut N is provided at a suitable point near the end toward the armed sleeve with a slot, *a*. (See Fig. 6.) The armed sleeve L is furnished with a pin, *b*, which, when said sleeve is in its normal position, as shown in Fig. 9, projects downward from the flanged portion L' of the sleeve into a space near the stud where the bushing I is cut away.

When it is desired to disengage the armed sleeve and quadrant from connection with the lever G, the operator will lay hold of the

flange L' , moving the armed sleeve endwise and pressing the spring O until the pin *b* has entered the slot *a*, when, by giving the armed sleeve a little rotary motion in one direction or the other, the parts may be securely locked in this position.

In Fig. 3 the parts are shown with the spring O compressed, and the pin *b* entered into the slot *a* in such a manner that the armed sleeve L is held away from the lever G.

From the foregoing description of the construction and arrangement of the several mechanical parts of my improved device for operating steam-engine-recorder indicators it will be easily observed how the device operates. As the cross-head E reciprocates between its ways, the connecting-link F will rock the vertical lever G upon its fulcrum. This rocking motion will, if the armed sleeve L and supported quadrant K are positioned relatively to said lever G, as shown in Fig. 9, be communicated to the quadrant, and consequently to the cord or rope D, which oscillates the oscillating cylinder C. The cylinder C will be regularly oscillated, and the pencil will register its indications thereupon in the usual manner.

It is necessary and desirable, however, at certain times to change the paper or cardboard with which the cylinder C is provided and substitute a new card or paper. With the ordinary device now in use, when it becomes necessary and desirable to make this change of cards, the engine must be stopped, except in cases where the recording-instrument is provided with ratchet or other mechanism to disengage the action of the recording-cylinder, which device is unsatisfactory, because the motion of the cord is not stopped, and consequently the cord is liable to become tangled and broken, and perhaps injure the recorder. My invention aims to avoid this difficulty by providing means whereby the substitution of cards may take place without stopping the engine. Inasmuch as the stopping of the engine is attended with difficulty and loss of time and work, it is evident that the result which I have in view is one of great benefit. With my mechanism all that the operator needs to do when he desires to stop the oscillation of the cylinder C is to pull upon the armed sleeve L and cause the pin *b*, which is carried thereby, to engage the slotted sleeve-nut N in such a manner that the quadrant may be held in a position sufficiently far removed from the lever G so that said lever may continue its vibrations without coming in contact with the projections on the armed sleeve L. As soon as the change of cards has been effected and the oscillating cylinder is ready to receive a new record the pin *b* may be disengaged from the nut N and the parts of the disengaging mechanism re-established in the normal position of Fig. 9, where at each vibration of the lever G the quadrant K is rocked and the cord D actuated.

It is obvious that the arc or quadrant K may be of any desired size, and that the point of attachment of the cord D thereto may be varied. Thus the device may be adjusted to
5 suit engines of different strokes, so as to make the indicator-diagrams of a uniform length.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

10 1. In a device for operating steam-engine indicators, the combination of the oscillating cylinder, the moving cross-head, a leverage and cord connection between the cross-head and cylinder, and disengaging or clutch mechanism whereby the oscillating cylinder may
15 be stopped when it is desired without stopping the engine, substantially as and for the purpose described.

20 2. In a recorder-indicator for steam-engines, the combination, with the indicating mechanism and a moving part of the engine, of suitable connections between said indicating mechanism and said moving part, and a suitable disengaging or clutch mechanism where-
25 by the indicator mechanism may be stopped without stopping the engine, substantially as and for the purpose described.

3. In a recorder-indicator for steam-engines, the combination of the operating-cord, the os-
30 cillating cylinder, the moving part of the engine, an armed sleeve supported on a stud on the engine-frame and carrying a quadrant to which the operating-cord is attached, the leverage-connections whereby the moving
35 part communicates motion to the quadrant and operating-cord, and disengaging mechanism for throwing said leverage-connections out of operative connection with the quad-
40 rant and operating-cord, substantially as de- scribed.

4. In a device for operating steam-engine indicators, the combination of a vertical rock-
45 lever actuated by a moving part of the engine, an armed sleeve supporting a device to which the operating-cord is attached, and the oscillating cylinder, said armed sleeve and rock-lever being mounted on a stud on the engine-frame, and disengaging mechanism
50 for throwing the armed sleeve and its supporting-quadrant out of connection with the rock-lever, substantially as described.

5. In a device for operating steam-engine indicators, the combination of the moving
55 cross-head, the vertical lever fulcrumed on a stud on the engine-frame, the link-connection between said lever and the cross-head, the armed sleeve carrying the device to which the operating-cord for the cylinder is attached, and adapted to be connected with
60 the rock-lever, and the sleeved nut and its surrounding spring, said sleeved nut and armed sleeve being located on the same stud that operates the rock-lever, substantially as described.

6. In a recorder-indicator for steam-engines, 65 the combination of a moving part of the engine, an oscillating vertical rock-lever fulcrumed at its lower end, a link-connection between it and the moving part, an armed sleeve located adjacent to the rock-lever, the
70 oscillating cylinder, and the operating-cord for connecting it with said armed sleeve, and suitable devices whereby the armed sleeve is engaged with or disengaged from the rock-le-
75 ver, substantially as described.

7. The combination, in a recorder-indicator, of the operating-cord D, rock-lever G, armed
80 sleeve L, the arc K, carried by said sleeve, and devices for engaging or disengaging the armed sleeve and rock-lever, substantially as described.

8. In a device for operating steam-engine indicators, the combination of the moving
85 cross-head, the vertical lever G, fulcrumed on a stud, H, on the frame and connecting with said moving cross-head, the armed sleeve L, supported likewise on the stud and having
90 projections M M and carrying the arc K, the cord D, attached thereto, and an oscillating cylinder which is actuated by said cord, sub-
stantially as described.

9. The combination of the lever G, the stud
95 H, on which the lever is supported, a moving part of the engine by which said lever is actuated, the armed sleeve L on said stud H, having projections M M, which normally lie
100 alongside lever G, and carrying the arc K, the indicator-cord attached thereto, said armed sleeve being also provided with a pin, b, the sleeved nut N, likewise on the stud,
105 and having the slot a, and the surrounding spring O, all the parts being arranged for joint operation as specified.

10. The combination of the oscillating le-
110 ver G, having a sleeved portion, G', the stud H on the engine-frame surrounded by said sleeved portion, the armed sleeve L, having
115 projections M M and carrying the pin b, the arc or quadrant K, secured to the armed sleeve, the sleeved nut N, slotted at a, the
120 surrounding spring O, and the jam-nut Q, substantially as described.

11. The combination of an oscillating lever,
125 a stud on the engine-frame on which it is fulcrumed, an armed sleeve supported on the stud alongside said lever, said armed sleeve being adapted for connection with the oper-
130 ating-cord and having the pin located as described, the sleeved nut, likewise on the stud and suitably slotted, as shown, and the coiled
135 spring surrounding said nut, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

ROBERT M. BECK.

Witnesses:

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D. K. WUNDERLICH.