

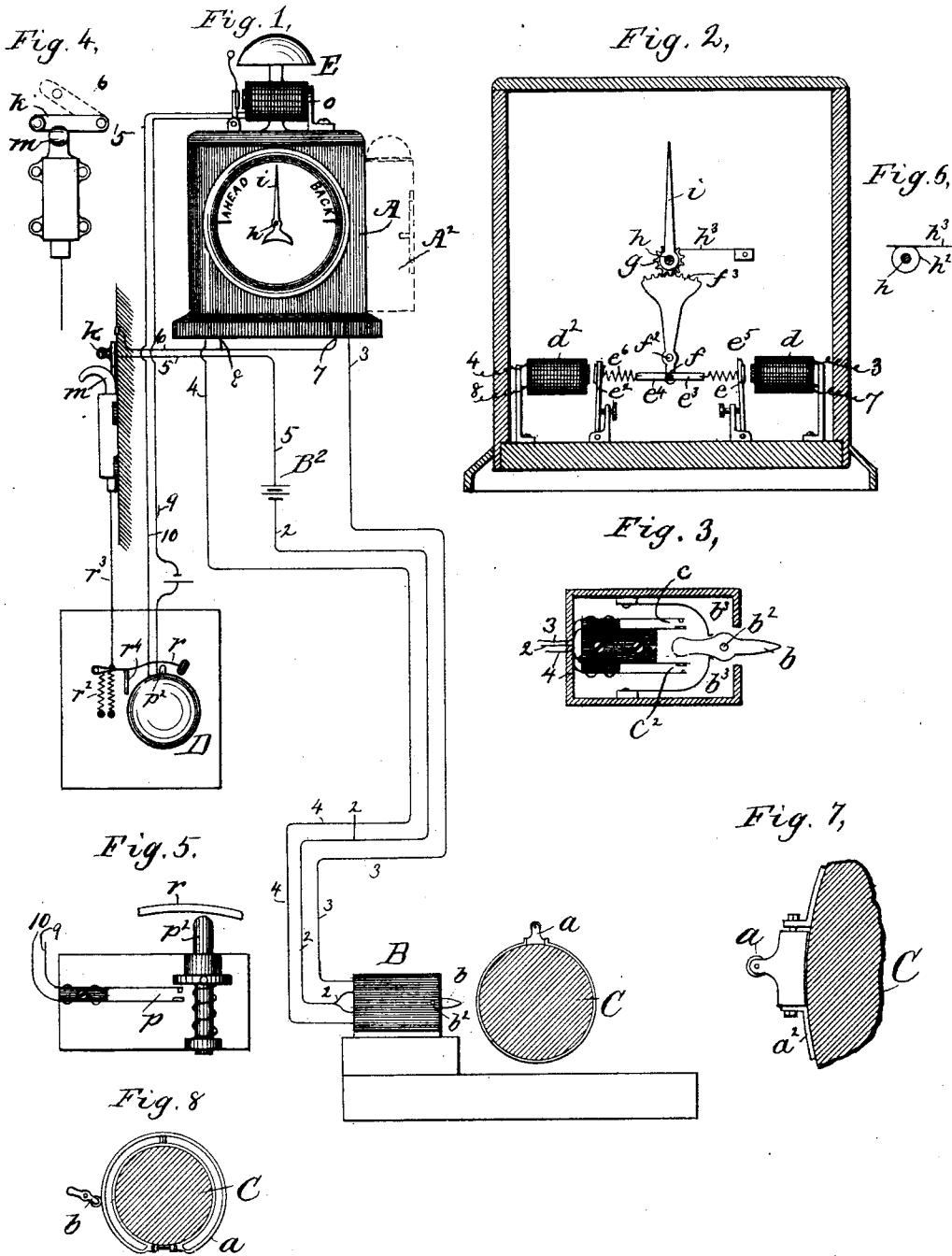
(No Model.)

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BELL AND ENGINE INDICATOR FOR PILOT HOUSES OF STEAM VESSELS.

No. 426,009.

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BELL AND ENGINE INDICATOR FOR PILOT-HOUSES OF STEAM-VESSELS.

SPECIFICATION forming part of Letters Patent No. 426,009, dated April 22, 1890.

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To all whom it may concern:

Be it known that I, WILLIAM E. HADLOCK, of Wenham, county of Essex, and State of Massachusetts, have invented an Improvement in Bell and Engine Indicators for Pilot-Houses of Steam-Vessels, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My invention relates to an indicator to be used in pilot-houses of steam-vessels, so as to indicate to the pilot the direction in which the engine is operating, and also to indicate or repeat in the pilot-house the operations of the signal-bell in the engine-room.

In steam-vessels a bell is used in the engine-room that is operated by the pilot in order to direct the engineer how to operate the engine, whether to stop or to go ahead or to go backward, and the proper management of the vessel depends upon the response of the engineer to such signals. Accidents have occurred to steam-vessels owing to the failure of the engineer to properly respond to the signals, and with the apparatus now commonly used the pilot has no means of knowing promptly whether or not the signals given by him have been properly acted upon, and, furthermore, he has no certain means of knowing whether or not the bell was actually rung by him, except the possibility of hearing the bell in the engine-room through a speaking-tube, or, more properly speaking, a sound-conducting tube that is usually employed between the engine-room and pilot-house. Such apparatus is not always satisfactory, as owing to other noises the bell cannot always be distinctly heard through the speaking-tube, and the pilot may suppose that the bell has sounded in response to his operation of the bell-pull, when, for some reason, it may have failed to operate.

The present invention is embodied in an apparatus comprising electric circuits extending from the pilot-house to the engine-room of a steam-vessel and a transmitting-instrument operated by the main shaft or other convenient part of the engine, by which electric impulses are transmitted to a receiving instrument or indicator in the pilot-house, which instruments are so constructed that the indicator shows in what direction the main

shaft of the engine is turning, and may also show, and in the apparatus in which the invention is herein illustrated does show, the speed at which the shaft is turning. The said circuit is also controlled by a switch arranged to be operated by the bell-pull, and the bell-hammer in the engine-room also operates a circuit-closer that controls a circuit containing an indicating-instrument in the pilot-house, which thus responds to the operation of the bell-hammer, such instruments being so made that the indicating-instrument operates only when the bell-hammer is moved far enough to actually strike the bell, so that when the pilot observes the operation of the indicating-instrument he is certain that the bell in the engine-room has given the corresponding signal.

Figure 1 is a diagram view showing the circuits between the engine-room and the pilot-house and the instruments in said circuits; Fig. 2, a front elevation of the main operative parts of the engine-indicator, the front part of its inclosing-case being removed; Fig. 3, a longitudinal vertical section of the transmitter or circuit-controlling instrument operated by the engine-shaft; Fig. 4, a detail showing the bell-pull and electric switch controlled thereby in front elevation; Fig. 5, a detail of the circuit-closer operated by the bell-hammer in the engine-room; Fig. 6, a detail of the engine-shaft indicator; Fig. 7, an enlarged detail of the devices on the engine-shaft that operates the transmitter for the indicating apparatus, and Fig. 8 a modification to be referred to.

The apparatus for indicating to the pilot the direction in which the engine is moving comprises an indicating-instrument A in the pilot-house and a transmitting-instrument B, properly arranged to be operated by some part C of the engine, preferably the propeller-shaft or paddle-shaft, although any part that reverses its direction of movement when the propellers or paddles have their direction of movement reversed may be used.

As shown in this instance, the part C, which will for convenience be called the "shaft," has fastened upon it a projection *a*, which thus turns with the said shaft and at each revolution engages the projecting end of a lever *b*, pivoted at *b*² in the box or case of the

transmitting-instrument B, thus turning the said lever *b* on its pivot in one or the other direction, according as the shaft C is turned. The said lever *b* is normally retained in an intermediate position between the position to which it is moved in one or the other direction by the projection *a* by means of springs *b*³, (see Fig. 3,) and the inner end of the said lever *b* is located between two circuit-controlling devices *c* *c*², each, as shown in this instance, consisting of two contact-springs normally separated from one another, but adapted to be pressed one into contact with the other by the lever *b* when it is moved by the projection *a* on the main shaft C, the said devices thus being normally-open circuit-closers. One of said circuit-closers, as *c*, is operated when the shaft C is turning in one direction, and the other, as *c*², is operated when the shaft is turning in the opposite direction, and, as shown in this instance, said circuit-closers control two practically independent circuits, both of which are operated by a battery B², (see Fig. 1,) the said circuits of which may be traced as follows: One pole of said battery is connected by wire 2 with one member of each of said circuit-closers *c* *c*², the other members of which are respectively connected with wires 3 and 4, that extend to the indicating-instrument A, at which one of said wires, as 3, is connected with one terminal of an electro-magnet *d*, (see Fig. 2,) and the other one 4 is connected with one terminal of another similar electro-magnet *d*². The other pole of the battery B² is connected by wires 5 and 6 with two branch wires 7 and 8, which are connected with the other terminals of said magnets *d* and *d*², respectively, thus completing two independent circuits, one including the magnet *d* and circuit-closer *c*, and the other including the magnet *d*² and the circuit-closer *c*². The armatures *e* *e*² of said magnets *d* *d*² are connected with an arm *f*, pivoted at *f*², and provided with a toothed arc *f*³, meshing with a pinion *g* on an arbor *h*, that is provided with a pointer *i*, visible at the front of the indicating-instrument A, as shown in Fig. 1.

The connection between the armatures *e* *e*² and the arm *f* is shown in this instance as made by links *e*³ *e*⁴ and springs *e*⁵ *e*⁶, making a somewhat elastic or extensible connection between each of said armatures and the arm *f*. As but one only of the circuit-closers *e* *e*² can be operated at a time by the lever *b*, one only of the magnets *d* *d*² can be energized at a given time, and when so energized it will attract its armature, and thus move both links *e*³ *e*⁴ and the arm *f* toward the magnet that is energized, both the springs *e*⁵ *e*⁶ yielding during such movement, which will cause the arm *f* and connected toothed sector *f*³ to vibrate, and thus rotate the pinion *g* and turn the pointer *i* in one direction.

The parts of the indicating-instrument thus far described are so proportioned as to give a considerable movement of the pointer *i* when

the magnet is energized, preferably turning it about quarter around to the marks at the side of the dial, Fig. 1, which are respectively characterized by the words "Back" and "Ahead," or words of similar signification. It is thus apparent that when the circuits of the battery B² are complete, except at the circuit-closers *c* and *c*², the pointer *i* will be vibrated once at each rotation of the shaft C and corresponding vibration of the actuator *b* for said circuit-closers, and will be vibrated in one or the other direction to the indication "Ahead" or "Back," according as the said shaft is turning in one or the other direction, and the pilot can by glancing at the indicator see in which direction the engine is turning and how rapidly it is turning. In order to bring the pointer to exactly the intermediate position after each vibration and to retain it there until the next movement, and to prevent oscillation past the intermediate or normal point, the shaft *h* is provided with a disk or hub *h*², (see Fig. 6,) which has a flattened portion, against which a light spring *h*³ rests, said spring being sufficiently strong to prevent oscillation of the pointer without materially opposing its movement when acted upon by the armature of the magnet.

As it will not be necessary to use the indicator when the engine is running steadily in one direction, the circuit of the battery B² is provided with a switch *k*, (best shown in Fig. 4,) one member of which is connected with wire 5, and the other member of which is connected with the continuation 6 of said wire, so that when the said switch is closed it completes the circuits of the battery B² to the circuit-closer in the transmitter B, but when open leaves the said circuits incomplete, so that the magnets *d* *d*² are unaffected, and the indicating-instrument A is thus relieved from continued action. The said switch *k* is so located with relation to the bell-pull *m*, by which the signal D in the engine-room is operated, that the bell-pull *m* cannot be moved to give a signal without closing the said switch, and accordingly whenever the pilot gives a signal calling for any change in the operation of the engine the engine-indicator is at once automatically, without any attention on the part of the pilot, placed in circuit, so that the indicator is in operative condition and shows immediately whether the engine has been operated in response to such signal, and if the engineer should fail to respond the pilot would immediately know it and could repeat the signal or take other necessary action, and it is apparent that such immediate knowledge on the part of the pilot may enable him to avoid a disaster which might occur from the failure of the engineer to act and the inability of the pilot to know of such failure until too late.

The indicating-instrument A may be provided with a lantern, as shown in dotted lines at A², Fig. 1, so as to illumine the dial, (which should be of translucent material,) and thus

render the indications visible at night without need of any external illumination in the pilot-house, which would interfere with the pilot's vision of outside objects.

5 In order that the pilot may know with certainty that the engine-bell D has been struck when he has operated the pull *m*, the apparatus comprises another indicator E in the pilot-house, shown as a tap-bell, the hammer of which is operated by an electro-magnet *e*, connected by circuit 9 10 with a circuit-closer *p*, (see Fig. 5,) that is operated by a plunger *p*² in position to be engaged and moved by the hammer-arm *r* of the engine-bell D. The said hammer-arm *r* is acted upon by strong springs *r*², that move toward the bell, it being drawn away therefrom by the wire *r*³, connected with the pull *m*. The bell is consequently struck upon the release of the pull *m* after it has been raised or pulled by the operator, and if the operator should decide not to ring the bell after the pull has been raised the said pull can be let down slowly, so that the hammer-arm will move forward slowly against the stop *r*⁴ without striking the bell. The plunger *p*² is so located that when the hammer-arm *r* is against its stop *r*⁴ it does not engage the said plunger, or at least does not move it far enough to operate the circuit-closer, and the said plunger is engaged and moved to close the circuit-closer *p* only when the hammer-arm springs forward by the momentum of the hammer, as takes place when the arm is moved up suddenly against its stop *r*⁴, so that in case the operator should decide to let the pull down gently the plunger *p*² would not be operated, and it is only when the pull is properly operated to permit the hammer to strike the bell that the plunger *p*² and circuit-closer *p* are also operated to close the circuit of the magnet *e* and cause the indicating-bell E to be operated. The said indicator E thus repeats with certainty the signals of the bell D, and if for any reason the bell D should not be struck, or if, on the other hand, it should be struck when it is not intended that it should be, the bell F will indicate such failure or such stroke, so that the pilot may take the proper action promptly.

It is obvious that the construction of the various parts may be widely varied without departing from the essential features of the invention, and numerous modifications will be readily suggested to one familiar with apparatus of this kind. The construction shown is, however, considered to be very efficient and desirable, as all the parts are positive in their operation and do not in any way interfere with the normal action of the existing apparatus to which they are applied.

Fig. 7 indicates the manner in which the projection *a* may be attached to the shaft C without in any way injuring or defacing the said shaft, the projection being fastened to the side of the shaft by a flexible band *a*³, of metal—such, for example, as sheet-brass—

which may be bent around the shaft and have its ends bolted or otherwise fastened to the rigid piece on which the projection *a* is made.

It is desirable to provide the projection *a* with an anti-friction roller, as shown.

If desired, the pointer *i* may be caused to remain longer in its indicating positions by lengthening the end of the projection *a*, which might, if desired, be extended nearly around the shaft, as indicated in Fig. 8, having merely a small opening or space to admit of the reversal of the position of the actuator *b* for the circuit-closers. In this construction the end of the lever *b* should be provided with a roller. In such construction the pointer should remain a greater part of the time in the position indicating the direction of movement of the engine and would return momentarily to its normal position once at each revolution, so that the pilot could observe the rapidity of movement of the engine.

Care should be taken to set the projection *a* so that it is about in engagement with the lever *b* when the engine is at the dead-center position, so that the projection and lever will not be in contact when the engine is stopped, as it is always the intention to stop the engine away from its dead-center position.

The revolutions of the engine-shaft will usually make the vibrations of the pointer *i* sufficiently rapid to be readily observed by the pilot by merely glancing at the indicator without withdrawing his attention from other objects which it may be necessary for him to watch in order for him to properly control the vessel.

I claim—

1. An indicating apparatus for steam-vessels, comprising a circuit connecting the engine-room and the pilot-house, a transmitter operated by the shaft or other moving part of the engine and connected by said circuits with an indicating-instrument in the pilot-house, a switch controlling said circuits, and a bell-pull in the pilot-house for operating a bell in the engine-room, the said switch being in the path of said bell-pull, as set forth, whereby the said circuits are placed in operative condition when the bell-pull is operated, substantially as described.

2. The combination of a bell-pull located in the pilot-house of a steam-vessel, and the bell in the engine-room operated thereby, with a circuit-closer and actuator therefor operated by the hammer of said bell and a signaling-instrument located near the bell-pull included in and controlled by the said circuit, substantially as and for the purpose described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

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Witnesses:

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