(No Model.) 3 Sheets—Sheet 1.

A. GROSS.

ELECTRIC ALARM FOR SHIPS' COMPASSES.

No. 381,693. Patented Apr. 24, 1888.

Fig. 1.

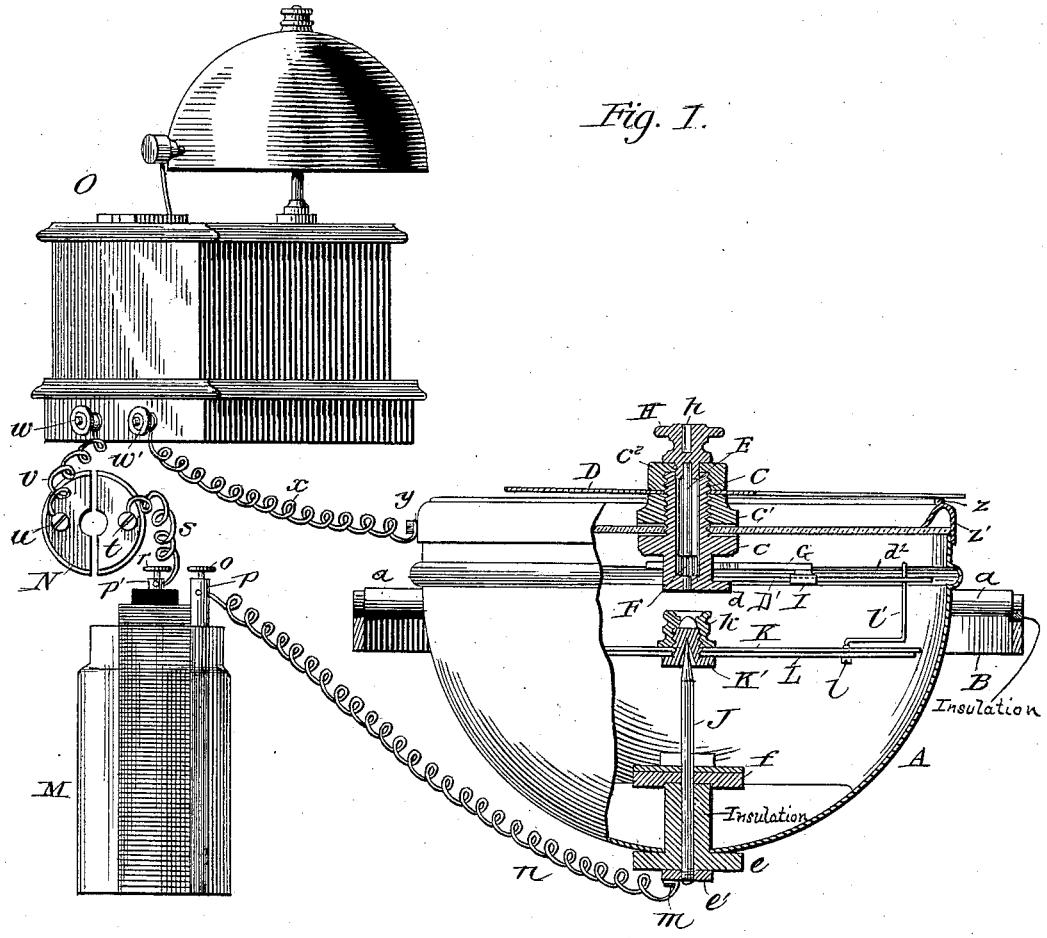

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Fig. 2.

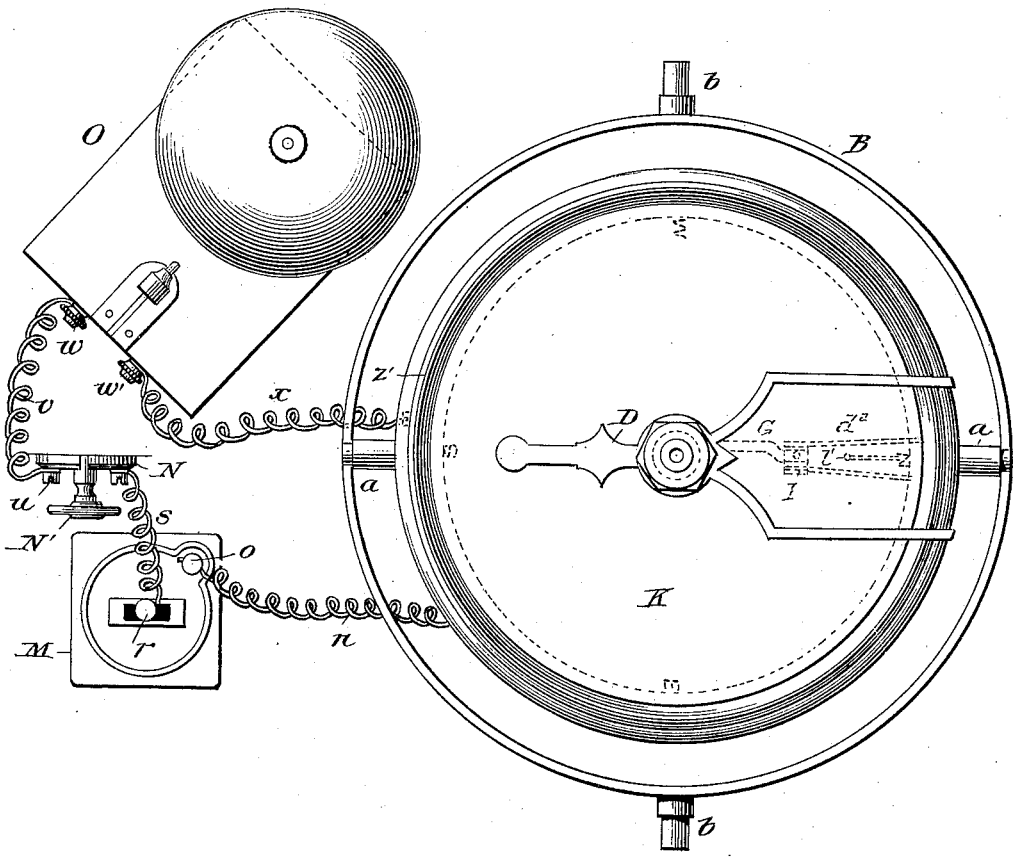

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Fig. 3.

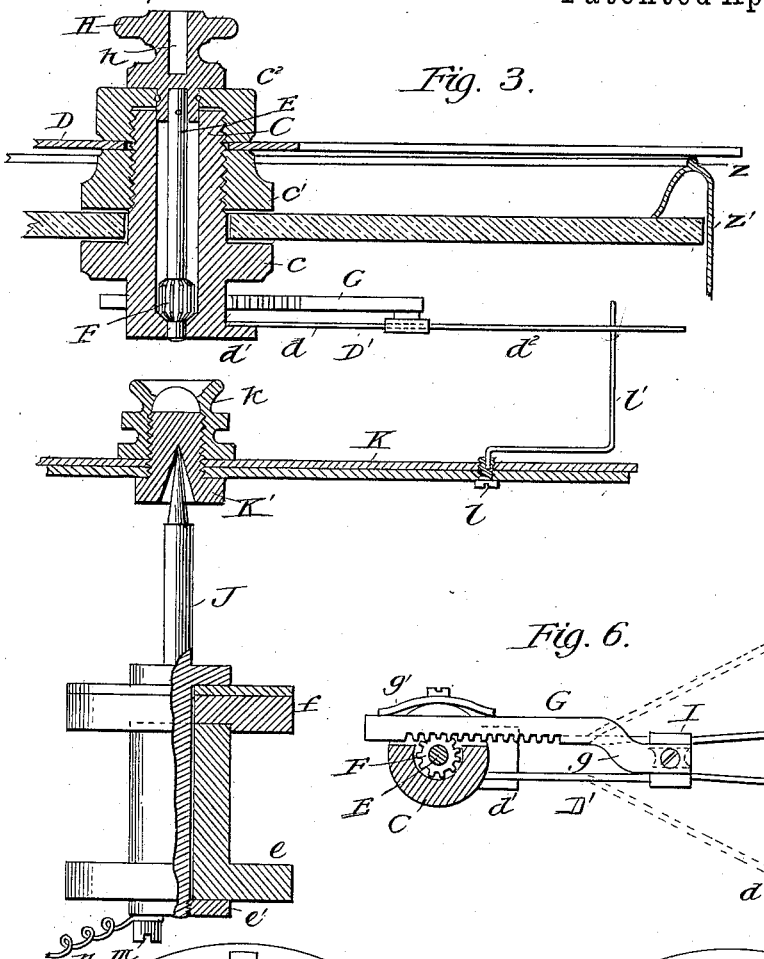


Fig. 6.

Fig. 4.

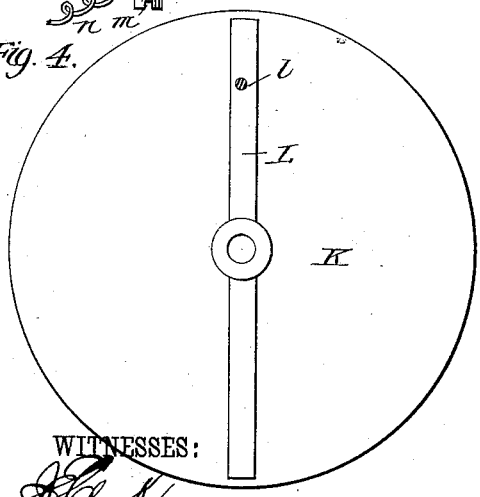
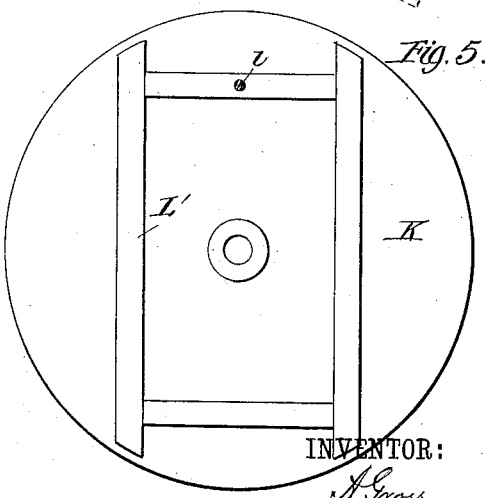


Fig. 5.



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UNITED STATES PATENT OFFICE.

AUGUSTUS GROSS, OF NEWCASTLE, NEW SOUTH WALES.

ELECTRIC ALARM FOR SHIPS' COMPASSES.

SPECIFICATION forming part of Letters Patent No. 381,693, dated April 24, 1888.

Application filed October 11, 1887. Serial No. 251,996. (No model.)

To all whom it may concern:

Be it known that I, AUGUSTUS GROSS, nautical-instrument maker, a subject of the Queen of Great Britain, residing at Newcastle, in the Colony of New South Wales, Australia, have invented an Electrical-Alarm Appliance for Mariners' Compasses, of which the following is a full, clear, and exact description.

The invention consists in placing an alarm bell or bells in electrical connection with a mariner's compass and its course-setters, whereby, upon any deviation of the vessel from its established course, an alarm is sounded to give notice of such deviation to the commander of the vessel, and further consists in the construction, arrangement, and combination of parts hereinafter described and claimed.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the views.

Figure 1 is a side elevation, partly sectional, of the bowl of an ordinary compass and its attachments, showing my improvement as applied thereto. Fig. 2 is a plan view of the same. Fig. 3 is an enlarged vertical sectional view of part of the compass-bowl and its mechanism. Fig. 4 is a plan view of the under side of the compass-card, having a single-bar magnet applied thereto. Fig. 5 is a plan view of the same, having a compound-bar magnet applied thereto; and Fig. 6 is a plan view of a portion of the mechanism below the glass of the compass-bowl and the rack for operating the same.

The bowl A of the compass is insulated from the binnacle B by small plates of vulcanite, ivory, or other non-conducting material, of suitable thickness, placed in the sockets in the binnacle for the gimbals *a* of the compass to hang in. The binnacle B hangs on gimbals *b*.

Through the glass of the compass-bowl passes a hollow axle, C, which is provided with a collar, *c*, fitting against the under surface of said glass, said axle extending downward in said bowl to a short distance above the surface of the compass-card. Said axle is threaded upon its exterior, and is fixed in place by a clamping-nut, *c'*, adapted to be screwed down upon the upper side of said glass. Upon said axle is tightly fitted a forked course-setter, D, preferably constructed of brass, about one-fourth of an inch wide and one-sixteenth of an inch thick, which is held on said axle between the nut *c'* and a nut, c^2, screwed upon the upper end of said axle. Said course-setter inclines downwardly toward its extremities, giving it a slight spring, and so that its extremities rest firmly on the rim or bezel of the compass-bowl to make a good connection therewith. At the lower end of said axle is fixed, about an inch above the compass-card, another forked course setter, D', composed of a strip of brass, *d*, about an inch wide and a sixteenth of an inch thick, and of such a length that its outer extremity reaches within about three and three-fourths inches of the periphery of the compass-card, its length varying according to the diameter of the compass. Said strip is soldered to a flange, *d'*, at the lower end of the axle C, and to the outer end of said strip are soldered, at about one-fourth of an inch apart, two fine gold wires, d^2, about a sixty-fourth of an inch in diameter, and of sufficient length to reach the periphery of the compass-card. Said wires are bent away from each other at their junction with the strip *d*, so as to give them a V shape and an outward spring. The distance intervening the outer extremities of said wire when fixed as aforesaid will necessarily vary according to the diameter of the compass. In a compass having the dimensions of that shown in the drawings, the diameter of which is eight inches, said wires will have as their widest range apart a distance of nearly three inches.

A spindle, E, passes through the axle C, and carries near its lower extremity a pinion, F, which gears with a rack, G, having an inwardly-curved extremity, *g*, and adapted to slide in said axle parallel with the compass-glass, against which rack bear the ends of a spring, *g'*, attached to said axle, and upon the upper end of said spindle is fitted a milled nut, H, which bears upon and extends above the nut *c'* of said axle. Said nut H is preferably provided with a central aperture, *h*, in its top, adapted to receive an azimuth style or pin for making nautical observations.

The wires of the course-setter D' are passed through grooves in a block, I, attached to the outer curved end of the rack G, and adapted to be moved back and forth on said wires as

said rack is moved by means of the spindle and its nut and pinion. When said block is close to the axle, it will allow the outer extremities of the wires d^2 of the course-setter D' to spread apart to the full extent of the distance they are adapted to cover. When and as said block is moved away from said axle, it will bring the outer extremities of said wires closer together, and ultimately allow of their being brought within one-fourth of an inch of each other, which will cause them to cover four degrees on the compass-card.

The pivot J, upon which the compass-card plays, is of the usual construction, except that it is insulated from the bowl of the compass by a washer, *e*, of vulcanite, ivory, or other non-conducting material, fitted around said pivot outside of the bowl, a portion of said washer extending up within the bowl, and also by a washer, *f*, of like non-conducting material, fitted around said pivot inside of the bowl, and in contact also with the upper portion of the washer *e*. A nut, *e'*, screwed upon the lower end of said pivot to a bearing against the washer *e*, serves to hold said pivot to place in the compass-bowl.

The compass-card K is of the usual character, except that I provide it with a cap, K', of the best silver-steel tempered to diamond hardness, and burnish it into the brass mount *k*, said steel cap being used in substitution as a conducting material for the ordinary agate cap, but of the same shape, being preferable, also, to the agate cap on account of its durability. Beneath said compass-card is held either a single-bar magnet, L, or a compound-bar magnet, L', the connection of the same being established by means of a brass screw, *l*, passed through proper apertures in said card and in the bar of the magnet L or the north cross-bar of the magnet L'. To said screw is soldered a piece of fine platinum wire, *l'*, which is bent at a right angle, so as to give it spring-power, its free end extending upward between and a short distance above the wires of the lower course-setter, as shown in Fig. 1 of the drawings.

In the nut at the lower end of the pivot J is fitted a binding-screw, *m*, to which is attached one end of a wire, *n*, the other end of which is attached, by a binding-screw, *o*, to one pole, *p*, of battery M, which may be located in an adjacent locker, in the captain's cabin, or in any other proper and convenient place. By preference, I use a Leclanché battery of four or more cells, according to the size of the electric bell to be operated, it being understood, however, that any other battery suitable for the purpose may be employed, if desired. To the other pole, *p'*, of said battery is attached by a binding-screw, *r*, a wire, *s*, which is in turn attached by a binding-screw, *t*, to one half of a divided switch-plate, N, of suitable conducting material adapted to receive a switch-key, N'. To the opposite half of said switch-plate is attached, by a binding-screw, *u*, a wire, *v*, which is in turn attached to the binding-screw *w* of an electric bell, O, of any approved construction, which bell may be located on the bridge of the vessel or in any other convenient and desired place. The switch-plate N may also, for convenient use, be fixed on the bridge of the vessel, if desired, and several switch-plates may, if preferred, be located at different points in the circuit of the conducting-wires. To the other binding-screw, *w'*, of said bell is attached a wire, *x*, which is in turn attached by a binding-screw, *y*, to a contact with a piece of platinum wire, *z*, about one thirty-second of an inch in diameter, soldered on the top of the compass-bowl, in the center of its bezel, *z'*. Said wire *z* serves for the more efficient conduct of the electric current, which might be impeded in its course by the oxidizing of the brass bezel.

I insulate the whole of the connecting-wires excepting the immediate ends thereof attached to the binding-screws, portions of the wires immediately in contact with the compass-bowl being lightly insulated, as a heavy insulating-covering would tend to impede the swing of the bowl with the motion of the vessel. As a protection against the action of salt water, the best quality of copper wires should be used as connections between the battery and the compass-bowl.

In arranging the apparatus for operation the platinum wire *l'* is brought midway between the wires d^2 of the course-setter D' by slightly lowering with the hand the portion of the bowl A opposite said wire *l'*, so as to raise the outer extremities of said wires d^2 above the wire *l'*, and then turning the course-setter D on the axle C, which carries the course-setter D' at the same time in the same direction, until the wire *l'* occupies a position equidistant from each of the wires d^2. The milled nut H is then turned. The pinion F acts upon the rack G to move the sliding block I upon the wires d^2 of the course-setter D' until the outer extremities of said wire are brought within the distance of each other requisite to show the deviation desired. Thus a distance showing two degrees upon the compass-card, one on each side of the wire *l'*, will serve to indicate a deviation on either side of one degree, and a distance of two points a deviation on either side of one point, &c. The switch-key is then properly inserted in the switch-plate.

If the ship's course, according to instructions, is kept exact by the steersman, the wire *l'* will remain exactly between the wires of the course-setter D'; but a deviation to either side of the established course to the extent to which said course-setter is set will bring the wire *l'* into contact with one or the other of the wires d^2, and, thus completing the circuit, will sound the alarm-bell O, which will continue to ring so long as such contact exists, and be renewed by a deviation to the other side of the course. In the event of its becoming necessary to suddenly alter the vessel's course before the disconnecting-switch can be

used, the wires of the course-setter D′ will spring over the wire *l*′ without causing injury to the apparatus.

The desired object of checking errors on the part of the steersman may be effected by placing the alarm apparatus on the bridge of the vessel or connecting it with a standard compass out of the reach of the steersman, and the alarm-bell may be fixed on the bridge within the hearing of the officer on watch, or in any other convenient place, and two or more bells may be connected with the compass, if desired.

A marine compass not provided with my improvement may be supplied with the same at a trifling expense by the additions and alterations thereto herein indicated, and by the substitution of the steel cap for the agate cap of its card or dial.

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

1. An improved mariner's compass consisting of a bowl insulated from the binnacle and having a conducting-wire on its bezel, a hollow axle passing vertically through the compass-glass, forked course-setters, one having rigid and the other flexible arms, and fitted to said axle one above and the other below the compass-glass, a spindle in said axle, fitted with a milled nut and carrying a pinion at its lower end, a rack in said axle, engaged by said pinion and attached to a block adjustable on the arms of the lower course-setter, a compass-card having a cap of diamond-hard steel in its center, a bar-magnet secured beneath said card, a pin connected to said magnet and projecting above the north point of said card between the arms of the lower course-setter, a pivot insulated from said bowl and on which said card plays, and conducting-wires respectively connecting said pivot and the bezel of said bowl with an electric battery and an alarm-bell, all constructed, arranged, and adapted to operate substantially as shown and described, and for the purpose herein set forth.

2. In a mariner's compass, the combination, with the bowl A, insulated from the binnacle B, and provided with the conducting-wire *z* in its bezel, the hollow axle C, spindle E in said axle, provided with milled nut H and pinion F, the rack G, engaged by said pinion, the course-setters D D′, fitted on said axle, one above the other, the block I, attached to said rack and movable on the arms of the course-setter D′, the compass-card K, having a steel cap, K′, in its center, a vertical pin, *l*′, near its periphery, and a bar-magnet secured to its under side, and the pivot J, insulated from said bowl and on which said card plays, of an electric battery, M, and an alarm-bell, O, and connections, as specified and shown, between said battery and bell, and the bezel of said bowl and the pivot on which the compass-card plays, substantially as shown and described, for the purpose herein set forth.

3. In a mariner's compass, the combination, with the bowl A, the hollow axle C, the spindle E in said axle operated by the milled nut H and carrying the pinion F, of the forked course-setter D, fitted on said axle above the compass-glass and having rigid arms, the forked course-setter D′, fitted on said axle below the compass-glass and having flexible arms, and the rack G in said axle engaged by the pinion F and attached to the block I, movable on the arms of the course-setter D′, substantially as shown and described, for the purpose herein set forth.

4. In a mariner's compass, the combination, with the hollow axle C, spindle E in said axle, provided with the nut H and pinion F, and the rack G, engaged by said pinion, of the forked course setter D′, having flexible arms and fitted on said axle below the compass-glass, and the block I, attached to said rack and movable on the arms of said course-setter, substantially as shown and described, for the purpose herein set forth.

A. GROSS.

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E. COCKS.