(No Model.) 3 Sheets—Sheet 1.

J. H. CROSBY & F. MOSSBERG.

AUTOMATIC SIGNALING APPARATUS.

No. 428,667. Patented May 27, 1890.

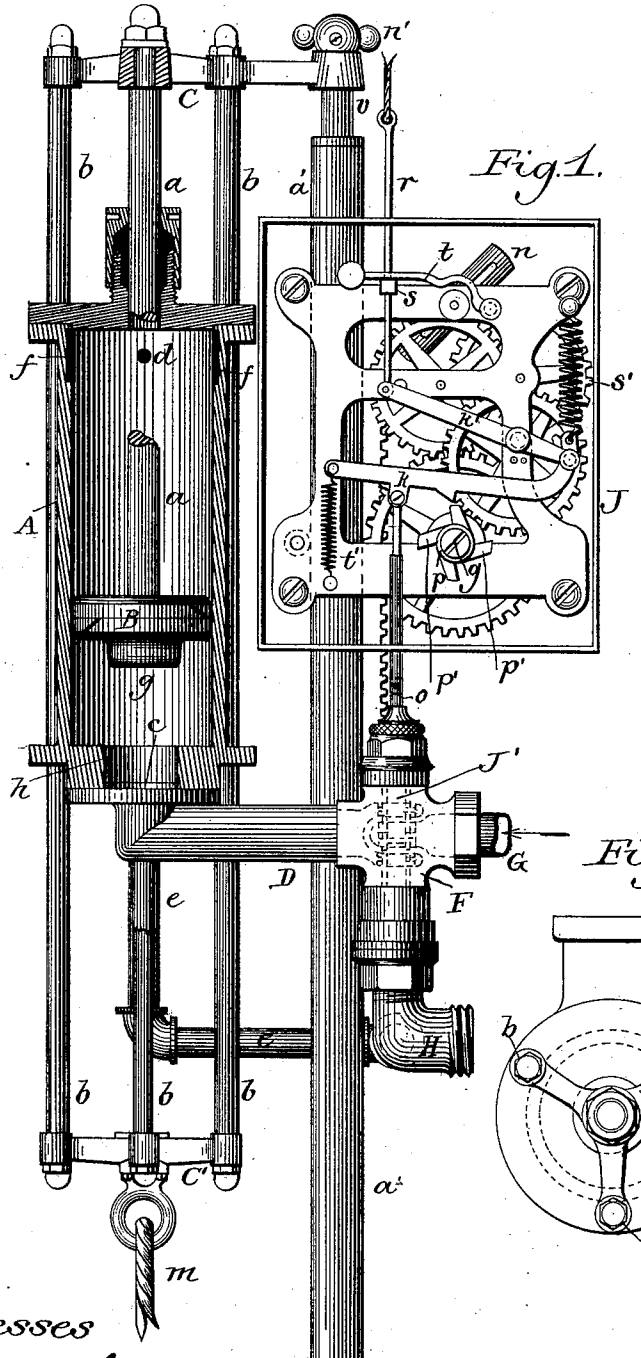


Fig. 1.

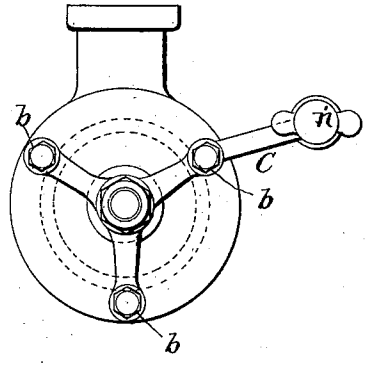


Fig 2.

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(No Model.) 3 Sheets—Sheet 2.

J. H. CROSBY & F. MOSSBERG.

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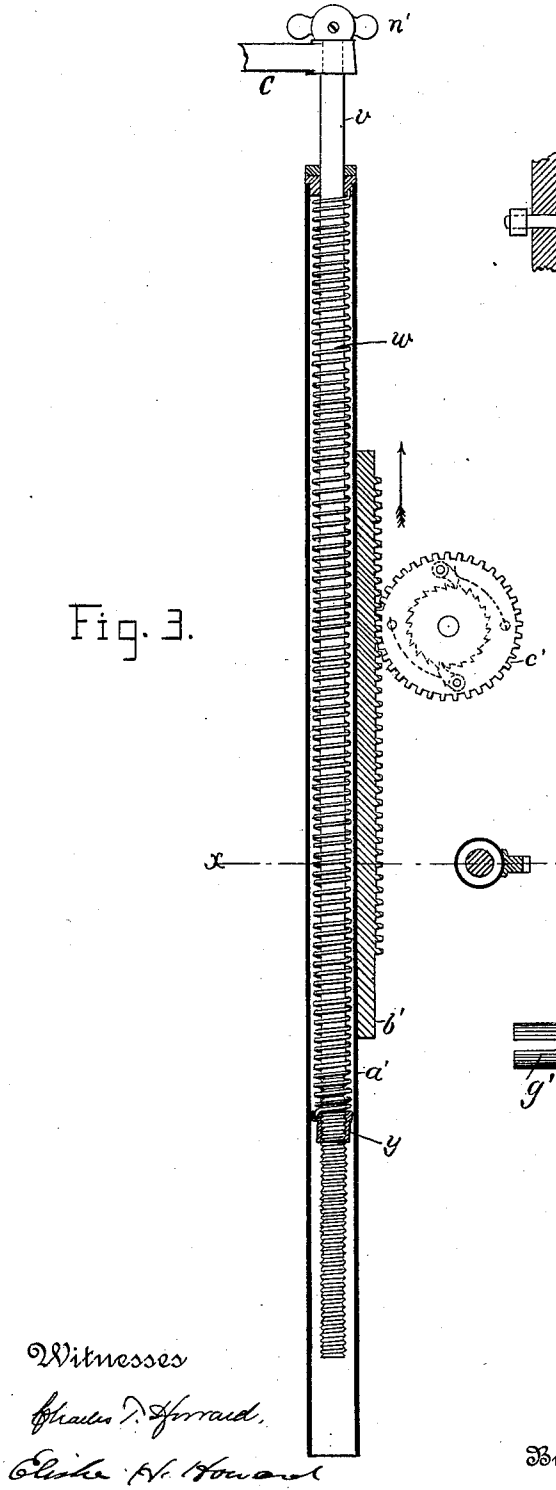


Fig. 3.

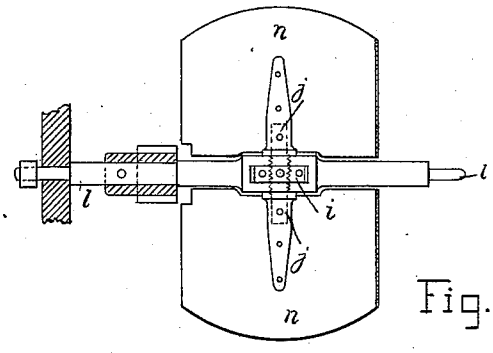


Fig. 5.

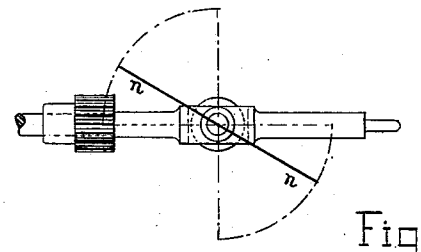


Fig. 6.

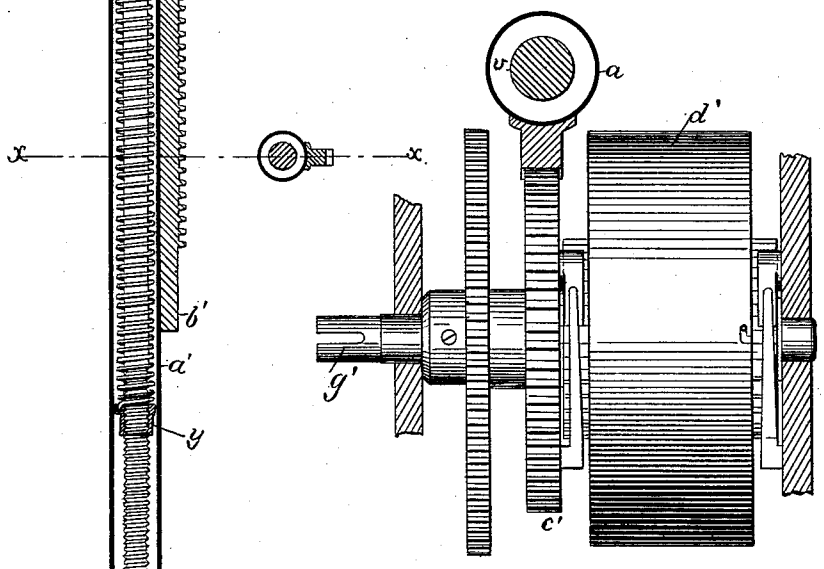


Fig. 4.

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J. H. CROSBY & F. MOSSBERG.

AUTOMATIC SIGNALING APPARATUS.

No. 428,667. Patented May 27, 1890.

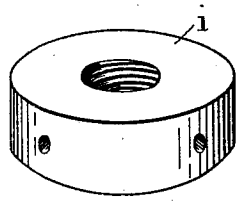


Fig. 7.



Fig. 8.

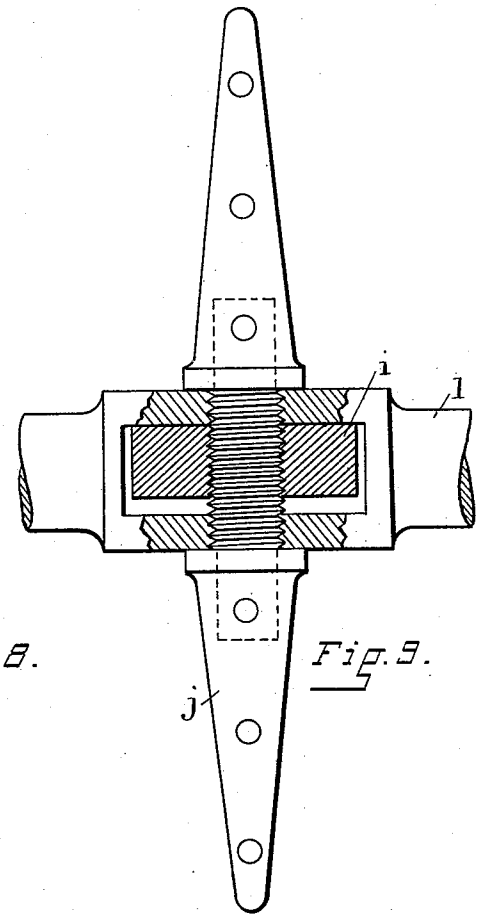


Fig. 9.

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UNITED STATES PATENT OFFICE.

JAMES H. CROSBY, OF BOSTON, MASSACHUSETTS, AND FRANK MOSSBERG, OF PROVIDENCE, RHODE ISLAND, ASSIGNORS, BY MESNE ASSIGNMENTS, TO THE CROSBY AUTOMATIC SIGNAL COMPANY, OF PROVIDENCE, RHODE ISLAND.

AUTOMATIC SIGNALING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 428,667, dated May 27, 1890.

Application filed April 4, 1889. Serial No. 305,989. (No model.)

To all whom it may concern:

Be it known that we, JAMES H. CROSBY, of Boston, in the State of Massachusetts, and FRANK MOSSBERG, of Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Automatic Apparatus for Operating Signals; and we do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to that class of automatic apparatus for operating signals operated by steam or air whereby a succession of intermittent blasts or sounds are made by means of a whistle or other suitable device, controlled in number and duration of signals by means of a train of clock-work—such an apparatus, for instance, as that described in United States Letters Patent No. 355,639, issued to J. H. Crosby (one of the present applicants) in January, 1887, upon which invention these improvements are made, their object being primarily to effect an automatic winding up of the clock-work employed to regulate the action of the apparatus, with a due regard to preventing injury to the same by overwinding. There are also modifications of some of the parts in shape, position, and mode of operation, as in the way of using and connecting the piston-rod, manner of cushioning the piston, devices for regulating the clock-fan, &c., which are illustrated in the drawings.

Figure 1 shows a front elevation of the signaling apparatus, a part of the front of the cylinder being broken away to show the upper and lower cushioning devices. Fig. 2 is a top view of the cylinder and cross-bars. Fig. 3 shows a vertical cross-section of the winding-connections. Fig. 4 shows a horizontal cross-section of the winding apparatus and its connections. Fig. 5 is a front elevation of the fan. Fig. 6 shows a top view of the same. Figs. 7, 8, and 9 show enlarged views of some of the parts of the fan.

The apparatus as modified consists of an upright cylinder A, having a piston B fitted to slide steam-tight in it by means of a suitable packing in the usual way of steam-cylinders. The rod *a* to this piston passes out through a stuffing-box in the upper head of the cylinder, and has a three-armed cross-bar C attached to its upper end, the arms of which extend out over the cylinder far enough on three sides (see Fig. 2) to receive the upper ends of the connecting-rods *b b b*, which are secured to the arms by screw-nuts and extend down on each side of the cylinder to similar cross-bar C′, to the arms of which they are fastened in like manner as at the top. These rods *b* are made long enough to allow the piston to rise to the top of the cylinder without bringing the lower cross-bar against the bottom of the cylinder. A passage *c* in the lower cylinder-head, which opens into the center of the cylinder, serves both for an admission-port and an exhaust-port for the steam used in the cylinder. This passage is connected by the pipe D to the valve-case F, to the opposite side of which the steam-supply pipe G is connected, and to the lower side of which the exhaust-pipe H is connected.

The necessity for cushioning the piston at both ends of its stroke has been found in the practical working of the signaling apparatus described in the Letters Patent before mentioned to be very great, as the effect of the momentum of the moving parts is quite destructive to some portions of the apparatus.

The required cushioning is provided for as follows: To relieve the cylinder A of the air above the piston when it rises, a port *d* is made in the side of the cylinder, near the top, which may open out into the air or be connected by a pipe *e* to the exhaust-pipe H below. The port *d* is placed far enough down from the top to be covered by the piston-head before it reaches the upper end of its stroke and cut off a portion of the air from escaping, which amount of air, being confined between the cylinder-head and the piston, serves as a cushion to the latter; and to further increase the effect one or more channels *f* are made in the inside surface of the cylinder at the top, which

channels extend down far enough for the piston-head to pass over and open their lower ends as it closes the port *d*, and thus allow the steam from below to pass around to the upper side of the piston-head, and thus check its motion.

The cushion for the return-stroke of the piston is obtained by making a recess *h* in the lower cylinder-head and putting a projection *g* on the under side of the piston-head that shall fit closely into the recess, so that when the piston has descended low enough for the end of the projection *g* to enter the recess *h* the exhaust of a portion of the steam is cut off, and it will remain and form a cushion between the cylinder-head and piston.

The valve for admitting the steam to the cylinder and to allow it to exhaust is placed in the case F, and is preferably the valve patented to one of the present applicants in June, 1886, No. 344,724; but any suitable valve may be used with the apparatus.

The motor used to control the number and duration of the signals is a clock-train, and is held in the case J. It may be run by a spring or weight, and, like the striking-train of a clock, its speed is governed by a fan. This fan is shown in Figs. 5 and 6, also in Figs. 7, 8, and 9. It has an arrangement for increasing or diminishing the speed of the clock, as follows: The fan consists of two wings *n*, fastened on a spindle *j*. The spindle has a screw-thread made on its middle portion and a check-nut *i* fitted thereon. The center of the fan-shaft *l* is enlarged and a slot cut therein to receive the check-nut *i*. The spindle *j* of the fan passes through the fan-shaft *l* at right angles to the slot in the shaft, and through the nut *i*, placed in the slot. The nut *i*, as herein represented, (see Fig. 7,) is a collar having a screw-thread made on its inside to fit the thread on the spindle *j*, and it has holes made in its periphery to receive the end of a rod or spanner-wrench for the purpose of turning it. This nut *i*, when turned so as to be in the middle of the slot and not touch either side thereof, will leave the spindle *j* free to be turned to set the fan-wings; but when the nut *i* is turned on the spindle *j* in either direction, so as to screw up against one side of the slot, it will bind up that part of the shaft between the nut and shoulder of the spindle on the outside and prevent the spindle *j* from turning out of position in the shaft of the fan.

The adjustment of the speed of the clock by means of the fan is as follows: If the fan-wings are placed in a line parallel with the fan-shaft, the point at which they receive the greatest resistance from the air in revolving, (see Fig. 5,) and it is found that the clocks run too slow, the check-nut *i* can be loosened and the wings of the fan set at an angle more or less to the line of the shaft *l*, (see Fig. 6,) so as to receive less resistance from the air, and the check-nut *i* turned up tight against one side of the slot to hold the wings in that position.

The clock operates the valve J′ by means of a cam *p*, fast on the shaft *g*′. This cam has one or more projections *p*′ on its periphery, according to the number of signals to be made in a certain time. When the clock is set in motion, the cam *p* revolves and one of its projections raises the lever *k*, which opens the valve J′ by its stem *o*, to which the lever *k* is connected. This admits the steam to the cylinder A, which raises the piston B and cross-bars C C′ and draws on the signal-cord *m*, attached to the lower cross-bar C′ and having its other end made fast to the valve-lever of a whistle or other signaling device. When the piston is raised, the signal sound will be made, and the time the piston remains up depends on the speed of the clock and the length of the face on the projection *p*′ of the cam *p*. When the cam projection has passed out from under the lever *k*, it will drop and let the valve-stem move down, closing the steam-inlet to the cylinder and opening the passage from the same to the exhaust-pipe. The steam will then pass out of the cylinder, letting the piston down, and allow the whistle-valve to close. The clock is kept from starting by means of a friction-lever *t*, which, when desired, comes in contact with the fan-shaft or a wheel on that shaft.

Two levers *k* and *k*′ are placed on the front of the clock. The upper one *k*′ is pivoted at a point between its middle and one end, and the lever *k*′ is attached to the end of the lever *k* by a pivot passing through the ends of both levers. A close spiral spring *s*′ has its lower end attached to the lever *k* at or near the junction and its upper end fast to the clock-frame to draw those ends of the two levers up, and a lighter close spiral spring *t*′ is attached to the free end of lever *k* to draw that end down. The lever *k* has a projection on its under side that rests on the top of the cam *p*. A rod *r* or other similar medium of connection is made fast to the free end of the lever *k*′ and is carried up to the pilot-house or office or other place from which it is desired to operate the apparatus. A collar *s* is made fast on the rod *r*, so as to engage with the friction-lever *t* when raised.

To start the clock the rod *r* is drawn up, thereby raising the end of the lever *k*′ connected to it and depressing its other end and the end of the lever *k* pivoted to it. This brings the projection on the latter lever in position to be operated by the cam *p*. The clock-train is started at the same time, the friction-lever being raised from the fan-shaft by the collar *s* on the rod *r*, allowing that shaft to turn, and the cam *p* will at once commence raising and dropping the lever *k* and valve-stem, and thus alternately admit and exhaust the steam to and from the cylinder.

The winding attachment is shown in Fig. 3. It consists of a rod or tube *v*, which passes up through an extension of one arm of the cross-bar C, and a handle *n*′ is made fast on its end. The lower end of the rod *v* has a

screw-nut y fitted on it. An open spiral spring w is placed on the rod v, the lower end of the spring being made fast to the screw-nut y and its upper end to the top of the case a'. This case or tube, which covers rod v and spring w, has a toothed rack b' attached to one side, the teeth of which engage with a gear-wheel c', loose on the spring-shaft of the clock. This gear-wheel c' is connected with the spring-case d' by a ratchet-wheel and pawl in the usual way. (See Fig. 4.)

The clock-spring is wound up by the motion up of the piston in the cylinder, which draws up the rod v by the cross-bar C, and by means of the spring w raises the case a' and rack b', which turns the wheel c', that carries the spring-case d', by means of a ratchet-wheel and pawl, as before stated.

The object of the spring w is to prevent overwinding of the clock-spring by yielding when the clock is wound clear up and allowing the rod v to be moved up and down by the cross-bar without moving the case and its rack. To increase the pressure of the spring w on its case and make the rack work with more force on the clock-spring, the rod v can be turned by the handle n', and the nut y, being held by the end of the spring, will be screwed up on the rod, so as to compress the spring and cause it to exert more force on the case at the top.

Having thus described these improvements, what we claim as our invention is—

1. In an automatic apparatus for operating signals, the rod v, surrounded by a spiral spring and inclosed in a tube having a toothed rack attached to one of its sides, the teeth of said rack engaging with the teeth of one of a clock-train of wheels, in combination with a clock-train and a steam-cylinder A, cross-bar C, said cross-bar being attached to the end of a piston-rod operating in said cylinder and to the end of rod v, substantially as and for the purpose set forth.

2. In an automatic apparatus for operating signals having its signaling operations controlled by a clock-train, an adjustable fan having wings capable of being turned on a center from a position in which the plane of the wings is parallel to the line of the fan-shaft to a position in which said plane will be at right angles to the fan-shaft, and a check-nut on said fan-center for securing the wings in any position, in combination with a clock-train of wheels, a shaft of said train provided with cam p, and valve-rod o, provided with a lever operated by said cam, substantially as and for the purpose specified.

3. In an automatic apparatus for operating signals having its signals governed by a clock-train, the lever k', pivoted to the frame and provided with a starting-rod r, pivoted to the said lever at one end, the lever k, pivoted to the said lever k' at its other end, a shaft of the clock-train provided with a cam p, operating said lever k, the valve-rod o, attached to the lever k', and springs s' t', connected to said frame and the opposite ends of said lever k, in combination with tube a', having rack b' thereon, and means for operating said tube, substantially as set forth.

4. In an automatic apparatus for operating signals regulated by a clock-train, the combination of the starting-rod r, having an adjustable collar s, the brake-lever t, pivoted to the clock-frame, which when in contact with the fan-shaft stops the clock and when drawn away from said fan-shaft by collar s allows the clock-train to start, the fan-shaft l, provided with fan n, the lever k', pivoted to said frame, the lever k, pivoted to said lever k' and operating the valve-rod o, and the cam p, operating lever k, substantially as and for the purpose set forth.

5. The combination of a steam-cylinder and piston to operate a signal with a clock-train having a cam on one of its shafts, and a lever operated by said cam, said lever connected to a valve-stem which controls the admission of steam to the cylinder to regulate the occurrence and duration of the signals, said piston being connected with the clock-train to wind it up when operating the signals, substantially as and for the purpose set forth.

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