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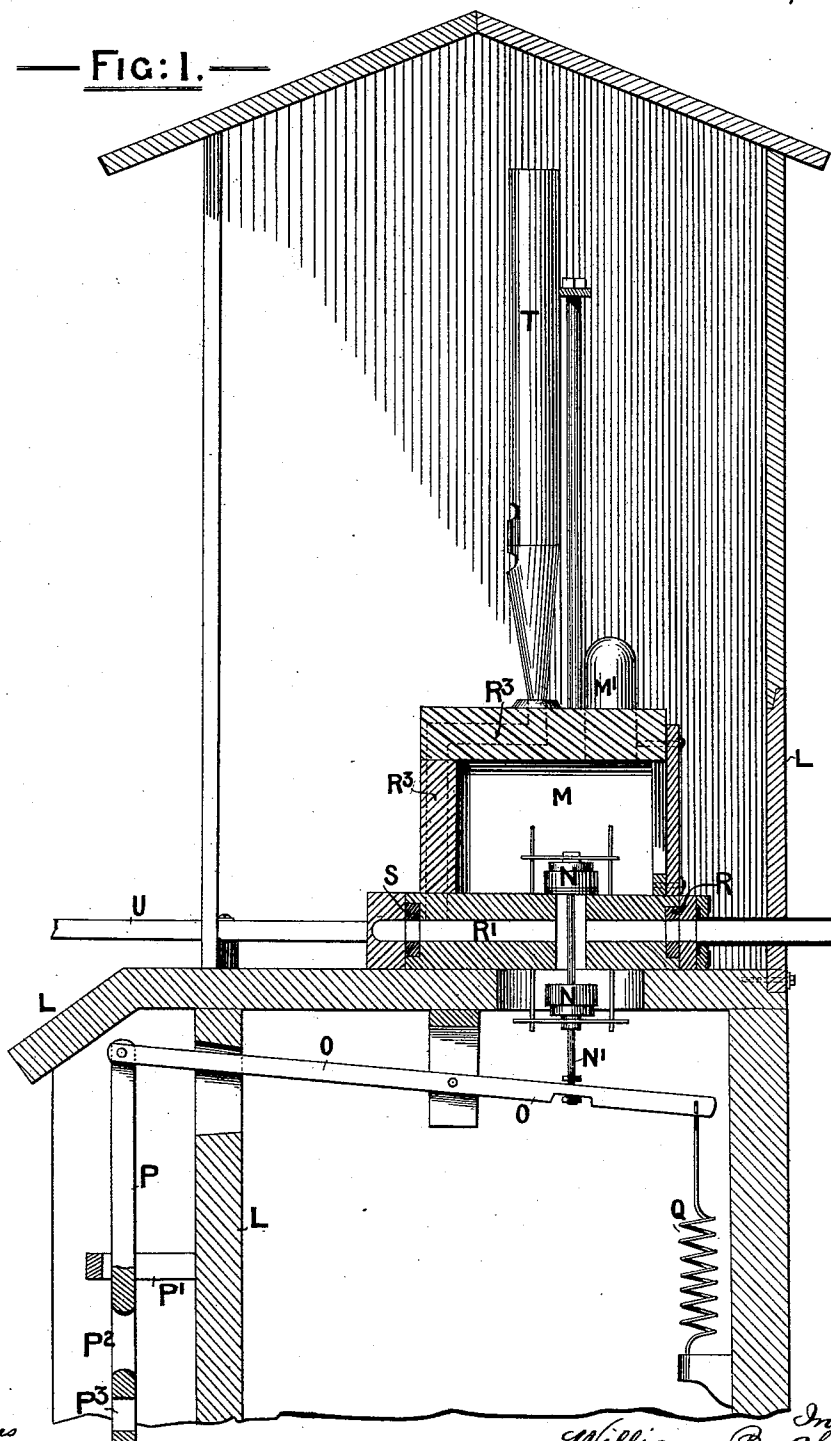
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W. B. CHALMERS.
SIGNALING APPARATUS.

No. 469,961.

Patented Mar. 1, 1892.

—FIG: 1.—



Witnesses
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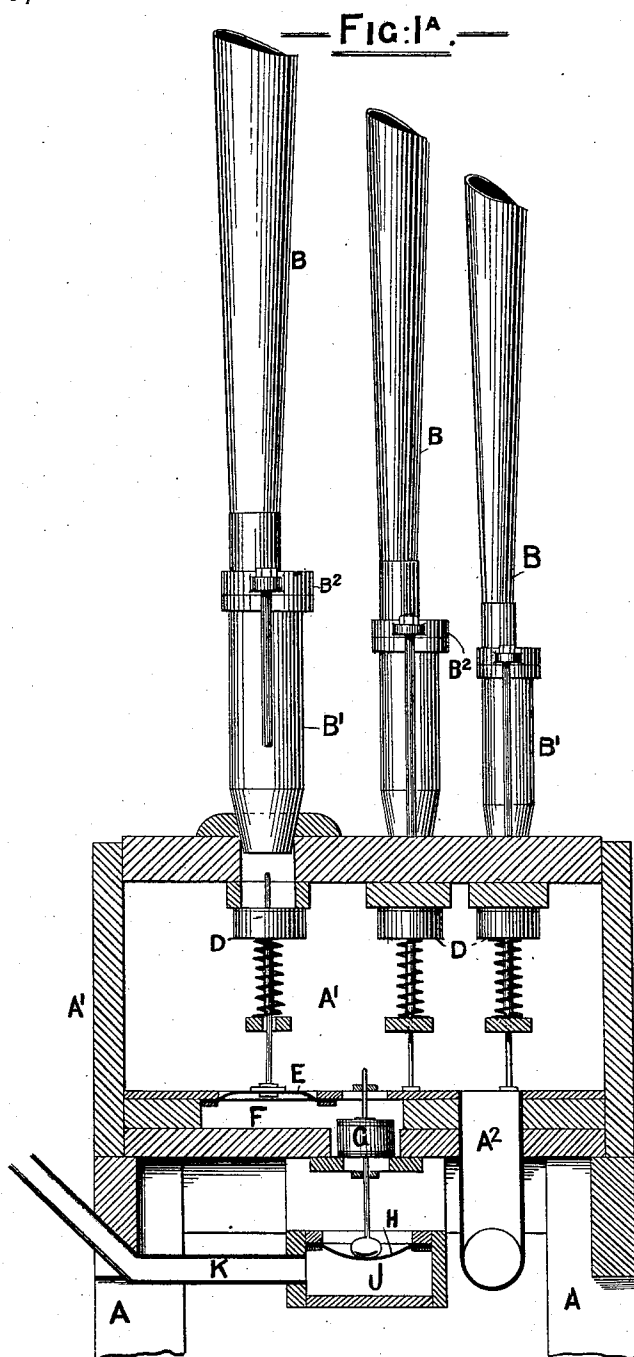
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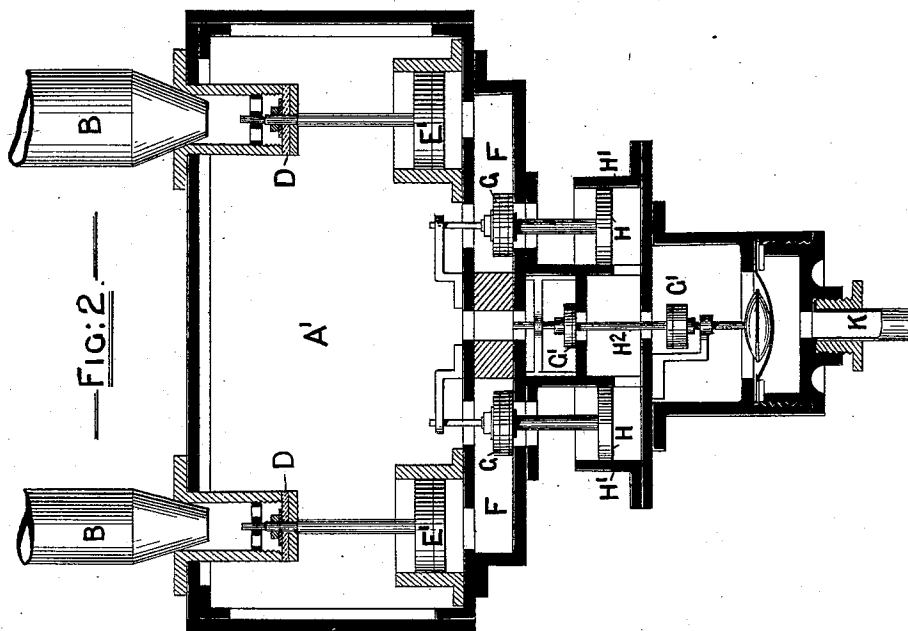
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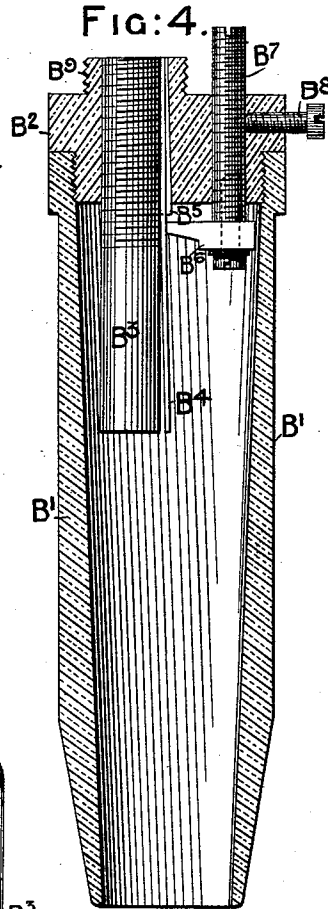
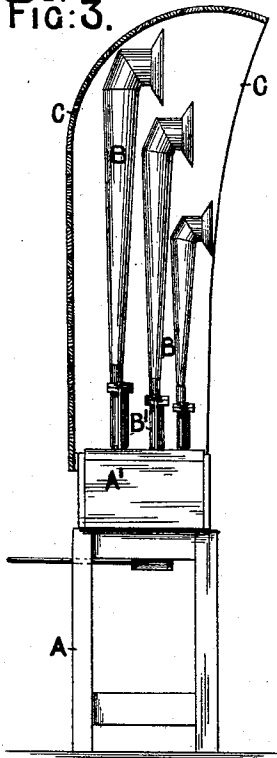
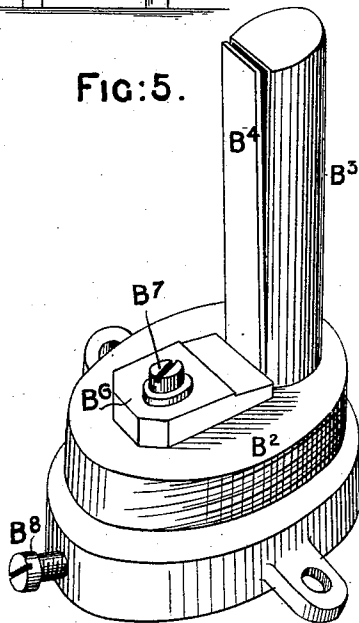


FIG:5.



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FIG: 7.

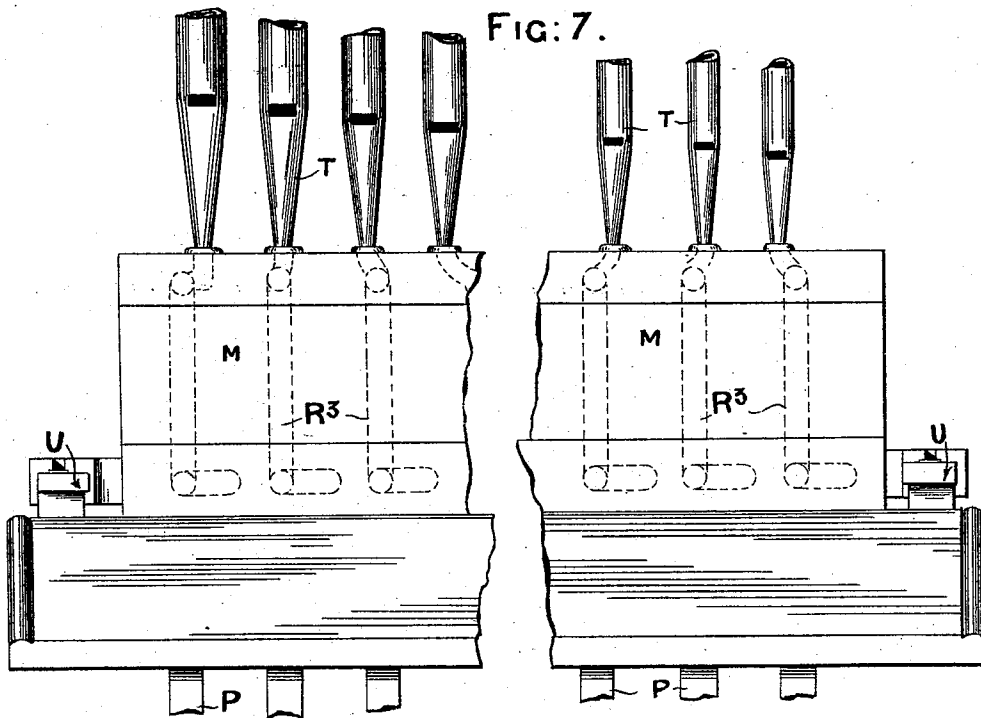
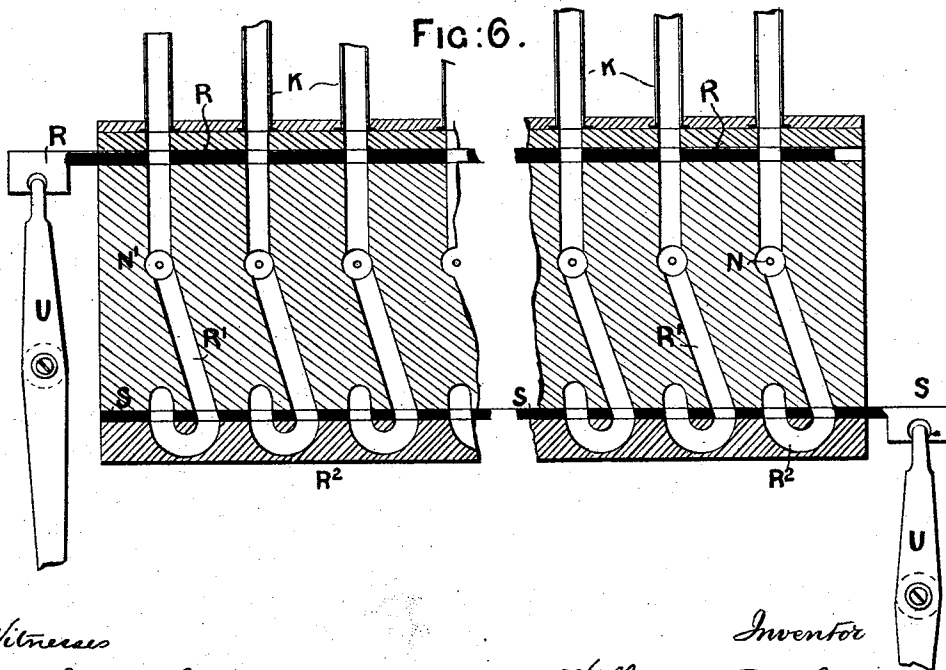


FIG: 6.



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UNITED STATES PATENT OFFICE.

WILLIAM B. CHALMERS, OF LONDON, ENGLAND.

SIGNALING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 469,961, dated March 1, 1892.

Application filed August 24, 1891. Serial No. 403,573. (No model.) Patented in England September 20, 1890, No. 14,889.

To all whom it may concern:

Be it known that I, WILLIAM BRYCE CHALMERS, a subject of the Queen of Great Britain, residing at the city and county of London, England, have invented a new or improved Apparatus for Signaling at Sea or on Land, (for which a patent has been granted to me in Great Britain bearing date September 20, 1890, No. 14,889,) of which the following is a specification.

My invention refers to a new or improved method of and apparatus therefor whereby signaling may be accomplished at sea or on land by means of musical notes or tones, as hereinafter described.

In all civilized nations of the world musical notes or tones are primarily divided into eight parts or notes—viz., “do, re, mi, fa, sol, la, si, do”—and consequently the sounds of these respective notes are universally known and recognized by their names or initials, and for the purposes of my invention I utilize this fact.

By my invention a complete system of signaling is produced available at all times at sea or on land, whether it be dark or light, or during foggy weather, and on land when the parties to communicate are not visible to one another. At sea, for example, the musical sounds or notes, or a particular combination thereof, would indicate or could be made to do so from one ship to another the direction in which each was proceeding, and the liability of collisions during foggy weather materially lessened thereby, and communications between them could be carried on uninterruptedly, (as is now attempted to be done by flags or semaphores or lights, all of which latter are practically invisible at night or during foggy weather,) while at the same time the communications could by my invention be made much more rapidly than heretofore.

In order that my invention may be fully understood and readily carried into effect, I will describe the same with reference to the accompanying drawings.

Figures 1 and 1^a show in vertical section an arrangement of apparatus constructed according to one modification of my invention. Fig. 2 is a vertical section according to another

modification, and Figs. 3, 4, 5, 6, and 7 are views of different parts in detail and hereinafter referred to separately in this specification.

Similar letters of reference indicate corresponding parts in all the figures.

The tone-sounding apparatus or tubes are mounted in or on suitable frame-work, such as that shown by the letters A A.

B B are the tone-sounding pipes, the number of them being regulated according to the number of the different notes or tones required to be produced. A detached view of these tone-sounding tubes with the stand in which they are fixed is shown on a smaller scale than Figs. 1 and 2 at Fig. 3. The lower parts B' of the tubes are composed of a metal casting, say of gun-metal or brass. They are coned at their ends, as shown, and fit into apertures formed in the upper part or top of the wind-chest A' on the frame A, to which they are secured by bolts or in any other convenient way. This lower part B' is shown, on a larger scale, in vertical section at Fig. 4, and the upper part, on a still larger scale, is shown inverted by a perspective view at Fig. 5. Into the lower casting B' the cap B² is screwed, which carries a tube B³ and a tongue B⁴, together forming a reed. The tube B³ is closed at the lower end and open at one side adjacent to the tongue B⁴, and is screwed through the top B² for the sake of its easy and accurate adjustment during the manufacture. When adjusted, the tube B³ and the tongue B⁴ are fixed in position by the wedge B⁵. The note is tuned by properly controlling the vibrations of the tongue B⁴, and this is accomplished by means of a finger B⁶, the latter pressing against the tongue B⁴ and being mounted on a screw B⁷, passing through the cap B². The finger B⁶ is thus capable of being vertically adjusted, when required, from the outside, the only tool necessary being a screw-driver.

B⁸ is a set-screw for fixing the screw B⁷ when adjusted. By traversing the tongue downward the number of vibrations of the tongue is increased, and consequently the note is raised in pitch, and vice versa. The tone-sounding pipes proper B are screwed onto the top B² at B⁹ and are or may be formed with

bell-mouths, as shown at Fig. 3, the length and size of the tubes being varied according to the notes to be produced.

C, Fig. 3, is a hood for covering and protecting the tubes from the weather.

D D are valves in the wind-chest A' for controlling the air-entrance to the sounding-tubes. These valves are held up to their seats by springs, and the lower ends of the valve-spindles are each fixed to a separate and distinct diaphragm, one of which E is shown at Fig. 1^A. The passage F under the diaphragm communicates with two other apertures, one leading to the wind-chest A' and the other or lower one to the atmosphere, the two latter apertures being controlled by a valve G, so that when one valve is shut the other is open. The spindle of the valve G acts or is acted on by a diaphragm H, working against a ball or abutment on the valve-spindle. This diaphragm H covers a passage formed in a chamber J, which passage leads to and is supplied with air-pressure through a pipe K, leading to the key board portion of the instrument.

For each sounding-tube there should be a series of parts just described and marked D E F G H J K. The air-pressure is supplied to the air-chest A' by the pipe A² from any convenient source of supply, whether that be a bellows, air-pump, compressor, or other means. In the arrangement just described the air-pressure in the pipe K and air-chest A' is about equal; but if the air or other equivalent pressure in the chest A' is to be much greater than what I may call the "actuating-pressure" supplied by the pipe K then a modification of the arrangement just described is required, and such as is shown with reference to Fig. 2 I have found to answer the purpose.

D D are the valves in the wind-chest A' controlling admission of pressure to the sounding-tubes B. Here, however, instead of the diaphragm E there is a piston E', the under side of the piston being in communication with the passage F, the two entrances to which, as before, are controlled by the valve G. The spindle of this valve G carries a piston H in a cylinder H'. The lower part of the latter cylinder is formed with a port communicating with a chamber H², having two apertures, one at top and one at bottom, the upper communicating with the pressure-chest A' and the lower with the atmosphere. These apertures are controlled by a double-beat valve G', the spindle of which carries at its lower end a boss resting on the diaphragm corresponding with the diaphragm H, Fig. 1, the latter diaphragm being acted on by pressure from the pipes K. These tone-sounding tubes and the mechanism connected therewith are operated by the keyboard apparatus or instrument, and which for the sake of clearness of description I may call "key verifying and testing mechanism," as well as for operating the sounding mechanism. These key-verifiers or actuating and testing mechanism and the

sounding mechanism may be placed at any suitable distance from one another, and in the examples dealt with are connected by tubes K, which may be of any length and suitable material, through which air-pressure conveys the impulses from one instrument to the other—that is, from the keyboard and verifying-instrument to the sounding-instrument.

The keyboard and verifying apparatus is inclosed in a case L and contains an air-chest M, in which a pressure is maintained by suitable means, the said pressure being introduced through the pipe M', (the pressure not being necessarily great.)

N is a double-beat valve, the spindle N' of which is connected to one arm of a lever O of the first order, the other arm being pivoted to a depending arm P.

P' is a guide-bracket for the arm.

P² is an aperture in the arm P, in which the finger of the operator may be inserted for operating the lever O.

P³ is an aperture which, when the rod P is depressed, may be passed onto or slipped over a pin and the lever O will be retained in its depressed position.

Q is a spring for holding and retaining in position the valve N. There is a similar valve and actuating mechanism for every note that is to be governed and actuated.

R S are stops consisting of slides in which there are apertures. The slide R when in one position closes the outlets to the tubes K, which are the supply-tubes to the sounding apparatus, and when the slide R is in its other position the supply-tubes K are open. The slide S is arranged with a double series of apertures, as shown in the horizontal section, Fig. 6, and when in the position shown by the drawings the valve N, when opened, will admit pressure through the passage R', slide S, passage R², back through the slide S, and upward through passage R³ in the vertical side of the air-chest.

Fig. 7 is a partial back elevation wherein the passages R³ are shown by dotted lines, and they lead to the verifying-tubes T, the number of which correspond in number and pitch with the sounding-tubes B.

U U are hand-levers for operating the slides or stops R S. The signal-sounding apparatus may be fitted to and mounted on a suitable turn-table for directing the sounding-pipes in any desired direction.

The action of the apparatus is as follows: Supposing that any one note is to be sounded on the sounding-tubes and it is desired, also, that the corresponding verifying-tube should also speak, the stops R S would be in the positions shown in Figs. 1, 6, and 7. The operator then depresses that one of the rods P which corresponds to the note it is required should sound. This action causes the valve-spindle N' to be raised and pressure to pass from the pressure-chest M through the passages R' R² R³ and into the pipe T, while simultaneously pressure passes through stop

R by the tube K, thus raising the diaphragm H and valve G, the latter closing the upper aperture into the wind-chest A' and opening the passage F to the atmosphere. The diaphragm E, being acted upon by internal pressure, is driven downward and opens the valve D, allowing the pressure to pass through the tone-sounding tube B and to produce the signal-note. If it is desired that the verifying-notes T should not speak, it is only necessary to move the slide S, Fig. 6, toward the right hand by the lever U, when the tubes B will act alone. Supposing the officer heard a note sounded from, say, an approaching vessel and was doubtful what note it was, he then closes the stop R and leaves the stop S open, when he can test the note on the verifier by operating the various fingers P until he obtains the note on the tubes T which exactly corresponds with that sounded by the said vessel. The tubes of the verifier only sound sufficiently loud to be conveniently heard within a reasonable distance by persons on board the vessel on which the instrument is situated or other place.

The action of the arrangement shown at Fig. 2 varies somewhat from the previous arrangement by reason of the pressure in the chest A' being greater than the pressure at M. Thus pressure by the pipe K raises the valve G' and allows pressure from A' to act on the under side of piston H, raises valve G, which closes the upper port, and opens the passage F to the atmosphere. The pressure in A', acting on the upper area of the piston E', opens the valve D and the tube B sounds. In the drawings the valves and tubes are shown duplicated—that is, there are two tubes shown which would sound at once—but this duplicate arrangement is not one I usually employ, a single set of valves and a single tube being generally found sufficient.

I prefer ten notes, because by using the "B" below "C" with the "C" or "do" I can call attention, and by using or sounding the "D" above the octave I can cut off communication without interfering with the use of the whole of the eight notes in the octave. By using an indicator I can signify that communication will be made by the numeral code, when I require the ten notes to represent figures "1" to "0," and by another indicator I can signify that the Morse code of dots and dashes is to be employed.

I am aware that it has been proposed to employ as a signaling-instrument a whistle by which several notes may be produced, and I am also aware that it is not new to employ musical notes for signaling purposes, as all bugle-calls consist of such.

In apparatus constructed according to my invention I employ a separate pipe for each note required, as for my invention it is essential that the instruments employed by the various signaling parties should coincide—that is, should be tuned to the same note—say the note "C," vibrating, say, five hundred and

forty times per second, and the other tones should be in conjunction or accord therewith—and this result I attain in what I have found to be a successful manner and as herein described, whereas by the employment of a whistle producing, say, several notes the said notes produced would depend on the original tone of the whistle, which latter tone is not in practice determinable with certainty during the manufacture; and, again, with my apparatus I gain a distinct advantage over single-sounding instruments in that there is a great saving of time, as I am enabled to sound or change a note as readily as upon an organ or piano.

I claim—

1. In signaling apparatus, a series of sounding-tubes tuned to predetermined notes in the musical scale, in combination with an air-chest and valves therein for admitting air to sound the tubes, keys corresponding in number with the sounding-tubes, valves operated by said keys, air-passages from the respective valves, and mechanism operated by air-pressure for actuating the valves of the sounding-tubes substantially in the manner and for the purposes set forth.

2. In signaling apparatus, a series of sounding-tubes tuned to predetermined notes in the musical scale, and mechanism, substantially as specified, for operating such sounding-tubes, the notes in the various instruments corresponding and the signals being given either singly or in groups, according to a predetermined code, by the different combinations of musical sounds, in combination with verifying sounding-tubes tuned to the predetermined notes in the musical scale, an air-chest, operating-keys corresponding in number with said verifying-tubes, valves connected to and corresponding in number with said keys, air-passages corresponding in number to the valves and connecting with passages to the verifying-tubes, whereby said verifying-tubes may be operated to give different musical sounds, substantially as set forth.

3. In signaling apparatus, a series of sounding-tubes tuned to predetermined notes in the musical scale, and a series of verifying sounding-tubes also tuned to the same notes of the musical scale, in combination with air-chests for admitting air under pressure to sound the various tubes, operating-keys agreeing in number with either set of sounding-tubes, valves connected to and agreeing in number with the operating-keys, air passage-ways controlled by said valves and passing to both sets of sounding-tubes, slides moving across said air-passages at opposite sides of the actuating-valves, and mechanism actuated by air-pressure for sounding the notes of the main sounding-tubes, whereby the main sounding-tubes and verifying-tubes may be operated together in unison or either set operated alone, substantially in the manner and for the purposes set forth.

4. In signaling apparatus, the combination, with the sounding-tubes B and their base-tubes B', of the caps B², screwing into and uniting the tubes B B', the screw-threaded tubes B³, passing into the caps B² and closed at their lower ends and open along one side and having tongues B⁴, which with said tubes form reeds within said tube B', fingers bearing against the tongues, and means for supporting the fingers and adjusting them lengthwise of said tongues, substantially as specified.

5. In signaling apparatus, the combination, with the series of sounding-tubes B, of metal base-tubes B', the screw-caps B² between and

uniting the tubes B and base-tubes B', the screw-tubes B³, passing through the caps B², the sounding-tongues B⁴ adjacent to the tubes B³, the screws B⁷ and locking-screws B⁸ in the caps B², the engaging-fingers B⁶ at the base of the screws B⁷, and the wedges B⁵, whereby the regulation and adjustment of the vibrating reeds are effected in tuning the sounding-tubes to the notes of the musical scale, substantially as set forth.

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