F. W. WOOD.

SIGNALING APPARATUS.

APPLICATION FILED JAN. 4, 1919.

1,419,708.

Patented June 13, 1922.

4 SHEETS—SHEET 1.

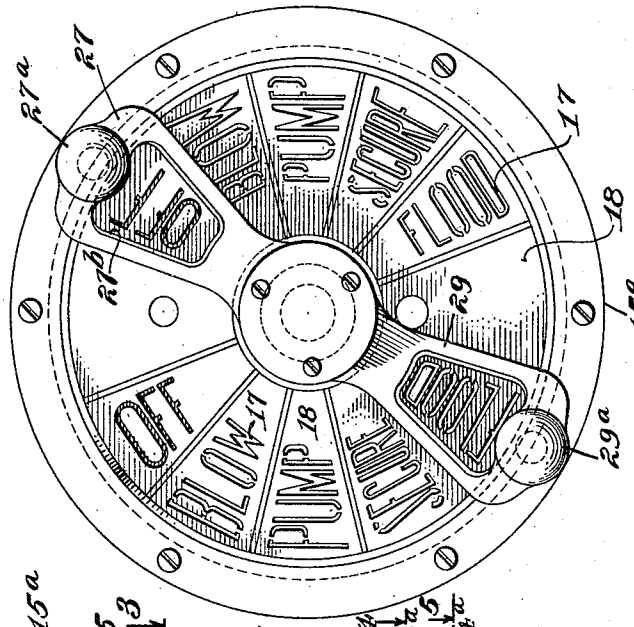


Fig. 2.

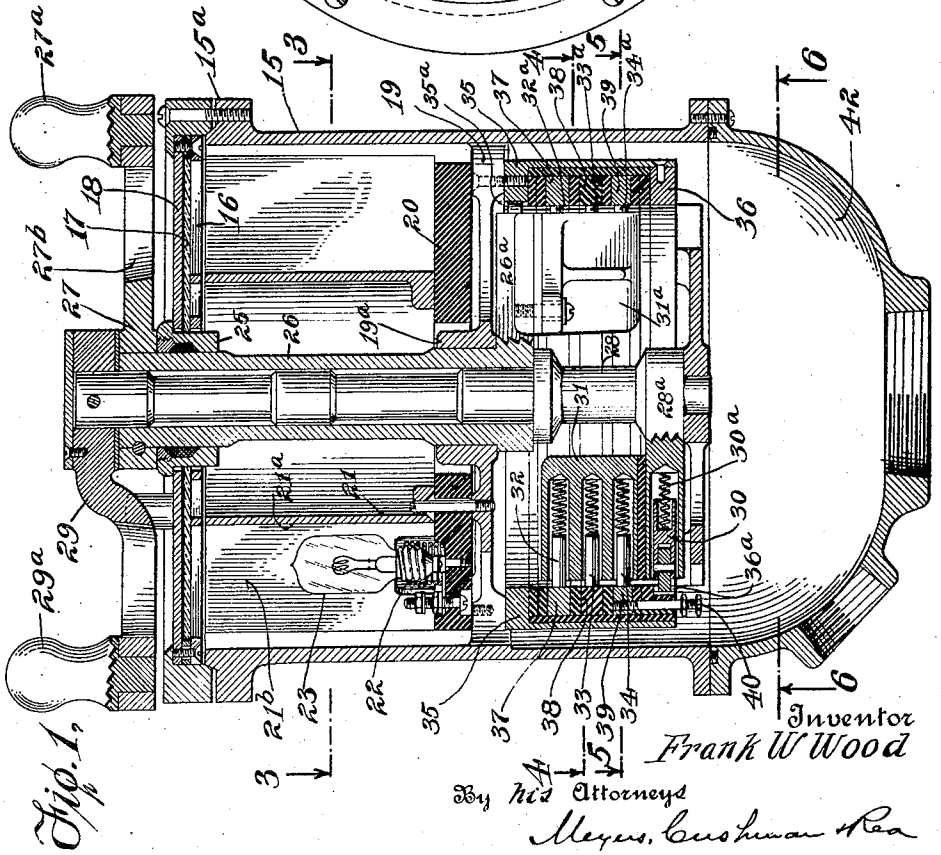


Fig. 1.

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4 SHEETS—SHEET 2.

Fig. 6,

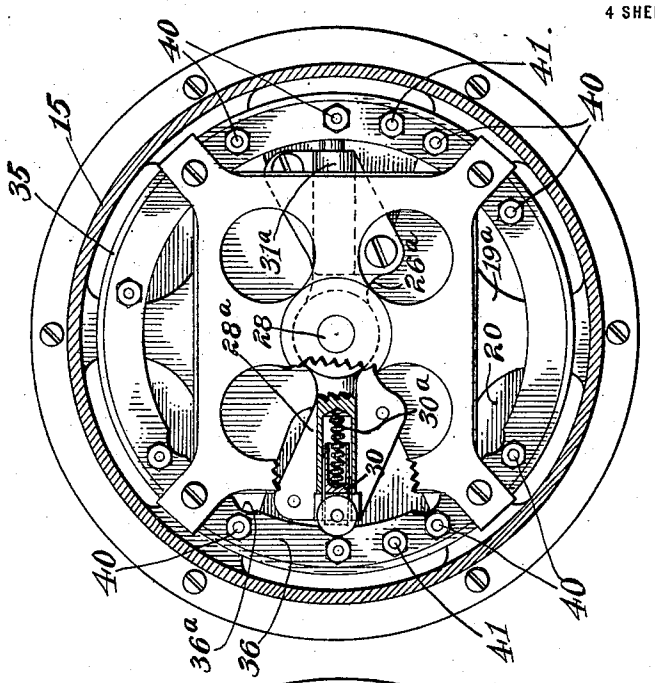
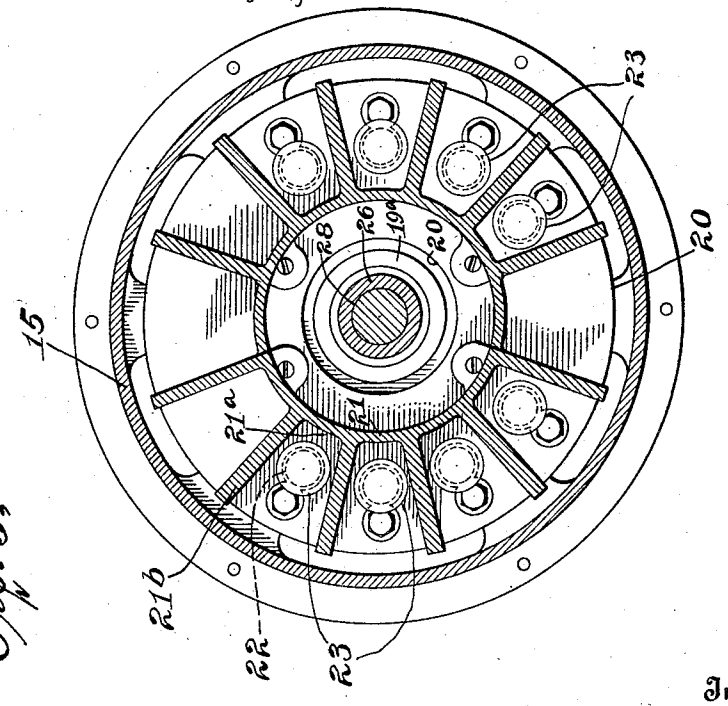


Fig. 3,



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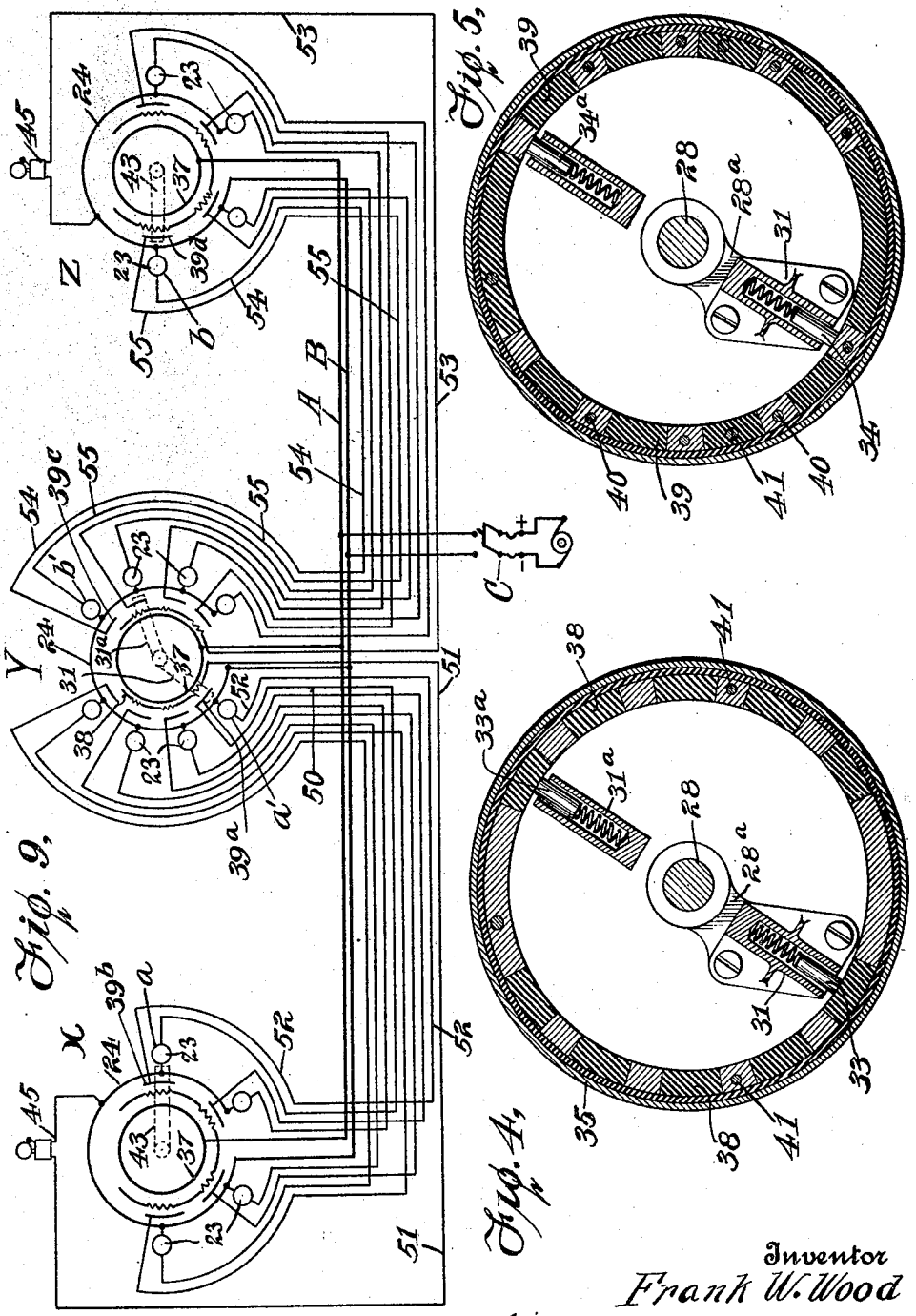
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4 SHEETS—SHEET 3.



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4 SHEETS—SHEET 4.

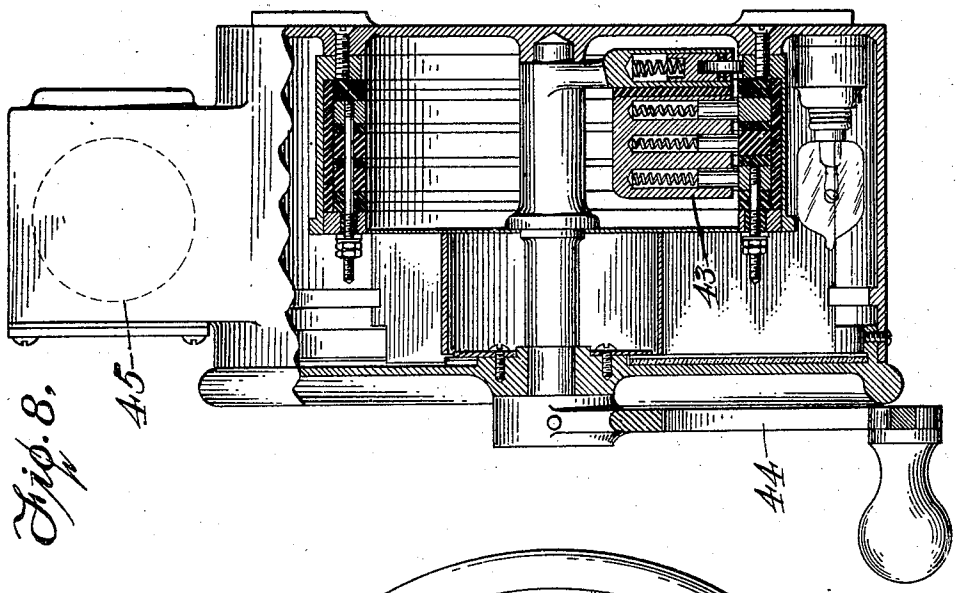


Fig. 8.

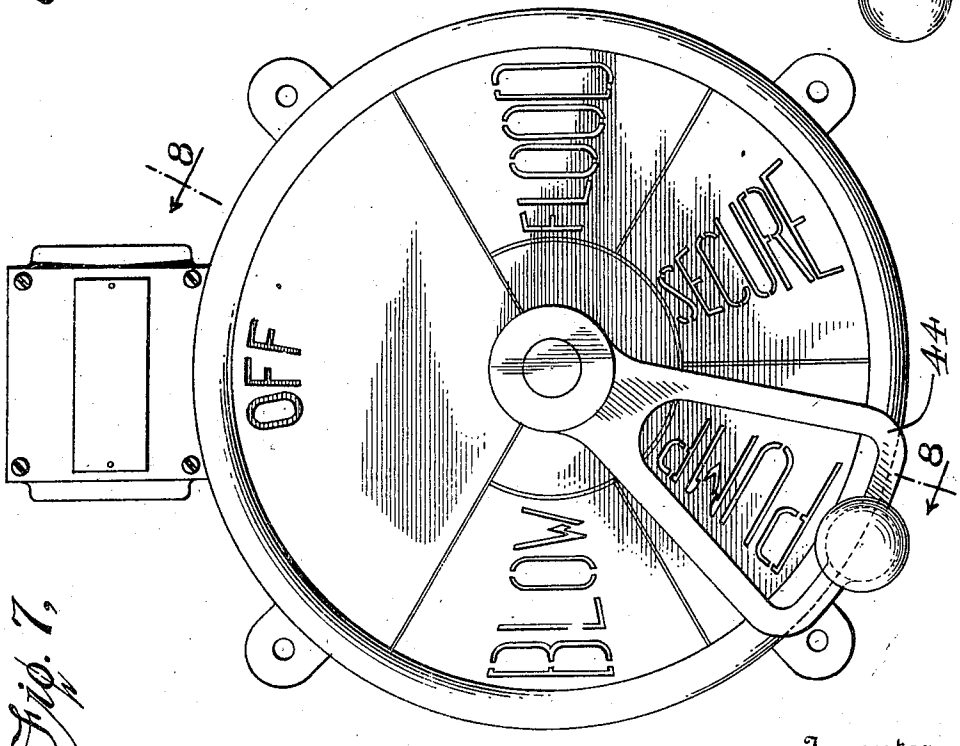


Fig. 7.

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UNITED STATES PATENT OFFICE.

FRANK W. WOOD, OF MONTCLAIR, NEW JERSEY.

SIGNALING APPARATUS.

1,419,708. Specification of Letters Patent. **Patented June 13, 1922.**

Application filed January 4, 1919. Serial No. 269,682.

To all whom it may concern:

Be it known that I, FRANK W. WOOD, a citizen of the United States, residing at Montclair, in the county of Essex and State of New Jersey, have invented new and useful Improvements in Signaling Apparatus, of which the following is a specification.

This invention relates to signaling apparatus, pertaining particularly to apparatus designed to provide for selective signaling both with respect to stations and the signals for the stations.

The invention is adapted for various uses where the conditions require selective signaling of the kind indicated, but for purposes of illustration I have shown it as applied to service in telegraphing signals between a central station and the trimming tank stations of a submarine vessel.

In such use the central station is generally central and the mechanism of controlling the trimming tank operations are located fore and aft. These operations are under the supervision of the central operator and must be made under strict compliance with his instructions. As will be understood, the orders for each auxiliary (trimming tank) station must be individual to that station, since the desired end to be obtained may depend on the operations individually or as a resultant of the combined operations. Not only may the character of the orders differ during combined operations, but the length of time each station operates in compliance with the order may be varied. Another factor is the necessity for the use of a return signal which permits the commander to determine the character and time of his orders.

These problems can be met by the installation of two individual systems, each having its transmitting and indicating elements, but this in turn provides two factors of disadvantage, in that—(*a*) two transmitting devices must be employed in a space of necessarily small dimensions, and (*b*) the return signals are on two different instruments under conditions where the signals must be under constant scrutiny and comparison, to permit the giving of proper orders indicating the change.

These problems are met by an arrangement of the transmitting elements in such form as to permit their housing by a single casing of comparatively small size—thus economizing space; by maintaining the individuality of the elements in such manner as to permit the giving of orders individually and the individual replies; by so arranging the transmitter indicators in such manner as to permit the concurrent inspection of both indicators to permit proper complemental action in giving orders, and by providing the return signal indications in such manner as to permit concurrent inspection. As a result, the commander is not only able by a glance to determine the character of the orders given and the return signals, but with knowledge of the resultant action which should result, is able to rapidly determine the action by the usual tell-tale indicators employed in the conning tower. In other words, the arrangement is such as to permit instant reading of all the components which may be operating concurrently and at the same time will permit of instant change in either or both sets of indications to meet the changing conditions.

To these and other ends, the nature of which will be readily understood as the invention is hereinafter disclosed, said invention consists in the improved construction and combination of parts, hereinafter fully described, illustrated in the accompanying drawings, and more particularly pointed out in the appended claims.

In the accompanying drawings, in which similar reference characters indicate similar parts in each of the views:

Figure 1 is a central vertical sectional view of the transmitter unit which may be employed as a part of the general system, parts being omitted for clearness.

Figure 2 is a top plan view of the same.

Figures 3, 4, 5 and 6 are sectional views taken respectively on lines 3—3, 4—4, 5—5 and 6—6 of Figure 1.

Figure 7 is a face view of a receiving indicator unit.

Figure 8 is a sectional view taken on line 8—8 of Figure 7.

Figure 9 is a diagrammatic view illustrating one way in which the several units may be connected electrically to provide the desired operation.

The system is of the electrical type, thus economizing space. The receiver-indicators—one for each auxiliary station—are duplicates, so that the use of electrical conductors permits of location of the indicators at desired points.

Before giving a detail description of

parts, the following general explanation is made:

The general system has the operating structure separate for each auxiliary station —the operating mechanism at the central station for controlling the signals of one auxiliary station are distinct from those of the other auxiliary station—although the central station equipment is so arranged as to locate these mechanisms in a single casing and includes the individual circuits within one general circuit system. This is made possible by carrying all leads through the central transmitting structure.

Each auxiliary station has its indicator arranged to indicate the desired signal by the lighting of a lamp individual to the signal, and at the same time an audible signal —such as a bell or buzzer—is sounded to call the attention of the operator; these are provided by transmitter operations at the central station, the signals remaining active until the transmitter signal is changed. The return or answering signal is made by the operator at the auxiliary station operating a circuit make and break structure operative to control lamp indicators at the central station, the latter remaining active until the circuit make and break structure is shifted.

The transmitter is so arranged as to cause concurrent exposure of the order signal and its answer for each auxiliary station, with the indicators arranged so that all are within the vision of the central operator when gazing at the transmitter unit. Consequently, the entire operation is made clear in the form of signal indications open to inspection concurrently, making it possible for the central operator to consider the time length factor of the individual operations as well as the rapidity of compliance with orders.

The orders generally given in connection with trimming tank operations are—"blow", "pump", "secure", "flood"; these being specific to the particular operation to take place. In addition, the indication "off" is generally employed, as, for instance, to indicate the periods when no signal is to be given, or when it is desired that the particular operation shall cease.

For example, the central operator desires the trimming tank at one station to be filled. He shifts the proper transmitting indicator to "pump" position, thus closing the circuit for the proper lamp and the audible signal at the auxiliary station. That operator, noting the particular signal, shifts the position of the circuit make and break device, placing the indicator arm in position over the word "pump" on the receiving indicator, thus closing the lamp circuit for the "pump" indication on the transmitter. Since the initial setting was with respect to this indication, both the transmitting and receiving indicators will have the movable indicator properly positioned with respect to the illuminated indication. This condition remains until the central station operator changes the order—his observance of the effect of the pumping operations given through the usual tell-tales will indicate the time for change—as by shifting his movable indicator to "off", thus breaking the previous circuit and establishing a circuit through the "off" lamp at the auxiliary station, and sounding the alarm. The operator at the auxiliary station then stops the pumping action, either before or after giving the answering signal through shifting his movable indicator, thus again presenting uniform conditions at the transmitting and receiving stations, the indications, however, being in connection with the "off" signal.

The action when both fore and aft stations are concurrently affected will be hereinafter described.

Referring first to Figures 1 to 6 of the drawings, 15 designates a casing, which may be sectional in form if desired—having an open top and a seat 15^a to receive a cover. The cover is of composite formation, embodying a spider 16, a dial window 17, preferably of amber glass, and a dial 18, the latter carrying in suitable arrangement, two sets of the indications. In the drawings, these are shown as arranged on radial lines on opposite sides of the center. The elements of the cover are secured together in suitable manner, and the cover secured to its seat.

The axis of casing 15 preferably extends vertically and at a suitable point intermediate its upper and lower ends the casing is provided with a spider-like web 19, preferably formed integral with the casing body, and having its central portion in the form of a bearing 19^a. Web 19 carries what may be termed an insulating base 20 on which is mounted a lamp shield 21, said shield generally embodying a tube-like portion 21^a carrying radial webs 21^b projecting outwardly and forming compartments extending substantially to the cover. The shield is secured to web 19 in suitable manner.

Secured to base 20 in suitable manner, are lamp sockets 22 and the proper terminals, the sockets being located within the compartments beneath the indications to be illuminated and are adapted to receive the usual lamp bulbs 23. As shown in Fig. 9, each lamp has its individual lead, there being a common return, this being shown as in the form of a contact ring 24.

The cover carries a central bushing or bearing 25, and mounted therein and in bearing 19^a is a sleeve-like shaft 26, properly positioned relative to said bearings by shoulders to prevent end-wise movement, the upper shoulder being, for convenience,

formed by the hub of an arm 27, the outer end of which carries a handle 27^a. Arm 27 is of suitable configuration and is formed with an opening 27^b of a size to permit exposure of either of the indications therethrough. For descriptive purposes arm 27 may be considered as a movable indicator.

The lower end of shaft 26 carries an outwardly extending portion 26^a of suitable configuration, and preferably having a recessed portion to receive a roller-carrying member and a spring for yieldingly supporting the member, an arrangement presently described in detail. Said portion 26^a also carries a brush holder for carrying other contact members, thus providing a brush carrier rotative by movements of the sleeve-shaft.

Extending axially of and projecting beyond the ends of sleeve shaft 26 is a shaft 28, the upper end of which carries arm 29 and its handle 29^a, the general structure of which is similar to arm 27, thus providing a second movable indicator, each indicator being movable to an individual set of indications. The lower projecting portion of shaft 28 carries an outwardly-extending portion 28^a, approximately similar to portion 26^a, and which is recessed to receive a roller-carrying member 30 and its supporting spring 30^a.

As presently described, the roller of member 30 of each of portions 26^a and 28^a operate as centering and holding devices for maintaining the parts in the positions to which they may be swung.

Portion 28^a carries a brush holder 31 formed with recesses to receive the brush members and their yielding supports, the particular arrangement shown providing three of such recesses to respectively receive brush 32 for the common return, brush 33 for the bell circuit and brush 34 for the lamp circuit, these brushes being in approximately vertical alinement. The corresponding brushes of brush holder 31^a carried by portion 26^a, are indicated at 32^a, 33^a and 34^a.

As will be seen portions 26^a and 28^a are spaced apart axially of the casing a distance slightly greater than the vertical length of a brush holder, brush holder 31 extending upwardly and holder 31^a downwardly, thus locating similar brushes on the same horizontal plane. As a result, it is possible to maintain the circuits for each auxiliary station separate although the circuits lead into this chamber and the two sets have common terminals therein, these being in the form of annular members carried by an annular member 35 supported by web 19—a portion of a face of which carries depressions 35^a which co-operate with the roller of portion 26^a for centering the brushes of brush holder 31^a, the construction being substantially the same as that provided for the roller of portion 28^a, which includes the depressions 36^a of a ring 36 carried by member 35.

Between the planes of these faces, member 35 carries the terminal contacts for the several circuits in the form of annular members or rings insulated from member 35 and from each other. For instance, ring 37 is the common return positioned opposite brushes 32 and 32^a, this ring being solid; ring 38 is the terminal member for the bell circuits and is formed of segments of metal and insulating material arranged in alternation, and located opposite brushes 33 and 33^a; and lamp terminal ring 39 is also of the composite formation and located opposite brushes 34 and 34^a.

As will be understood from Figures 4 and 5, the metal segments of terminals 38 and 39 are practically in two sets, duplicated on diametrically opposite sides. This arrangement places a complete set of contacts within an angular distance of less than 180 deg. and permits each brush holder to sweep throughout its range of activity without interfering with the other brush holder, both of the latter being in the same horizontal plane.

Each active segment of terminal 39 forms the terminal contact for an individual circuit, so that each contact has its individual binding post terminal 40 (Figures 1 and 6) to which a lead may be connected. Since but one audible signal circuit is employed in each set, the segments of a set in ring 38 may be electrically connected together and a single binding post terminal 41 employed.

The lower end of the casing may be enclosed as by a bottom 42 having suitable openings for the passage of the lead wires.

As will be understood, when either or both of the movable indicators is shifted, the connections cause the corresponding brush holder to swing a corresponding distance, causing the brushes carried thereby to move over the ring terminals until the parts are shifted to the desired positions, the roller or wheel retaining element maintaining the position of the parts.

The auxiliary station unit may be of suitable type, one form being shown in Figures 7 and 8. Since such unit is operative only in connection with one set of signals, the structure is greatly simplified, a single brush holder 43 being employed operating in connection with ring terminals carrying the requisite number of segments, the arm 44 operating in connection with a single set of indications, these being lamp illuminated as in the central station unit. The auxiliary station unit also carries an audible signal 45 of suitable type—bell or buzzer, for instance—which is connected up to the bell circuit.

In Figure 9 I have shown a simple wiring

diagram of a system of this type. In this view the auxiliary stations are indicated at X and Z and the central station at Y.

A and B represent the main lines connected to the supply lines in suitable manner, which may include a switch C. Line A connects direct to the common terminal 37 at each station, and line B connects direct to the common lamp ring 24 of the lamps at each station. The various lead connections are shown.

To illustrate the general operation, the following brief description is given.

Assuming switch C closed, and both arms 27 and 29 are positioned in the "off" position, all circuits are broken and the system is inactive. The operator at station Y now wishes to signal the operator at the aft station X to "flood" the trimming tank. To provide this signal arm 27 is shifted to bring the opening 27^b over the "flood" indication, thus swinging brush holder 31 to a corresponding position and completing a circuit from line A to line B as follows: terminal 37 at station Y, brush 32, brush holder 31, brush 34, segment 39^a of terminal 39, lead 50, lamp a of station X, and return terminal 24 at that station to line B. During the movement to this position a circuit is established leading from line A to brush holder 31 as before and then continuing through brush 33, terminal 38, lead 51, audible signal 45 to terminal 24, both at station X, and then to line B as before. This completes the circuit of the illuminating lamp of the "flood" indication at station X, and the circuit for sounding the audible signal.

During the travel of arm 31 it has temporarily made and broken circuits through other lamps and sounded the signal, thus warning the station X operator of the giving of a signal, but these temporary activi are unnoted, the steady illumination giving the desired signal.

The operator at station X then swings arm 43 at his station to a position over the illuminated "flood" indication, thus completing a circuit from line A to terminal 37 and brush holder 43 and segment 39^b at that station, to lead 52, to lamp a' at station Y, return 24 at that station and line B, thereby completing the circuit for lamp a' beneath the "flood" indication over which arm 27 is located, so that the signal is shown illuminated through opening 27^a. During operation of this return circuit the bell segments at station X corresponding to segments 38 at station Y need not be used, such segments being merely diagrammatically illustrated at stations X and Z.

On completion of these operations, the units at both stations X and Y will show the "flood" indication illuminated through the arm openings, the remaining indications being non-illuminated. As a result, the operator at station X executes the order given, and the operator at station Y not only is aware of the particular order given but in addition is assured that notice has been taken of the order.

By his tell-tale appliances, the operator at station Y notes the effect of the manœuvre, and at the proper time changes it by shifting arm 27, for instance to the "off" position, breaking the circuit through lamp a and thus notifying the operator at station X of the fact through the absence of illumination and the sounding of the audible signal during the return movement. By noting the time when lamp a' is rendered inactive by breaking its circuit—through shifting of arm 43 at station X—the rapidity of execution of the order may be maintained.

A general operation such as described may be provided between stations Y and Z by employing arm 29 in place of arm 27.

Provision is thus made for individual signaling to each auxiliary station, the indications at station Y however, being presented by the dial carried by the casing cover.

Aside from economy of space thus provided in utilizing a single casing for the transmitter of each set of auxiliary stations, a further positive advantage is provided when it is necessary to give orders for both stations X and Z concurrently.

For instance, assume the order to station X be as before—the "flood" order—and it is necessary to "blow" the fore trimming tank, arm 27 is moved to the position above indicated setting up the cycle described, and arm 29 is also shifted to position above the indication "blow". This movement establishes the circuit from line A to brush holder 31^a through terminal 37 and brush 32^a, so that as the arm is advanced brush 33^a contacts with a segment of terminal 38 and completes the circuit through the audible signal at station Z by lead 53, signal 45 and lamp terminal 24 at station Z to line B, sounding the signal. When arm 29 reaches its position over the indication "blow" a circuit is established through lamp b at station Z, by brush 24^a contacting with segment 39^c at the central station, thus rendering lead 54 active; as this lead is connected to the lamp return terminal 24 at station Z, the circuit will be completed to line B, lamp b being illuminated. The operator at station Z provides the answering signal by moving arm 43 at his station to position over the illuminated indication, completing the circuit through lamp b' at station Y, the circuit being from line A (station Z) to segment 39^d, lead 55, lamp terminal 24 (station Y) to line B, rendering lamp b' active.

On completion of these cycles, the dial at station Y will show that the aft station is operating under "flood" conditions, and the

fore station under "blow" conditions, the indications being in close juxtaposition so that the vision of the central station operator can gain knowledge of the complete conditions by a glance, and permitting him to act accordingly, knowing the resultant effects of the concurrent operations and noting the tell-tale indications.

As will be understood, the compact arrangement and juxtaposed indications permit of rapid and accurate action being had, since movement of either arm cannot be had without receiving visual indication of the conditions at both auxiliary stations, thus preventing necessity of divided vision between the two sets of indications.

And since the terminals 37, 38 and 39 are practically common in both sets—requiring but a single support, the terminal structures can be of substantial character and readily assembled and handled, and the number of circuit connections reduced.

While I have herein disclosed one general embodiment in which my present invention may be utilized, it will be understood that changes or modifications therein may be found essential or desirable in meeting the various exigencies of use, and I desire to be understood as reserving the right to make any and all such changes or modifications as may be found necessary or desirable, in so far as the same may fall within the broad spirit and scope of the invention as expressed in the accompanying claims when broadly construed.

What I claim is:

1. In a signaling apparatus wherein the signals at a plurality of independent stations are made operative from a central station and wherein selective signaling circuits connect the central station with the independent stations, means at the central station for selectively completing said circuits; said means including a casing, a dial on the casing, a unit mounted in the casing and comprising a series of stationary contact members annularly arranged, said series comprising a plurality of sets of members, one set for each independent station, a plurality of independently movable contact means operative within the casing, each independent contact means cooperating with a set of contact members for controlling the activity of a single independent station and a plurality of separate indicating elements, one for each contact means, the plurality of separate indicating elements cooperating with the casing dial.

2. In a signaling apparatus wherein the signals at a plurality of independent stations are made operative from a central station and wherein selective signaling circuits connect the central station with the independent station, means at the central station for selectively completing said circuits; said means including a casing, a dial on the casing, a plurality of independently movable shafts mounted in the casing and rotatable about a common axis, contact means carried by each shaft, a unit mounted in the casing and comprising a plurality of annular stationary contact members mounted concentrically with said shafts for cooperation with the contact means, at least one of said contact members comprising a plurality of sets of members, one set for each station, a plurality of indicating elements, one operatively related to each shaft, the plurality of indicating elements being movable over the casing dial.

3. In signaling apparatus wherein the signals at two independent stations are made operative from a third station and wherein selective signaling circuits connect the third station with the two stations, means at the third station for selectively completing said circuits, said means including a casing and circuit make and break devices within the casing, said devices including stationary contacts, one of which comprises an annular contact member common to the circuits of both independent stations, and independently-movable elements co-operative with the contacts and each having its control activity limited to the circuits of a single independent station.

4. In signaling apparatus wherein the signals at two independent stations are made operative from a third station and wherein selective signaling circuits connect the third station with the two stations, means at the third station for selectively completing said circuits, said means including a casing, independent circuit make and break elements independently movable relative to a common axis within the casing and each having its control activity limited to the circuits of a single independent station, and circuit make and break contacts within the casing cooperating with the said elements, the said make and break contacts including contact members arranged in the same plane and active with the said independent make and break elements.

5. In signaling apparatus wherein the signals at two independent stations are made operative from a third station and wherein selective signaling circuits connect the third station with the two stations, means at the third station for selectively completing said circuits, said means including a casing, and independent circuit make and break elements independently rotative relative to a common axis within the casing with the elements positioned to move in the same plane intersecting such axis, each element having its control activity limited to the circuits of a single independent station.

6. In signaling apparatus, a transmitting unit comprising a casing, a pair of shafts

supported thereby, each shaft being movable rotatively with the axis of rotation common to both shafts, a circuit make and break element carried by each shaft, circuit make and break contacts within the casing in the paths of movement of the respective elements, said circuit make and break contacts including contact members arranged in the same plane and cooperating with the make and break elements on both shafts, a dial, and separate indicating means connected to each of said shafts and cooperating with said dial to render separate juxtaposed signals thereon.

7. In signaling apparatus, a transmitting unit comprising a casing, a pair of shafts supported thereby, each shaft being movable rotatively with the axis of rotation common to both shafts, a circuit make and break element carried by each shaft, circuit make and break contacts within the casing in the paths of movement of the respective elements, said contacts including a member common to both elements, and including contact members arranged in the same plane and cooperating with the make and break elements on both shafts, a dial and separate indicating means connected to each of said shafts and cooperating with said dial to render separate juxtaposed signals thereon.

8. In signaling apparatus, a transmitting unit comprising a casing, a pair of shafts supported thereby, each shaft being movable rotatively with the axis of rotation common to both shafts, a circuit make and break element carried by each shaft, and at least two circuit make and break contact members within the casing and positioned in the path of both elements, one of said members having a continuous circuit-connecting contact with both elements, each element being adapted to operatively connect said member with individual contact segments of a different member in the completion of transmitting circuits.

9. In signaling apparatus, a transmitting unit comprising a casing, a pair of shafts supported thereby, each shaft being movable rotatively with the axis of rotation common to both shafts, a circuit make and break element carried by each shaft, an exposed shaft-operating member carried by each shaft, a dial carrying a set of indications for and individual to each member and adapted to form guides for the movements of the members, said indications being carried by the casing, and circuit-make and break contacts within the casing in the path of movement of the respective elements, said circuit make and break contacts including contact members arranged in the same plane and cooperating with the make and break elements on both shafts.

10. In signaling apparatus, a transmitting unit comprising a casing, a pair of shafts supported thereby, each shaft being movable rotatively with the axis of rotation common to both shafts, said shafts being of unequal lengths, and each carrying a laterally projecting arm, said arms being at corresponding ends of the shafts and located on spaced-apart planes in the shaft assembly, a circuit make and break element carried by each arm with the elements positioned between said planes, and circuit make and break contacts within the casing in the paths of movement of the respective elements.

11. In signaling apparatus, a central station unit comprising a casing carrying a support intermediate its ends extending transverse to the axis of the casing, said support carrying a bearing, a cover member for an end of the casing, said member also carrying a bearing, a sleeve-like shaft mounted in said bearings, a shaft extending axially of said sleeve-like shaft, each of said shafts carrying an indicator external of the cover member, a circuit make and break element individual to and carried by each shaft beyond the support, and circuit make and break contacts supported by said support and positioned in the paths of said elements.

12. In signaling apparatus, a central station unit comprising a casing having a support intermediate its ends extending transverse to the casing axis, a cover member for a casing end, said member carrying signal-indications, compartment-forming means between the cover member and said support and supported by the latter, said means being positioned to locate a compartment in alinement with an indication, said compartments being adapted to receive an illuminating structure, a pair of rotative shafts extending through the cover member and said support, each shaft having its external end provided with an indicator movable relative to predetermined indications and each having its inner end formed to support a circuit make and break element, and circuit make and break contacts supported by the support on the path of movement of said elements.

In testimony whereof I have hereunto set my hand.

FRANK W. WOOD.