

SELECTIVE WAVE TRANSMISSION SYSTEM.

1,326,727.

2 SHEETS—SHEET 1

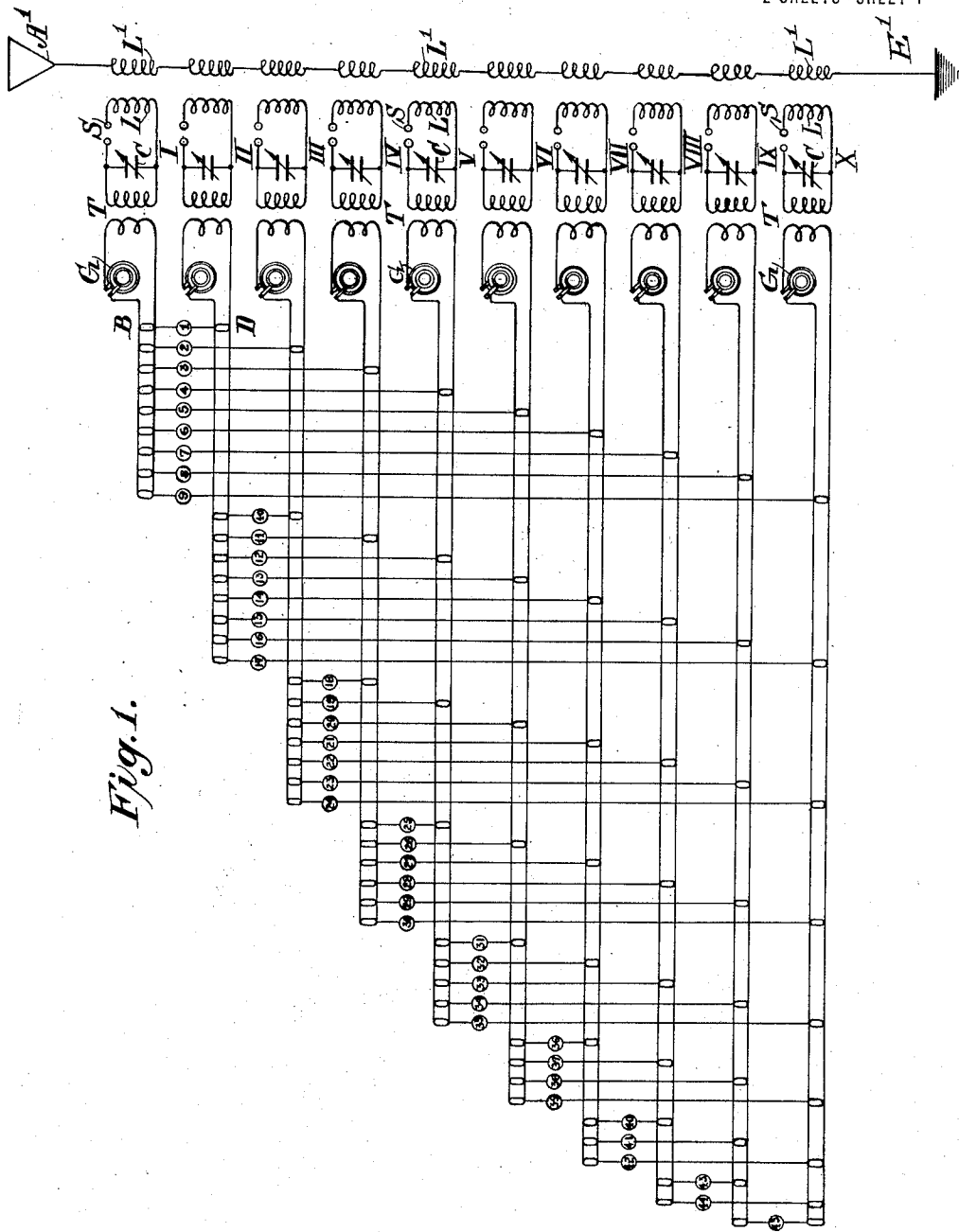


Fig. 1.

Geschnaw

H. Wächter

John Hays Hammond, Jr. INVENTOR

BY

Messimer & Austin ATTORNEYS

J. H. HAMMOND, JR.

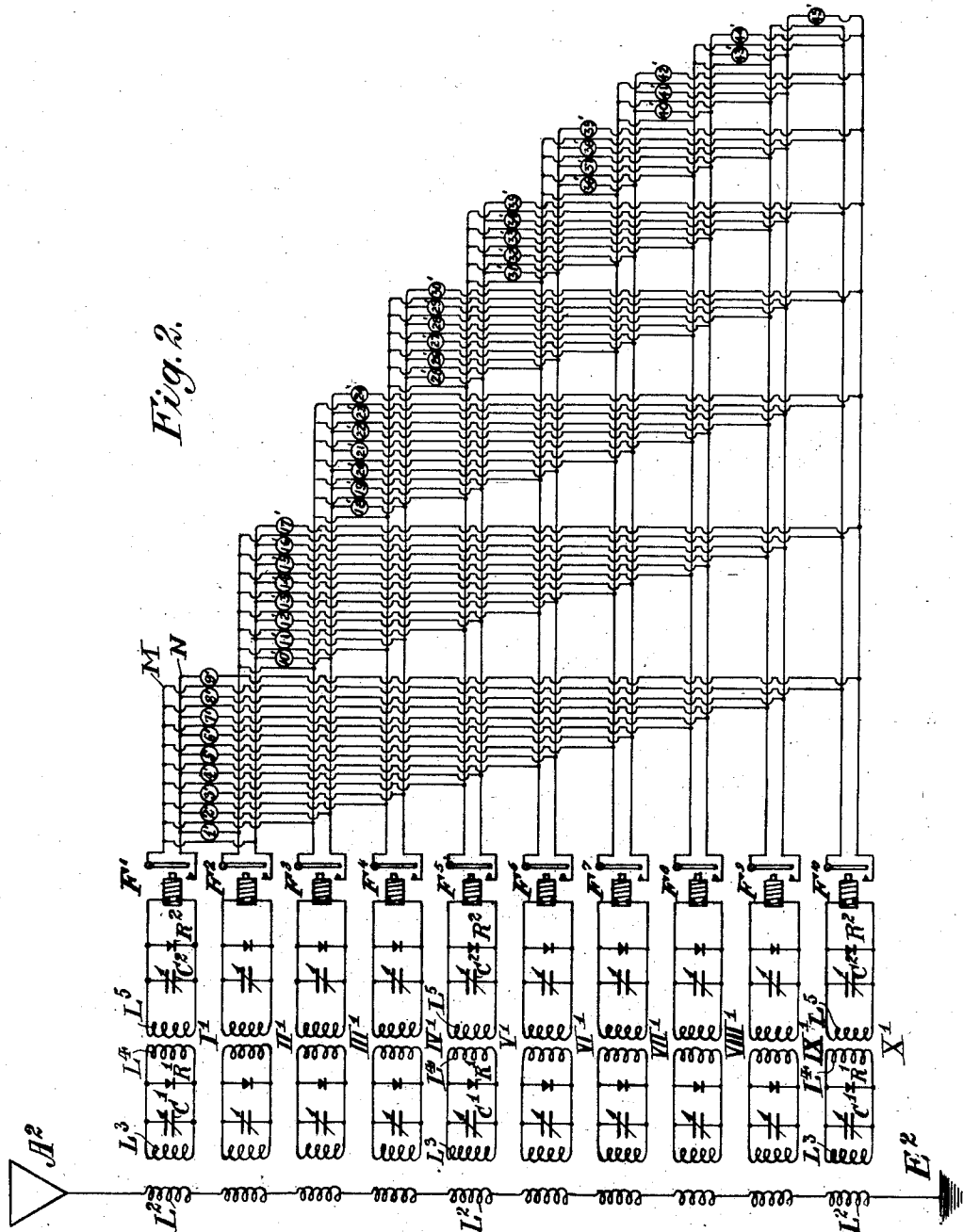
SELECTIVE WAVE TRANSMISSION SYSTEM.

APPLICATION FILED APR. 30, 1912. RENEWED JAN. 8, 1919.

1,326,727.

Patented Dec. 30, 1919.

2 SHEETS—SHEET 2.



WITNESSES

Gerfman
H. Pächter

John Hays Hammond, Jr. INVENTOR

BY

Messmer & Austin ATTORNEYS

UNITED STATES PATENT OFFICE.

JOHN HAYS HAMMOND, JR., OF GLOUCESTER, MASSACHUSETTS.

SELECTIVE WAVE-TRANSMISSION SYSTEM.

1,326,727.

Specification of Letters Patent.

Patented Dec. 30, 1919.

Application filed April 30, 1912, Serial No. 694,185. Renewed January 8, 1919. Serial No. 270,246.

To all whom it may concern:

Be it known that I, JOHN HAYS HAMMOND, JR., a citizen of the United States, residing at Gloucester, in the State of Massachusetts, have invented certain new and useful Improvements in Selective Wave-Transmission Systems, of which the following is a specification.

My invention relates to systems of selective wireless transmission of energy, in which electric waves of definite frequencies are transmitted in groups also having definite group frequencies, and relates more particularly to systems in which electric waves of two or more wave lengths and in groups of two or more frequencies are transmitted simultaneously.

My invention consists broadly in the transmission of radiant energy from one point in groups of waves having two or more group frequencies, the waves comprising each group having one definite wave length, but having different wave lengths in the different groups, and the receiving of this energy at another place so as to effect the selective control of suitable mechanisms.

The apparatus I have employed to illustrate this invention relates to the operation of a typewriter keyboard by means of combinations of two or more groups of electric waves, both the wave groups and the individual waves being tuned to definite frequencies, as will hereafter be set forth more fully, but my invention is not confined to this particular embodiment, but may be applied in many other ways.

In order to effect the operation of 45 keys on a typewriter keyboard by means of radiant energy, it is usually necessary to have 45 separate circuit-closing relays, or other suitable controlling mechanisms, each operated by waves of a certain frequency, or group frequency, set out from a transmitting station by suitable apparatus for the production of these 45 varieties of waves or wave groups. But with my system it is possible to operate the 45 keys with only 10 relays, or other suitable apparatus, acting in combinations of two, connected in such a way that both must be energized simultaneously to operate the key which they control.

In order that these 10 relays may be selectively operated by means of radiant energy, it is necessary to have, at the transmitting station, 10 transmitting units, and at the receiving station, 10 corresponding

receiving units, one for the control of each relay. In my system each of these units is tuned to a definite wave length and a definite spark, or group frequency, and is therefore doubly selective. Moreover, since each key can only be operated by two relays acting simultaneously, each key has a quadruple selectivity, and the chances of any outside interference with the operation of these keys are practically negligible.

In the accompanying drawings,—

Figure 1 represents, in diagrammatic form, a transmitting station on my system, and

Fig. 2 shows, also diagrammatically, a receiving station.

In Fig. 1 are shown 10 transmitter units, numbered from I to X, inclusive, which in combinations of two, are controlled by 45 keys, numbered from 1 to 45, inclusive. Each unit emits groups of waves having a distinct group frequency and a distinct wave length, and it is composed of an alternating-current generator G, a step-up transformer, T, and a closed oscillatory circuit comprising a spark gap S, a variable condenser C, and an inductance coil L. B and D are short-circuiting strips which close the circuits through generator and transformer of transmitter units I and II when key 1 is operated. A¹ is an untuned antenna in inductive relation to all 10 oscillatory circuits.

In the operation of the transmitting apparatus, when key 1 is closed, transmitter units I and II, each with its distinctive wave length and group frequency, impress their oscillations upon the antenna A¹ and cause the latter to radiate energy of two wave lengths and at two group frequencies. When key 28 is closed, transmitter units IV and VIII impress upon the antenna oscillations of their respective wave lengths and group frequencies, which are then radiated outward. In a similar way, each key controls two of the transmitter units, each of which emits waves of distinct wave length and group frequency.

In Fig. 2, there are 10 receiver units, I¹ to X¹, inclusive, tuned, respectively, to the 10 transmitter units. A² is an untuned antenna. I¹ is a receiver unit, comprising a closed oscillatory circuit consisting of the inductance coil L¹ and the variable condensers C¹, this circuit being tuned to the wave length of the corresponding oscillatory circuit of the transmitter unit I. The recti-

fier R^1 allows unidirectional currents to pass through the coupling coil L^4 , which is in inductive relation to coupling coil L^5 , the latter and the variable condenser C^2 being in a comparatively low frequency circuit which is tuned to the group, or spark frequency of transmitter unit I. Rectifier R^2 allows unidirectional currents to pass through the relay F^1 , which short circuits the bus-bars M and N. The other receiver units function in an exactly similar manner.

There are 45 printing elements numbered from 1^1 to 45^1 , inclusive, and in the operation of the receiving apparatus, when printer 1^1 is to work, relays F^1 and F^2 must be closed, which causes the closure of a circuit through a source of current and an electromagnet, which causes printer 1^1 to operate. This requires the simultaneous operation of receiver units I^1 and II^1 which can only be effected when transmitter units I and II are emitting their characteristic waves, upon having been started by the closing of key 1. In a similar manner, any one of the 45 printers can be operated by closing the corresponding key of the transmitting apparatus.

The particular apparatus here described is suitable for the transmission and receiving and recording of telegraphic signals and messages, but it is obvious that my invention has a far wider scope. A great variety of wave lengths and of forms of radiant energy can be utilized, and a large number of mechanisms can be actuated thereby. A tuned relay or any other device which responds to a specific frequency of impulses received may be used at the receiving station.

I do not confine myself to the particular means here shown for carrying out my invention, but what I claim is:

1. In a selective wave transmission system, a receiver comprising a plurality of sets, each of said sets comprising a plurality of tuned circuits and being responsive to a predetermined combination of wave lengths and group frequencies, said sets operating in predetermined combinations, two or more, to actuate local mechanisms.

2. In a selective wave transmission system, a transmitting apparatus comprising a plurality of mechanisms, each of which controls a combination of two or more transmitting sets, the number of said transmitting sets being less than the number of mechanisms, and each of said sets being tuned to a plurality of frequencies.

3. In a selective wave transmission system, a transmitting station comprising a plurality of sets, each of said sets transmitting a predetermined combination of wave lengths and group frequencies, said sets being operated in predetermined combinations, two or more by local mechanisms.

4. In a radio typewriter system, a receiving station comprising receiving circuits tuned to wave length and group frequency, and typewriter keys each operated directly by combinations of two or more of said receiving circuits.

5. A selective receiving system for waves comprising a plurality of elements selectively responsive respectively to a plurality of differentiated series of waves, each series having a wave frequency and a wave group frequency different from the wave frequency and wave group frequency of every other series, and a plurality of devices each of which is independently controlled as a result of the combined action of a plurality of said elements, the number of said devices being greater than the number of said elements.

6. A selective receiving system for waves comprising a plurality of elements selectively responsive respectively to a plurality of differentiated series of waves, each series having a wave frequency and a wave group frequency different from the wave frequency and wave group frequency of every other series, and a plurality of devices each of which is independently controlled as a result of the combined action of a plurality of said elements, the number of said devices being greater than twice the number of said elements.

7. A selective receiving system for waves comprising a plurality of elements selectively responsive respectively to a plurality of differentiated series of waves, each series having a wave frequency and a wave group frequency different from the wave frequency and wave group frequency of every other series, and a plurality of devices each of which is independently controlled as a result of the combined action of a plurality of said elements, each of said elements being arranged to cooperate selectively with any one of a plurality of the remaining elements to actuate a corresponding device.

8. A selective receiving system for waves comprising a plurality of electromagnetic elements, means for selectively energizing any one of said elements independently of the remaining elements, and a plurality of devices electrically connected to different groups of said elements respectively whereby when the elements of any one of said groups are simultaneously operated the corresponding one of said devices will be operated, the number of said devices being greater than the number of said elements.

9. A selective receiving system for waves comprising a plurality of electromagnetic elements, means for selectively energizing any one of said elements independently of the remaining elements, and a plurality of devices electrically connected to different groups of said elements respectively where-

by when the elements of any one of said groups are simultaneously operated the corresponding one of said devices will be operated, the number of said devices being greater
5 than the number of said elements, each of said elements being electrically connected to a plurality of the remaining elements and forming therewith a plurality of said groups.

10 10. In a radio typewriter system, a receiving station comprising a plurality of sets each comprising circuits tuned to wave frequency and group frequency respectively, and typewriter keys each operated directly by a combination of a plurality of said sets.

15 11. In a radio system, a receiving station comprising a plurality of sets each comprising circuits tuned to wave frequency and group frequency respectively, and typewriter keys each independently operated by a combination of a plurality of said sets, the
20 number of said keys being greater than the number of said sets.

25 12. In a radio system, a receiving station comprising a plurality of sets each comprising receiving circuits tuned to wave frequency and group frequency respectively, and operative elements each independently operated by a combination of a plurality of said receiving circuits.

30 13. In a selective wave receiving system, a receiver comprising a plurality of sets, each of said sets comprising a plurality of circuits tuned to different frequencies respectively, and a plurality of operative elements
35 each independently operated as a result of the action of a predetermined combination of a plurality of said sets.

40 14. In a selective wave receiving system, a receiver comprising a plurality of sets, each of said sets comprising a plurality of successively acting circuits tuned to different frequencies respectively, and a plurality of operative elements each independently operated as a result of the action of a predetermined combination of a plurality of said
45 sets.

50 15. In a selective wave receiving system, a receiver comprising a plurality of sets, each of said sets comprising a plurality of circuits tuned to different frequencies respectively, and a plurality of operative elements each independently operated as a result of the action of a predetermined combination of a plurality of said sets, the number
55 of said elements being greater than the number of said sets.

60 16. In a selective wave receiving system, a receiver comprising a plurality of sets, each comprising a plurality of circuits tuned to different frequencies respectively, and a plurality of operative elements, each independently operated as a result of the simultaneous action of a predetermined combination of a plurality of said sets.

65 17. In a selective wave receiving system,

a receiver comprising a plurality of sets, each comprising a plurality of circuits tuned to different frequencies respectively, and a plurality of operative elements, each independently operated as a result of the simultaneous action of a predetermined combination of a plurality of said sets, the number
70 of said elements being greater than the number of said sets.

75 18. In a radio typewriter system, a receiving station comprising receiving circuits tuned to wave length and group frequency, and typewriter keys each operated directly by a plurality of said receiving circuits.

80 19. A selective receiving system for waves comprising a plurality of elements selectively responsive respectively to a plurality of differentiated series of waves, and a plurality of devices each of which is independently controlled as a result of the combined
85 action of a plurality of said elements, the number of said devices being greater than the number of said elements.

90 20. A selective receiving system for waves comprising a plurality of elements selectively responsive to a plurality of differentiated series of waves, and a plurality of devices each of which is independently controlled as a result of the combined action of
95 a plurality of said elements, the number of said devices being greater than twice the number of said elements.

100 21. A selective receiving system for waves comprising a plurality of elements selectively responsive respectively to a plurality of differentiated series of waves, and a plurality of devices each of which is independently controlled as a result of the combined
105 action of a plurality of said elements, each of said elements being arranged to cooperate selectively with any one of a plurality of the remaining elements to actuate a corresponding device.

110 22. A selective receiving system for waves, comprising a plurality of electromagnetic elements, means responsive to radiant energy for selectively energizing any one of said elements independently of the remaining elements, and a plurality of devices electrically connected to different groups of
115 said elements respectively whereby when the elements of any one of said groups are simultaneously operated the corresponding one of said devices will be operated, the number of said devices being greater than
120 the number of said elements.

125 23. A selective receiving system for waves comprising a plurality of electromagnetic elements, means responsive to radiant energy for selectively energizing any one of said elements independently of the remaining elements, and a plurality of devices electrically connected to different groups of said elements respectively whereby
130 by when the elements of any one of said

groups are simultaneously operated the corresponding one of said devices will be operated, the number of said devices being greater than the number of said elements, each of said elements being electrically connected to a plurality of the remaining elements and forming therewith a plurality of said groups.

24. In a selective wave receiving system, a receiver comprising a plurality of sets, each of said sets comprising a plurality of elements tuned to different frequencies respectively, and a plurality of operative elements each independently controlled as a result of the action of a predetermined combination of a plurality of said sets.

25. In a selective wave receiving system, a receiver comprising a plurality of sets, each of said sets comprising a plurality of successively acting elements tuned to different frequencies respectively, and a plurality of operative elements each independently controlled as a result of the action of a predetermined combination of a plurality of said sets.

26. In a selective wave receiving system, a receiver comprising a plurality of sets, each of said sets comprising a plurality of elements tuned to different frequencies respectively, and a plurality of operative elements each independently controlled as a result of the action of a predetermined combination of a plurality of said sets, the number of said operative elements being greater than the number of said sets.

27. In a selective wave receiving system,

a receiver responsive to radiant energy comprising a plurality of sets, each comprising a plurality of circuits tuned to different frequencies respectively, and a plurality of operative elements each independently operated as a result of the simultaneous action of a predetermined combination of a plurality of said sets.

28. A wave transmission system, comprising a plurality of transmitter units arranged to generate a corresponding plurality of series of waves respectively, having different wave frequencies respectively, and said plurality of series of waves being periodically modified respectively at different frequencies respectively, and means including a plurality of keys arranged to connect one of said units operatively to any one of the remaining units.

29. A wave transmission system comprising a plurality of transmitting units for transmitting a plurality of series of groups of waves respectively having different wave frequencies and different group frequencies respectively, of means for selectively connecting any one of said units operatively with any one of the remaining units so as to cause the units thus connected to transmit simultaneously two corresponding series of waves.

This specification signed and witnessed this 23rd day of April, A. D., 1912.

JOHN HAYS HAMMOND, JR.

Signed in the presence of—

BENJ. F. MIESSNER,

M. P. WINNE.