G. H. BROWN.

ELECTRICAL BLOCK SIGNALING SYSTEM FOR RAILWAYS.

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906,861. Patented Dec. 15, 1908.

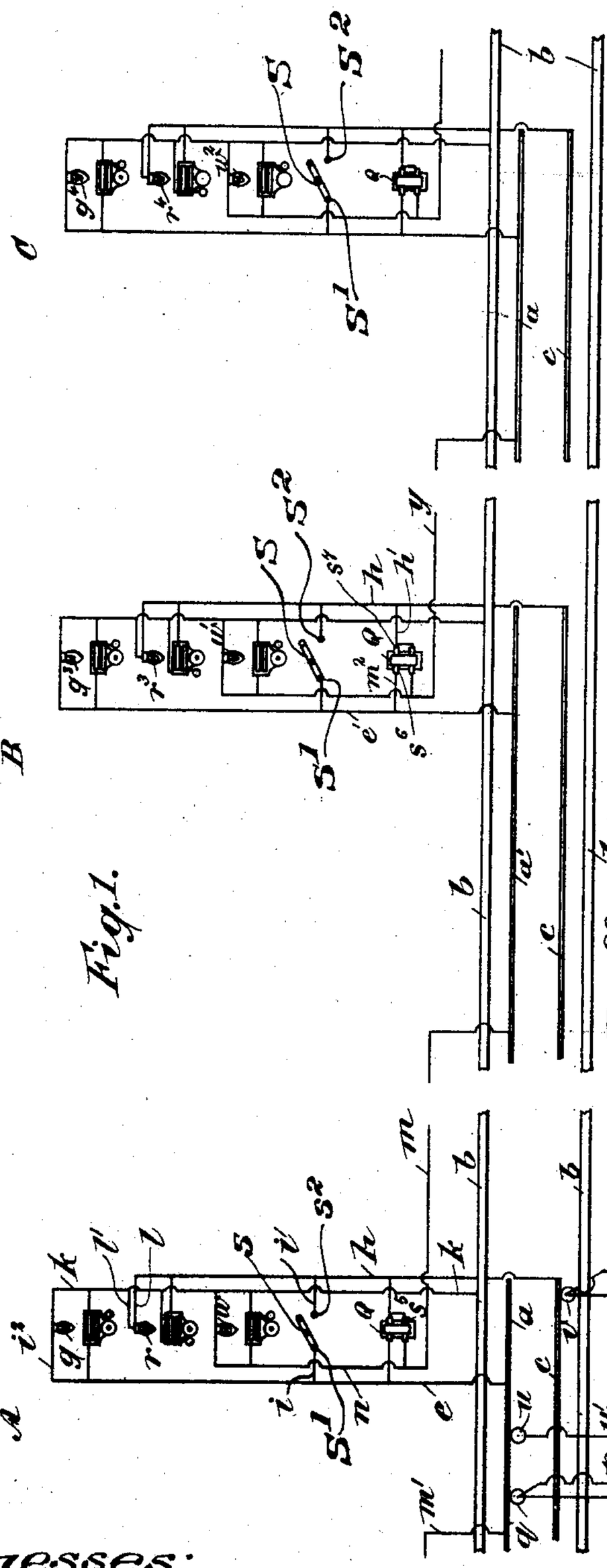

Fig. 1.

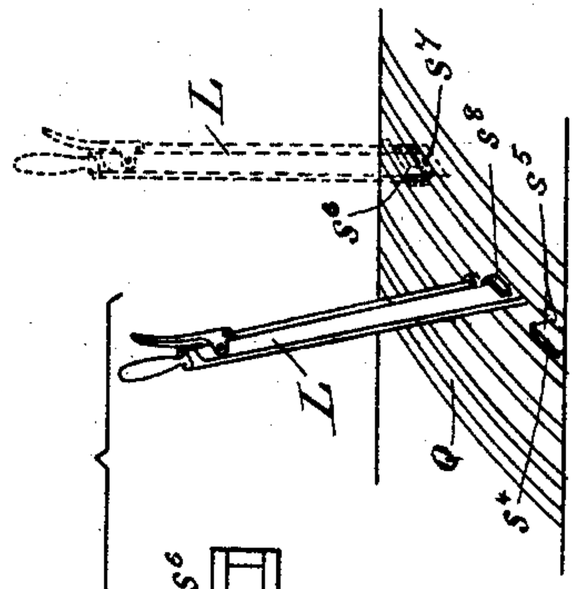

Fig. 2.

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UNITED STATES PATENT OFFICE.

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ELECTRICAL BLOCK-SIGNALING SYSTEM FOR RAILWAYS.

No. 906,861. Specification of Letters Patent. Patented Dec. 15, 1908.

Application filed September 20, 1907. Serial No. 393,804.

To all whom it may concern:

Be it known that I, GEORGE HERBERT BROWN, a subject of the King of Great Britain, residing at 14 Dublin road, Belfast, Ireland, have invented certain new and useful Improvements in Electrical Block-Signaling Systems for Railways, of which the following is a specification.

This invention relates to an electrical block signaling system for railways.

The system is so arranged that an incoming train automatically notifies or indicates its approach to the signal cabin, controlling that section of the line, and also (if the line is clear), notifies or indicates its approach to the signal cabin, controlling the next section of the line ahead, and, further, to the signal cabin controlling the section of the line just left.

In carrying out the invention which is a development of the prior invention of W. J. Mackenzie Serial No. 291557 filed the 13th. December, 1905, two rails or bars or the like, are arranged parallel to one another in advance of each signal cabin, and these rails or the like, which are suitably insulated may be of any suitable length and are preferably laid between the ordinary rails.

The special rails which I will hereinafter refer to as "signaling rails", are adapted to be charged with electricity from a source of electricity on the train, preferably a dynamo on the engine, and by means of a contact brush or wheel, which is normally pressed downwards by one or more springs, in the same manner as described in the specification of the aforesaid invention. Wires are led from the signaling rails of each section to the signal cabin of that section and indicating lamps and bells are arranged in the circuits, in any suitable and well known manner. On each engine and also preferably in the guard's van of each train, similar signaling lamps and bells are used, and also, if preferred a whistle in addition. The connections of the lamps and whistle on the engine are fully described in the patent specification afore mentioned. A switch is provided in the cabin and also on the engine.

Each cabin is connected up with the signaling rails of the section ahead, and with the cabin behind, by means of properly insulated wires. The lever quadrants of the locking frame in each cabin are provided with insulated contact studs, the levers are also provided with corresponding studs, and the contacts are so arranged that, when the lever is pulled into the position to indicate danger, a circuit is closed whereby a danger lamp is lighted in the signal cabin and also, if an engine is on that signaling area, on the engine also; and likewise, when the lever is thrown over to show clear, another circuit is closed which, if a train is in the signaling area ahead, also indicates danger both in the cabin and on the engine. The first circuit just mentioned is supplied with electricity from the locally situated train, while the electricity for the second circuit is supplied from the train in the signaling area ahead.

In order that my invention may be properly understood, I have hereunto appended explanatory drawings, whereon:—

Figure 1 is a diagrammatic view of a section of railway track showing three signal cabins and an engine and guard's van in the signaling area of one of them; and showing the wires and connections between the engine and the signal cabin of the signaling area on which the engine is, also between the engine and guard's van, and between the signal cabins before and behind the signaling area on which the train is. Fig. 2 is an elevation and plan of the lever quadrants arranged as switches to break or complete the signaling circuits.

Under this invention I lay along a section of the track at each signal cabin a conducting wire or signaling rail *a* which, as shown in Fig. 1, is placed beside the ordinary rail *b* and is supported at intervals in any suitable manner. A second conducting wire or signaling rail *c* is also laid parallel to the wire or rail *a*. An insulated wire *e* is led from the signaling wire or rail *a* and by a branch wire *i* to the switch contact s^1 in the signal cabin A, and a second insulated wire *h* is led from the signaling wire or rail *c* by a branch wire i^1 to the switch contact s^2. The completing of each of these circuits through the danger lamp *r* is made by means of the switch *s*.

In each signal cabin there is, preferably, arranged a green lamp, a red lamp, and a white lamp as shown in Fig. 1 and marked *g*, *r*, and *w*, respectively, each lamp having in conjunction with it, a call bell, suitably connected in circuit.

On the engine, and also preferably in the guard's van, are two lamps, red, and green as shown in Fig. 1, and which are marked g^1 and r^1, on the engine, and g^2 and r^2 in the

guard's van. The various lamps are suitably wired and connected so as to light up in the manner hereinafter described.

If desired and as described in specification Serial No. 291557 '05 there may be arranged on the engine and in conjunction with the lamps thereon, a whistle electrically controlled and so arranged as to be operated when the danger signal on the engine is worked. From the wire *e*, as before stated, a branch wire *i* is led to the switch contact s^1 and when the circuit is completed, by means of the switch *s*, to the danger lamp *r*. From the wire *e* there is also led a branch wire i^2 to the lamp *g* and this circuit by the wire *k* is earthed to the rail *b*. From the wire *h*, when the circuit is completed by means of the switch *s*, and contact s^2, current is led by the branch wire *l* to the danger lamp *r* and by the branch wire l^1 to the wire *k* and then to the earth by the rail *b*. When this circuit is completed and the switch *s* is on contact s^2 the lamps *r*, r^1 and r^2 are all lighted and also the green lamp g^3 in the signal cabin B, there being a branch wire *m* led from the wire *h*, to the signaling rail a^1 of the signaling area B, and by a branch wire e^1 to the call lamp g^3. There is also led from the rail *a*, the branch wire m^1 which is connected to the wire, corresponding to the wire *h* in the cabin of the signaling area behind, and from which wire m^1 a branch wire is led to the white lamp in that signal cabin.

As shown in Fig. 1 the engine of the train is provided with a dynamo *o* (driven in any suitable and well known manner, from one of the engine axles) and with a distributing pulley or trolley *q* which is normally pressed downwards by one or more springs in the same manner as described in the prior specification hereinbefore mentioned. There is also a collecting trolley *u*, and a collecting trolley *v* which are also pressed downwards by springs. A + wire *p* leads from the dynamo *o* to the distributing trolley *q* and a − wire p^1 to the engine framing. The trolley *u* is connected by a wire u^1 to the wire *t* and from the wire *t* by a branch wire t^1 to the green lamp g^1 in the cab of the engine then to earth by the engine framing. From the wire *t* there is also led a branch wire t^2 to the green lamp g^2 in the guard's van, which is also earthed to the van framing. The trolley *v* is connected by the wire v^1 to the red or danger lamp r^1 in the engine cab, and by the branch wire v^2 to the red lamp r^2 in the guard's van.

The two red or danger lamps r^1 and r^2 in the engine and guard's van respectively, are connected in circuit by the wire *x* and to the switch contact j^1 so that when the switch *j* is brought into connection with the contact j^1, a circuit is completed between the signaling wires or rails, *a* and *c*, and the lamps r^1 and r^2 on the engine and in the guard's van are lighted, also the red or danger lamp *r* in the signal cabin A, and simultaneously the green or call lamp g^3 is lighted in the signal cabin B ahead.

When a train enters the signaling area A, the distributing trolley *q* forms a connection between the dynamo *o* and the signaling rail or wire *a* and the current from the dynamo *o* passes from thence by wire *e* and the branch wire i^2 to the lamp *g*, and to earth by the wire *k* and rail *b*.

At the same time the electric current passes by the collecting trolley *u* and the wires u^1, *t* and t^1 to the lamp g^1 in the engine cab. In this manner a simultaneous alarm is given in the signal cabin and in the cab of the engine, thereby intimating to both the signalman and to the engine driver that the train has entered the signaling area. When the line is clear there is no further signal required between the driver of the engine and the signalman in the signal cabin, but should the engine driver desire to call the attention of the signalman he can do so by bringing his switch *j* into connection with the contact j^1, a flash only, and thereby completing the circuit through the signaling rails *a* and *c*, and operating and lighting the red or danger lamp *r* in the signal cabin. This flash signal can be replied to by the signalman in the signal cabin, by means of the switch *s* which is brought into connection with the contact s^2 thereby completing the circuit and lighting up the lamps r^1 and r^2 in the engine cab and the guard's van respectively.

When the line ahead is not clear, the signalman throws the switch *s* into connection with the contact s^2 and keeps it there until the obstruction on the line is removed, so that when a train enters the signaling area under the control of that cabin, the circuit is completed between the signaling wires or rails *a* and *c* and therefore immediately the contact brushes or wheels *q*, *u*, *v*, of the engine make contact with the signaling rails, a complete connection is formed between the dynamo *o* on the engine and the danger lamps r^1 on the engine, and r^2 in the guard's van, also with the danger lamp *r* in the signal cabin, and thereby at once warning the engine driver that the signals are against him, and intimating to the signalman in the signal cabin that a train has entered his signaling area.

When the train enters the area under the control of the signal cabin B, it automatically lights the green or call lamp g^3 in the signal cabin controlling that area and simultaneously by means of the wire *m* which is connected to the signaling rail a^1 and the branch wire *n*, lights the white lamp *w* in the cabin controlling the signaling area A, and at the same time, if the signal cabin A has its signaling lever at "clear" and the circuit closed through contact studs s^4, s^5 and contact

piece s^8 (as hereinafter described with reference to Fig. 2) lights the red or danger lamp r in this cabin, thereby indicating to the signalman that the train is on section B, but is not yet clear thereof. The driver of the engine flashes, by means of his switch j and works the red or danger lamp r^3 in the signal cabin B, and simultaneously the flash is transmitted on by the wire y to the rail a^2 and thence by wire i^2 to the green lamp g^4 in the signal cabin C. The signalman in cabin B, replies to the engine driver by means of his switch s, and works the danger lamp r^1 on the engine, and danger lamp r^2 in the guard's van, and also works the green lamp g^4 in the signal cabin C thereby announcing that a train is in signaling area B.

When the train leaves the signaling area at each cabin, the contact of the trolleys q, u, and v, with the signaling rails a and c is broken and the various lamps on the train and in the signaling cabins go out. If the white or clear lamp w in the cabin controlling the signaling area A is not lighted, when the train, which has passed that area, arrives or should have arrived at signaling area B, the signalman in the cabin A, knows that something is wrong, and by throwing his switch lever s into connection with the contact s^2 he is able to warn and stop a succeeding train.

I propose under my invention to use, in connection with the system hereinbefore described, special insulated studs or contacts, preferably arranged in connection with each signal lever and in each signal cabin.

As shown in Fig. 2 the quadrant Q of the frame for each lever is provided with four contact studs s^4, s^5, s^6, s^7, arranged, two at one side and two at the other side of the slot, one pair being at one end of the slot and one pair being at the other end of the slot. The lever L itself is provided with a contact piece s^8 so arranged that, when the lever is thrown over to show that the line is blocked, an electric circuit is closed through the studs s^6, s^7 (at that end of the slot) and the lever. Similarly, when the lever L is pulled into the clear position on the quadrant Q another circuit is closed, through the lever and the studs s^4 s^5 at that end of the slot. A branch wire m^2 leads from the wire e^1 running to the green lamp g^3 in the cabin of the signaling area B ahead, and is connected to the contact stud s^6 at the "blocked" end, in the side of the lever quadrant Q in which the lever L works. The circuit is continued from the lamp g^3 to one side, or contact of the white lamp w^1 in the signal cabin of area B.

The "danger" stud s^7 in the lever quadrant is connected by means of a branch wire h^1 with the danger wire h, which leads to the signaling rail c. It will be seen that with this arrangement, when the signal lever L is pulled back to show "way clear", and so allow a train to pass, it automatically closes or completes a circuit connected with the signaling area ahead, with the result that, when the train arrives in the signaling area ahead, a current will be transmitted from the engine, along the wire m to the signal cabin in the rear, and will indicate to the signalman (by lighting up the white lamp w) in that cabin that the train has arrived in the next signaling area ahead.

The signaling arrangements are such that a train cannot, without ignoring the signals, leave the signaling area A while a train is in the signaling area B, or leave the signaling area B while a train is in area C. When a train enters signaling area A and a train still occupies the signaling area B, then the green call lamps will be lighted on the train in signaling area B and by means of the wire m a current will be conveyed to the danger lamps on the engine and guard's van of the train in signaling area A thereby indicating danger to the driver of that train.

When a train enters the signaling area A following another train which has left the signaling area A but has not yet reached the signaling area B, the signalman in signaling area A knows that the latter train has not yet reached the area B as his white lamp w has not lighted. The signalman in signaling area A must then block any train entering his area in the usual way.

When a train enters the signaling area A, after a train has left the signaling area B, but which has not yet reached the signaling area A the signalman in area B is warned by his green or call lamp g^3 that a train has entered the area A and knowing that the train which has just left his section or area, has not yet reached the signaling area C, he can be prepared to block the train from area A, if necessary.

When the train in signaling area B is stopped and blocks the train in area A, and it is desired to move the train in area A, say to the station platform, then the signalman in area A partially releases his signal lever L in the quadrant Q so that it is clear of the contact studs s^4, s^7, and then taking his switch off the contact s^2 he can make a signal by a flash or a series of flashes to the driver of the engine as hereinbefore described. The signal cabin for signaling area C would of course be provided with an arrangement of lamps g^4 r^4 and w^2 and an arrangement of wires and switches similar to the cabins for areas A and B.

As the electrical signaling system is quite complete in itself, and it is not, or may not be, necessary to employ the ordinary semaphore signals, then in that case of course the arrangement herein described for using the ordinary signal levers as switches, would not be required, but in lieu thereof, contact levers or switches, preferably somewhat in the same style, would be provided, the switch contacts being arranged as herein described.

It may be arranged that instead of the electricity being supplied from the engine, it may be supplied from any other convenient source, such as a dynamo or electric machine in a station and so charge the signaling conductor wires and operate the various lamps and signals as hereinbefore described.

Having now fully described my invention what I claim and desire to secure by Letters Patent is:—

1. An electrical block signaling system for railways in which similar signaling apparatus are placed on the engine and in the signal cabin the electrical connections on the track, in the engine or guard's van and in the signal cabins being so arranged that the incoming train completes an electric circuit or circuits and thereby automatically notifies or indicates its approach to the signal cabin controlling the section of the line on which it is on, and also, (if the line is clear), notifies or indicates its approach to the signal cabin controlling the next section of the line ahead and, further, to the signal cabin controlling the section of the line just left, substantially as described.

2. In an electrical system of block signaling on railways the combination of conductors arranged at intervals on the track, electrical signaling apparatus on the engine similar signaling apparatus in the guard's van, electrical signaling apparatus in each signal cabin, switching means on the engine and in the guard's van for communicating with the signal cabin controlling the section of the line for the time being in use, and means whereby an incoming train automatically indicates its approach to the cabin of the next section of line ahead and also to the cabin for the section of line just left, substantially as described.

3. In an electrical block signaling system such as described, insulated studs or contacts fitted to the ordinary signal levers and quadrant frame in the signal cabin whereby when a train enters the signaling area of the cabin and energizes the electrical signaling apparatus by means of a dynamo on the train and a signaling lever is pulled, it immediately thereafter automatically completes an electric circuit with the signaling area ahead and audibly or visibly indicates to the signalman that a train has entered his section, substantially as described.

4. An electrical system of block signaling on railways such as described having, in combination, conductors on the track audible and visible electrical signaling devices on the engine, similar devices in each signal cabin, contact devices on the engine for contacting with the said conductors, connections from the cabins to the conductors switching means on the engine and in each cabin whereby signals can be given from the engine to a cabin or vice versa and means whereby an engine automatically notifies its approach to the next signal cabin ahead and to the signal cabin just left, substantially as described.

5. An electrical system of block signaling on railways such as described having, in combination, conductors on the track audible and visible electrical signaling devices on the engine, similar devices in each signal cabin, contact devices on the engine for contacting with the said conductors, connections from the cabins to the conductors, switching means on the engine and in each cabin and means whereby when the ordinary signalman's lever is operated so as to allow a train to pass, the signalman in the next cabin ahead is at once and automatically notified by a signal of the passage of the train, substantially as described.

6. An electrical system of block signaling on railways such as described having, in combination, conductors on the track audible and visible electrical signaling devices on the engine, similar devices in each signal cabin, contact devices on the engine for contacting with the said conductors, connections from the cabins to the conductors switching means on the engine and in each cabin, a quadrant with contacts and electrical connections and a lever adapted to work in the quadrant and having a circuit closing device thereon, substantially as described.

7. An electrical system of block signaling on railways such as described having, in combination, conductors on the track audible and visible electrical signaling devices on the engine, similar devices in each signal cabin, contact devices on the engine for contacting with the said conductors, connections from the cabins to the conductors switching means on the engine and in each cabin, a quadrant, two contacts at one end of the quadrant slot, two contacts at the other end of the quadrant slot, electrical connections with the contacts, and a lever having a circuit closing device thereon, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE HERBERT BROWN.

Witnesses:
JOSEPH MCGUINNESS,
EDWARD HARVEY.