

April 9, 1968

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3,377,618

ARRANGEMENT FOR IDENTIFYING FREIGHT CARS

Filed Sept. 11, 1961

2 Sheets-Sheet 1

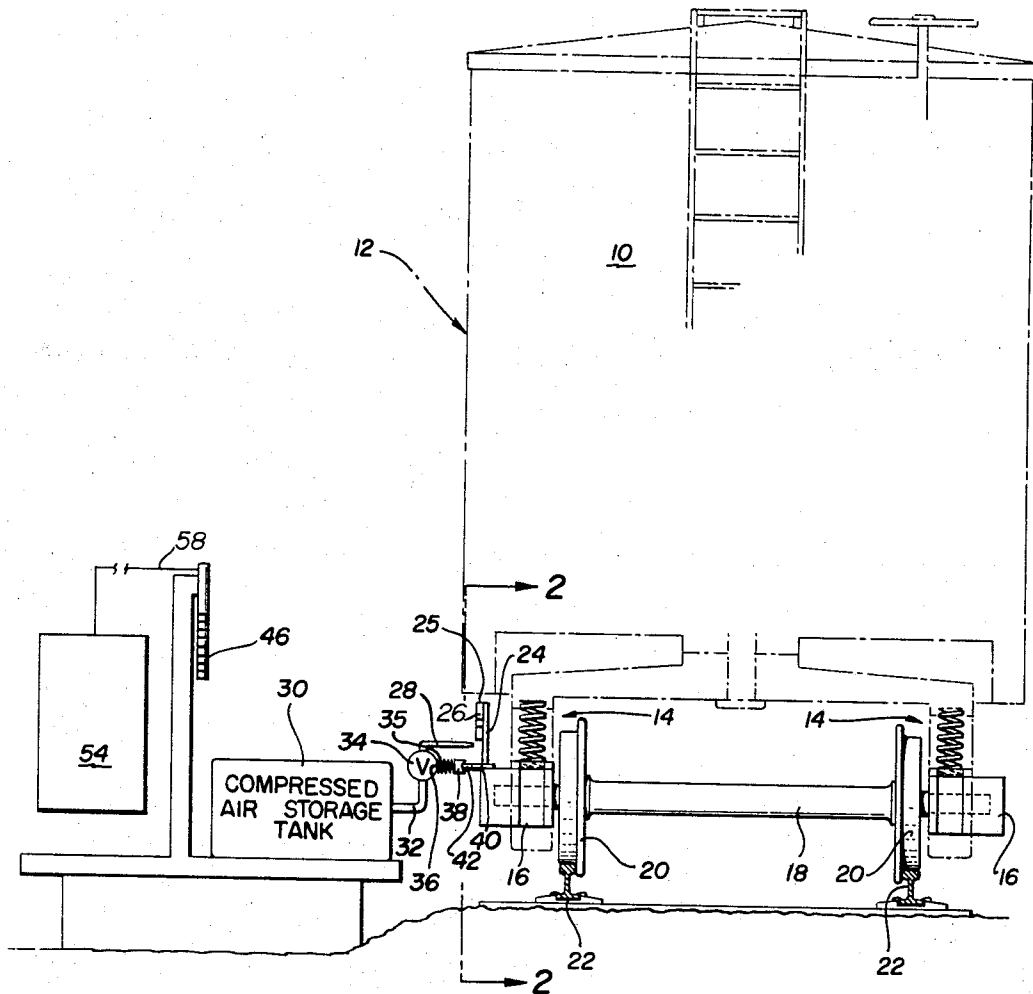


Fig. 1

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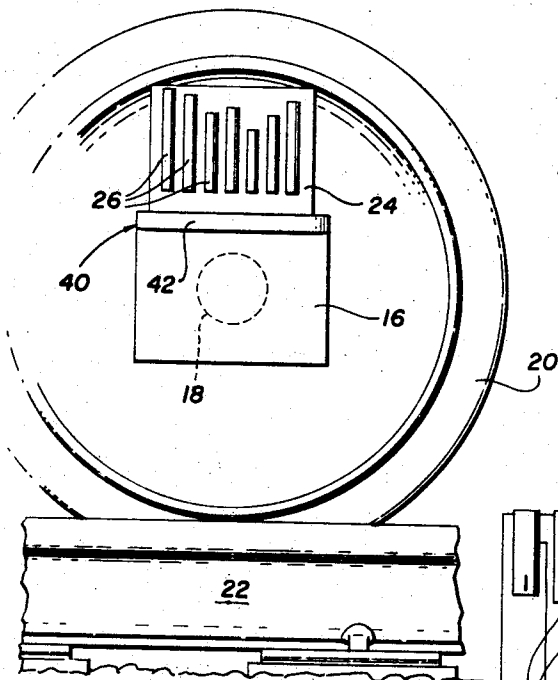


Fig. 2

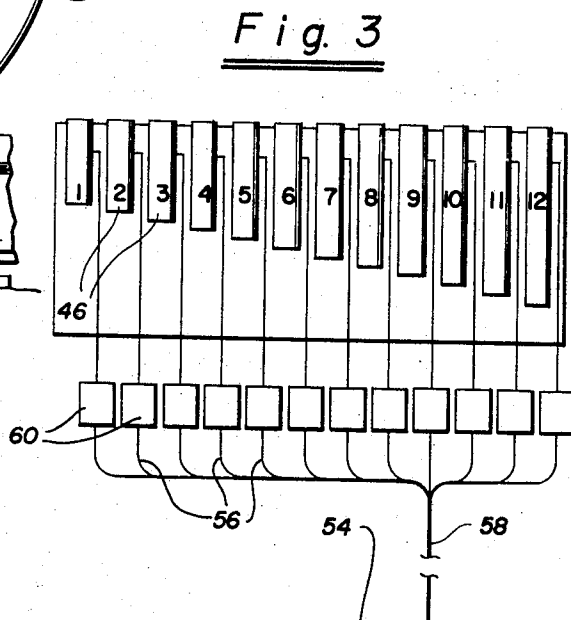
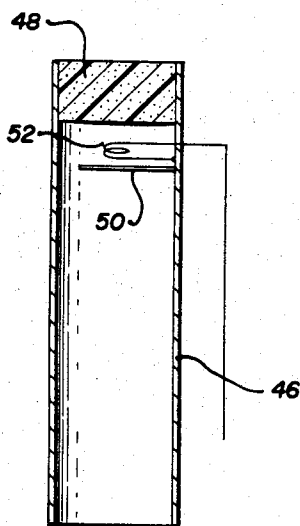


Fig. 3

Fig. 4



	O	XI	XII	x
O	0			
I	1	*	I	R
II	2	A	J	S
III	3	B	K	T
IV	4	C	L	U
V	5	D	M	V
VI	6	E	N	W
VII	7	F	O	X
VIII	8	G	P	Y
IX	9	H	Q	Z
y				

Fig. 5

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1

3,377,618 ARRANGEMENT FOR IDENTIFYING FREIGHT CARS

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Filed Sept. 11, 1961, Ser. No. 137,300

2 Claims. (Cl. 340—47)

ABSTRACT OF THE DISCLOSURE

An arrangement for identifying railroad cars as they pass a predetermined checking point, which comprises the combination of a set of whistles mounted upon the car, with a normally disabled device for producing a blast of air mounted adjacent the track at the checking point in a position wherein it is effective upon activation to sound the whistles on a car passing by, a cam operated valve operative in response to a cam on the car, upon the passage of the car past said blast producing device for activating said blast producing device to sound the whistles on the passing car. The whistles on the car are tuned to a selected combination of frequencies, and located in the vicinity of the blast producing device is a number of sound-responsive current-generating devices tuned to different frequencies. When a car passes the checking point and the blast producing device is set in operation, the sounds produced by the whistles cause corresponding ones of the sound-responsive current-producing devices to generate currents of different frequencies, which are employed to identify the car at a remote control station.

The present invention relates to arrangements for identifying railroad cars and particularly freight cars. In the administration of railroad stations and yards, it is desirable to have a record of all the cars that are at a yard or station at the moment and for this purpose it is important to know the identity, and keep a record, of all cars moving into and out of a station.

It is an object of my invention to provide an automatic arrangement for identifying cars moving past a predetermined checking point of a railroad track.

More particularly, it is an object of the invention to provide an automatic car identifying arrangement, of the type referred to, that supplies the car identifying information to a remotely located control station.

Furthermore, it is an object of the invention to provide an arrangement wherein cars passing predetermined points of a railroad system are automatically identified and their identity reported to a centrally located control station for visual display, recording in information storage apparatus, and/or processing in computers.

It is still another object of the invention to provide a car identifying arrangement, of the type referred to, that is of simple construction, and is rugged and dependable in operation and which remains effective despite adverse weather conditions, such as rain, frost, heavy snow, and dust or dirt.

These and other objects of my invention will be apparent from the following description of the accompanying drawings which illustrate a preferred embodiment thereof, and wherein:

FIGURE 1 is a fragmentary end view of a freight car traveling on a railroad track, and illustrates schematically the co-operating components of the car identifying arrangement of the invention on the car and adjacent the track, respectively;

FIGURE 2 is a side elevation of the left wheel of the car shown in FIGURE 1 and of the components supported

2

from the journal of the axle of said wheel, viewed in the direction of the arrows 2—2 indicated in FIGURE 1;

FIGURE 3 is a detail view illustrating schematically an arrangement for converting the sound of whistles of predetermined frequencies into identifying current pulses;

FIGURE 4 is a detail view illustrating one of the components of FIGURE 3 in section; and

FIGURE 5 is a table illustrating the manner in which all the arabic characters and all the letters of the alphabet may be represented by a relatively small number of different whistles.

In accordance with the invention each car carries for identification a multiple set of whistles tuned to selected, preferably supersonic, frequencies. For different cars the frequencies of the whistles differ in a manner similar to different composite numbers; and at predetermined checking points along the railroad tracks are mounted normally inoperative means for directing a blast of air or of some other gaseous fluid against the whistles on a railroad car as it passes by said checking points so that said whistles may briefly be sounded in succession. Means are provided to sense the presence of a car and activate the normally disabled blast-generating means. For instance, a source of light may be placed adjacent the tracks at said checking points and may be arranged to throw a beam of light across the track onto a photosensitive element which forms part of a circuit that maintains the blast-generating means in a disabled condition as long as it is illuminated by said beam, but permits said blast-generating means to operate whenever the beam is interrupted by the passage of a railroad car upon the tracks. For reasons of simplicity and ruggedness of construction, however, I prefer to provide each railroad car with camming means arranged to operate a control valve for the blast-producing means as the car passes through the checking station.

When a blast of air is directed against the whistles on a railroad car passing by, said whistles are activated and produce sounds of their particular frequencies. Likewise located adjacent the railroad track at the checking point is a battery of as many resonance devices as there are different frequencies employed to identify the cars, each tuned to one of said frequencies and each adapted to produce an electric current in response to the reception of a sound wave of the frequency to which it is tuned. Hence, upon passage of a car bearing an identifying set of whistles which are sounded by the activated blast-generating means, corresponding ones of the resonance devices at said checking points generate separate current pulses representing the different whistles on the car, and these separate current pulses are transmitted to the central control station where they may be employed to operate mechanism for recording the arrival or departure of the identified car in a suitable information storage apparatus, or where they may be fed into computing apparatus. Since the sequence of identifying sounds emitted by the whistles on a car passing through a checking point differs depending upon the direction in which the car passes by, each car may be furnished with an additional whistle located either in front or to the rear of the set of identifying whistles, and a special resonance device tuned to the frequency of said additional whistle may be provided at each checking point. Depending upon whether said special resonance device produces a signal before, or at the end of the car identifying current pulses, said pulses must be read in a forward or in the reverse direction.

Having first reference to FIGURE 1, the reference numeral 10 designates the body of freight car 12 that is supported by suitable spring means 14 upon journals 16 provided at the opposite ends of an axle 18. Said axle is supported on a pair of transversely spaced wheels 20 which engage the rails 22 of a railroad track. Sup-

ported from the left journal 16 is a plate 24 to which are detachably secured several adjacently positioned whistles 26 (FIGURE 2) each tuned to a particular supersonic frequency or frequencies representative of a number or letter.

Suitably supported from the ground adjacent each side of the railroad track 22 at each car-checking point and at a level slightly below the open lower ends of the whistle pipes 26 of a car passing through said checking point, is a nozzle 28 which is arranged to discharge in a direction transversely of the railroad track and which receives compressed air from a suitable air storage tank 30 through a conduit 32. Said conduit contains a valve 34 that is normally in closed condition, but which may temporarily be opened against the urgency of a strong restore spring 35 by depression of an actuating rod 36. Said rod is provided with a funnel-shaped cam follower 38 that extends into the path of a cam 40 which is mounted upon the journal 16 of the railroad car. Cam 40 has a curved outer camming surface 42 (FIGURE 2) that engages the cam follower 38 (FIGURE 1) and in this manner actuates the rod 36 to permit air from a tank 30 to reach, and discharge through, the nozzle 28 whenever a car moves through the checking point and its identifying whistles 26 pass said nozzle 28. Due to the funnel-shaped construction of the cam follower 38, engagement of said cam follower by the cam 40 is also effective to place the nozzle 28 into vertical registration with respect to the whistle orifices when necessary and thus compensates for wheel wear. Thus, the whistles 26 are sounded individually in quick succession whenever a car provided with such whistles passes through the checking station.

Located in the vicinity of the nozzle 28 and whistles 26 (FIGURE 1) is a battery of as many receiving devices 46 (FIGURE 3) as there are separate frequencies employed in the car identifying arrangement of my invention. Preferably, these devices are resonant chambers such as the battery of twelve adjacently positioned sound chambers in the form of vertically disposed pipes 46 of progressively greater length, which resonate individually in response to the reception of sound waves of the frequency to which they are tuned. The lower ends of said pipes are open, but their upper ends are closed by suitable sound damping means, such as the plugs of plastic foam indicated at 48 in FIGURE 4; and arranged within each tube near its closed upper end is a magnetic reed 50 of a natural frequency equal to the natural frequency of the pipe within which it is located. Arranged closely adjacent each reed is a pick-up coil 52 which produces current pulses whenever its magnetic reed vibrates in response to the reception of a sound wave of the natural frequency of said reed and its co-operating receiver pipe. The pick-up coils comprised in the arrangement of the invention may be connected to a remotely located central control station represented by the block 54 (FIGURE 1). At said central control station the electric pulses arriving from the pick-up coils may be employed to actuate visual signalling mechanisms that indicate visibly the character or letter which pulses received through a particular wire represent, or the pulses may be employed to record the characters or letters which they represent, upon punch tapes or the like for delivery to computers or information storage apparatus in a manner well known in the data processing art.

FIGURE 3 illustrates an arrangement wherein the pulses from the pick-up coils are transmitted to the central control station in separate wires 56 gathered into a cable 58 for reasons of simplicity in explaining the principles of my invention. In practice, however, the different frequencies generated by actuation of the reeds 50 in the pick-up coils 52 are usually transmitted to the apparatus in the central control station upon a common line in a manner well known in the telephone art, and suitable threshold circuitry may be interposed between

the pick-up coils and the apparatus at the central control station, as indicated schematically by the blocks 60, to minimize the possibility that spurious responses of the resonance devices may interfere with the proper operation of said apparatus. The presence of a receiver on each side of the track aids in insuring correct identification of the freight car. If the signals are not the same, a further check can be made of the car's identity and the offending whistle or receiver corrected. After electronic comparison of the signals, only one signal is utilized in the system. Such comparison devices are well known in the computer art.

Freight cars are usually identified by a combination of letters or figures which can represent their ownership, the type of car, its capacity, age, etc., and which may supply other information necessary for computing the rent chargeable for the use of the car. In the arrangement of the invention no more than twelve different frequencies are necessary to represent any one of the arabic characters or any one of the letters of the alphabet as demonstrated by the table shown in FIGURE 5. In said table, the column 0 and I to IX at the left of the vertical line y represents ten consecutively higher fundamental frequencies ranging from, say, 18 kc. to 30 kc., which may be employed to represent arabic characters 0 to 9 when sounded by themselves, as indicated by the first vertical column to the right of line y. All the letters of the alphabet and a direction indicating signal identified by the symbol * may then be represented by harmonics produced by sounding simultaneously selected ones of the frequencies I to IX and, in addition, where necessary, the frequency representing the character 0 or one of the two additional frequencies, as indicated by the symbols 0, XI and XII along line X above the second, third and fourth vertical column of letters to the right of line y in FIGURE 5. Thus, while it may be necessary to have a font of as many as 36 different types of (single or composite) whistles to give any one of a plurality of cars a desired identification "label," it will only require twelve resonance devices 46 to respond to sets of whistles representing any and all combinations of the arabic characters and/or the letters of the alphabet that may be employed to identify a car. The table given in FIGURE 5 represents only one example of the manner in which whistles may be employed to identify a car, and other and more advanced coding methods may readily occur to those skilled in the art.

The car identifying arrangement of my invention is of simple and inexpensive construction and dependable in operation. It requires relatively few and inexpensive components. It is not likely to fail in practice, even under adverse weather conditions such as rain, dust, and snow, because both the whistles 26 and the resonance devices 46 may be made of a rugged construction, and while the whistle may be supported from any readily accessible part of the car, I prefer them to be mounted upon the journals of the cars' axles below the car bodies as shown in FIGURE 1, because there they are protected from snow and rain, and the constant vibration and heat of these journals as the car travels, inhibits ice formation and is effective to knock off cakes of dirt and ice if ice should have formed thereon. Also, the structure for activating the blast nozzle, namely the cam follower 38, its restore spring 36 and the cam 42 on the car may be made of an extremely rugged construction. In addition, the velocity and volume of the air blast from nozzle 28 can be of very high power to exert a cleaning effect on whistles 26. The preferred high power air blast also causes the whistles 26 to supply signal frequencies of very high power, which can readily be detected over the noise and rumble of the freight car.

While I have described my invention with the aid of a preferred embodiment thereof, it will be understood that the invention is not limited to the specific constructional details shown and described by way of example,

5

which may be departed from without departing from the scope and spirit of the invention. Thus, other sound responsive devices for converting whistle signals of predetermined frequencies into current pulses than those specifically illustrated and described, for instance, piezo-electric crystals, such as the crystals of barium titanate, may be employed in combination with tuned reeds and/or cavities to generate electric currents in response to the reception of predetermined frequencies.

Now, having described my invention, I claim:

1. Arrangement for identifying a railroad car as it passes a predetermined checking point along the track comprising the combination, with a set of whistles mounted upon the car and tuned to a selected combination of frequencies, of normally disabled means for producing a blast of gaseous fluid mounted adjacent the track at the checking point in a position effective upon activation to sound the whistles on the car passing by, means operative in response to the passage of the car at said blast-producing means for activating said blast-producing means to sound the whistles on the passing car, and a number of sound-responsive current-generating means tuned to different frequencies in the vicinity of said blast-producing means.

2. Arrangement for identifying railroad cars as they pass a predetermined checking point comprising the combination of sets of whistles mounted upon the cars and tuned to selected different combinations of frequencies

6

and camming means supported from the cars adjacent said whistles, with normally disabled means for producing a blast of gaseous fluid mounted adjacent the track at the checking point in a position effective upon activation thereof to sound the whistles on cars passing by, funnel-shaped cam follower means effective upon engagement by the cams on the cars to activate and vertically align said blast-producing means to sound the whistles on cars passing through the checking point; a plurality of sound-responsive current-generating means located at the checking point and tuned to the various frequencies of the car identifying whistles, and remotely located symbols recording means operatively connected to corresponding ones of said current-generating means.

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