J. J. STOETZEL.

PNEUMATIC TRANSMISSION SYSTEM.

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994,344.

Patented June 6, 1911.

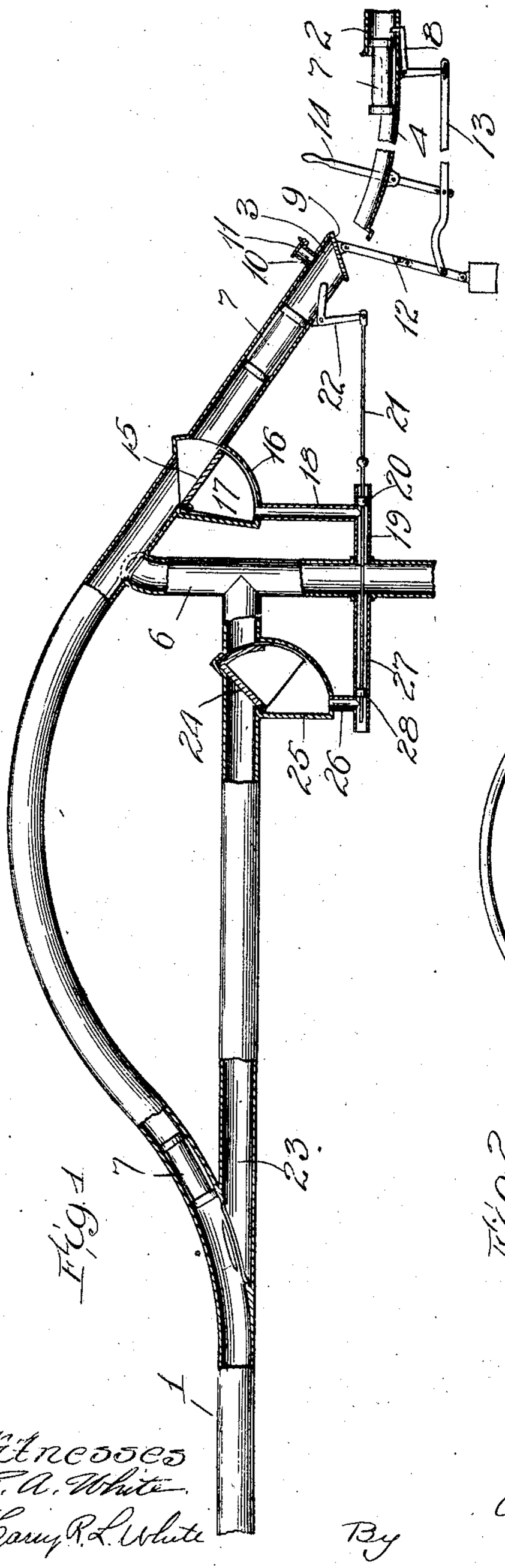

Fig. 1

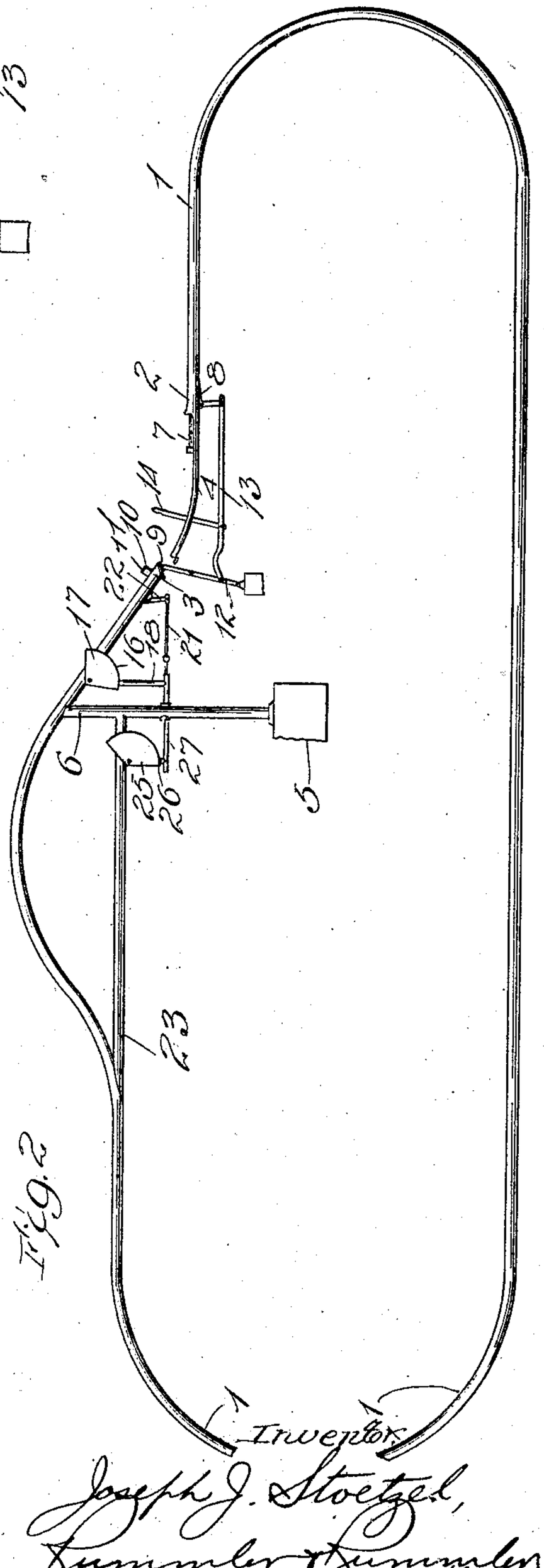

Fig. 2

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PNEUMATIC TRANSMISSION SYSTEM.

994,344. Specification of Letters Patent. **Patented June 6, 1911.**

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To all whom it may concern:

Be it known that I, JOSEPH J. STOETZEL, a citizen of the United States of America, and a resident of Chicago, county of Cook, State of Illinois, have invented certain new and useful Improvements in Pneumatic Transmission Systems, of which the following is a specification.

The main objects of this invention are to provide an improved form of pneumatic transmission apparatus having an improved form of delivery terminal mechanism which is capable of preventing the discharge of a carrier from the line except at the will of an operator; to provide a device of this class in which the presence of a carrier at the delivery terminal will prevent a second carrier from entering said terminal; and to provide an improved form of vacuo-pneumatic transmission system which is particularly adapted for use in conveying passengers and wherein improved means are provided for preventing the cars or carriers from approaching each other closely enough to incur risk of collision between successive carriers in transit. These objects are accomplished by the device shown in the accompanying drawings, in which—

Figure 1 is an elevation, partly sectional, of the despatching and delivery terminal apparatus at a station in a pneumatic transmission system constructed according to this invention and particularly arranged for use in operating cars for carrying passengers. Fig. 2 is a diagrammatic view, illustrating the arrangement of a complete system having one station.

In the construction shown in the drawings, the transit tube 1 is looped so that its despatch terminal 2 and delivery terminal 3 are in alinement with each other, and it is provided with a station platform 4, shown in the drawings as a trough-shaped guiding surface extending from the delivery outlet 3 to the despatching inlet 2 and forming a continuation of the lower part of the tube. The system shown is of the vacuum type, in which the carriers are transmitted through the despatch tube by pressure of air admitted from the atmosphere, the system being normally exhausted by means of suitable exhausting mechanism represented in the drawing by the suction drum 5 and the suction branch 6 connecting said drum with the despatch tube near the delivery terminal.

The carriers are designated 7 in the drawings, and are represented, for the purpose of illustration, in the form which is usual in pneumatic transmission devices.

The detent or catch 8 in the despatch terminal prevents the transmission of a carrier except at the will of the operator, and a closure in the form of a gate 9 at the delivery terminal prevents the delivery of a carrier except at times when the carrier on the station platform 4 is started into the system. The gate 9, in the form shown, is hinged at its lower edge and, when open, forms a surface for guiding the carriers onto the station platform. The gate 9 closes the delivery terminal so that said terminal acts as a dash-pot for bringing a carrier gradually to rest upon its arrival at said delivery terminal. As a part of the dash-pot arrangement, the terminal is provided with a small air outlet 10 having a flap valve 11 normally closed through the pressure of the outer air, but adapted to permit the gradual escape of air which is compressed in advance of the carrier.

In order to prevent the gate 9 from being forced open by the pressure of air in advance of a carrier at its arrival at the delivery terminal, said gate is held in its closed position by means of a toggle strut 12. One leg of the toggle is connected with the detent 8 by means of a link 13, and an operating lever 14 is provided by means of which the catch 8 and gate 9 may be simultaneously shifted by the operator.

In order that a carrier in the delivery terminal may freely pass out of the transit tube when the gate 9 is opened, the transit tube is inclined downwardly for a considerable distance near the delivery terminal and is provided with a gate valve 15 which automatically closes after the passage of a carrier to cut off the delivery terminal from the influence of the vacuum in the system. The gate 15 is operated pneumatically, being inclosed in a casing 16 and being swung in said casing by means of the difference of pressure on the opposite sides of it. The gate 15 is arranged to swing on its pivotal axis between a position of contact with its seat and a position of alinement with the lower surface of the transit tube, being stopped in the latter

position by wings 17 which engage the wall of the casing 16, as in Fig. 1.

The lower part of the casing 16 is connected with the suction branch 6 by means of a port 18 and a transverse pipe 19. One end of the pipe 19 is in connection with the suction branch 6, and the other end is open to the atmosphere. A piston valve 20 is mounted in the pipe 19 and is slidable along the same so as to alternately open the port 18 to the outer air or to the vacuum of the suction branch. The stem of the valve 20 is connected by a link 21 with a trip-lever 22 of bell crank shape and having an arm extending into the delivery terminal so as to be engaged by a carrier on its arrival in said delivery terminal. This trip, when depressed by the carrier, shift the valve 20 so as to admit air below the gate 15, causing it to be closed, and also breaking the vacuum behind the carrier 7 so that it will freely pass out of the terminal by gravity when the gate 9 is opened.

In order to prevent the arrival of a second carrier into the delivery terminal when one carrier is already in position therein, the transit tube has a comparatively steep ascent for a considerable distance in the part which approaches the suction branch 6, and a second suction branch 23 communicates with the transit tube 1 at the lower part of this ascent. The suction branch 23 is connected with the suction branch 6, as shown, and is controlled by means of a valve 24 which is inclosed in a casing 25 similar to the casing 16 of the valve 15, and which valve 24 is so shaped that when it is closed it will cut off communication between the branch 23 and the branch 6, and at the same time cut off the lower part of the casing from communication with either. The lower part of the casing has a port 26 connecting it with a pipe 27 which has one end connected with the suction branch 6 and the other end open to the atmosphere. The pipe 27 is preferably located in alinement with the pipe 19, and a piston valve 28 controls the port 26 and is mounted upon the same stem with the valve 20. These valves therefore balance each other in such manner that they are not influenced in their movements by the pressures on the opposite faces thereof. The valves 20 and 28 are spaced and arranged so that when the port 26 is open to the atmosphere, the port 18 will be in connection with the suction apparatus, and vice versa. This arrangement insures that when the gate 15 is closed, the gate 24 will be open, and vice versa. The length and declivity of the ascending part of the tube 1 between the pipes 23 and 6 should be such that when the conveying air current is deflected into the pipe 23 through the opening of the valve 24, the action of gravity and friction on the carrier will overcome its momentum and the effect of the remaining air pressure behind it and will cause it to fall back along the ascent before reaching the highest point thereof.

The operation of the device shown is as follows:—It is assumed that the exhausting apparatus is operated so as to maintain the required vacuum in the system. Fig. 1 shows the parts in the position which they occupy when a carrier is about to be brought to rest by the dash-pot arrangement in the delivery terminal. It may also be assumed, for example, that another carrier is in the system and is either in or approaching the ascending part of the transit tube. As the carrier in the delivery terminal approaches the gate 9, it depresses the trip 22 and shifts the valves 20 and 28. The air rushing into the port 18 closes the gate 15, and the suction at the port 26 opens the valve 24. This opens communication between the second suction branch and the suction apparatus, and thereby prevents the transmission of a carrier in the part of the tube which lies between the suction branches 6 and 23. The second carrier in the line will be forced along the tube until it passes the mouth of the suction branch 23, when its momentum will be overcome by gravity and friction in the ascent of the upwardly inclined part of the transit tube, when it will slide back until it again passes the mouth of the suction branch 23, and its momentum is overcome by the pressure of the air behind it, when it will again advance part way up the ascent. This carrier will therefore rebound at the base of the ascent until the operator opens the gate 9, discharging the carrier which is in the delivery terminal, and until the trip 22 is returned to its normal position across the transit tube. This movement of the trip causes the gates 15 and 24 to be returned to the positions shown by full lines in Fig. 1, whereupon the communication with the suction apparatus behind the ascending part of the transit tube is cut off, and the carrier which was stopped at the ascent is therefore permitted to continue its progress until it arrives at the delivery terminal, where it is stopped in the dash-pot and the hereinbefore described operations are repeated. With this system, it is assured that the carrier in the delivery terminal cannot pass out upon the station platform until the operator opens the gate 9 on releasing the detent 8, which starts the car which was standing on the station platform.

What I claim as my invention and desire to secure by Letters Patent is:—

1. In a pneumatic transmission system, the combination of a transit tube having an upwardly curved portion leading to a delivery terminal, means for producing a conveying air current in said tube for transmit-

ting carriers, and means controlled by a carrier in said delivery terminal for automatically deflecting the conveying air current out of its normal path along said tube at a point near the entrance to said upwardly curved portion and thereby preventing a succeeding carrier from reaching said delivery terminal.

2. In a pneumatic transmission system, the combination of a transit tube having an upwardly curved portion leading to a delivery terminal, means for producing a conveying air current in said tube for transmitting carriers, means for stopping a carrier in said delivery terminal, and means controlled by a carrier in said delivery terminal for automatically deflecting the conveying air current out of its normal path along said tube at a point near the entrance to said upwardly curved portion and thereby preventing a succeeding carrier from reaching said delivery terminal.

3. In a transmission apparatus, the combination of a transit tube having despatch and delivery terminals, a suction branch freely communicating at all times with said tube near said delivery terminal, a second suction branch communicating with the tube at a point between the despatch terminal and said first suction branch, a valve controlling said second suction branch, and a trip extending into the path of a carrier in said delivery terminal and adapted through engagement with a carrier to open said valve.

4. In a pneumatic transmission system, the combination of a transit tube having a despatch terminal and a delivery terminal, said transit tube having an upwardly inclined portion and a downwardly inclined portion, a suction branch freely communicating with said transit tube in its downwardly inclined portion, and near said delivery terminal, a second suction branch communicating with said tube between said despatch terminal and said first suction branch, a valve controlling the exhausting of air from said second branch, and means adapted to be controlled by a carrier in the tube near said delivery outlet for opening the valve in said second suction branch, said second suction branch being adapted to deflect the conveying air current and thereby prevent the delivery at said discharge outlet of a succeeding carrier.

5. In a pneumatic despatch apparatus, the combination of transit tube downwardly inclined at its delivery end, a suction branch for exhausting said tube, said tube being upwardly inclined for a considerable distance inward from said suction branch, a second suction branch communicating with said tube at a point near the lower end of said upwardly inclined part, a valve controlling said second suction branch, and mechanism comprising a trip extending into the path of carriers between said first suction branch and the delivery outlet of said transit tube and adapted, through engagement with a carrier, to open the valve in said second suction branch and thereby deflect the conveying air current and prevent a succeeding carrier from entering said delivery end until the preceding carrier has been discharged.

6. In a pneumatic transmission system, the combination of a looped line of tubing having despatch and delivery terminals, a surface extending between said terminals for guiding carriers from said delivery terminal to said despatch terminal, means controlling the despatching of carriers from said surface, means controlling the delivery of carriers to said surface, and mechanism for operating said despatching and delivery controlling means and adapted to prevent the delivery of a carrier before the operation of said despatching means.

7. In a pneumatic transmission system the combination of a looped line of tubing having despatch and delivery terminals, a surface extending between said terminals for guiding carriers from said delivery terminal to said despatch terminal, means for producing a conveying air current in the line of tubing, means controlling the despatch of carriers from said surface, means controlling the delivery of carriers to said surface, mechanism for operating said despatching and delivery controlling means and adapted to prevent the delivery of a carrier before the operation of said despatching means, and means controlled by a carrier in said delivery terminal for automatically deflecting the conveying air current at a certain point in front of said delivery terminal, and thereby preventing a succeeding carrier from reaching said delivery terminal.

Signed at Chicago this 9th day of March, 1908.

JOSEPH J. STOETZEL.

Witnesses:
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MARY M. DILLMAN.