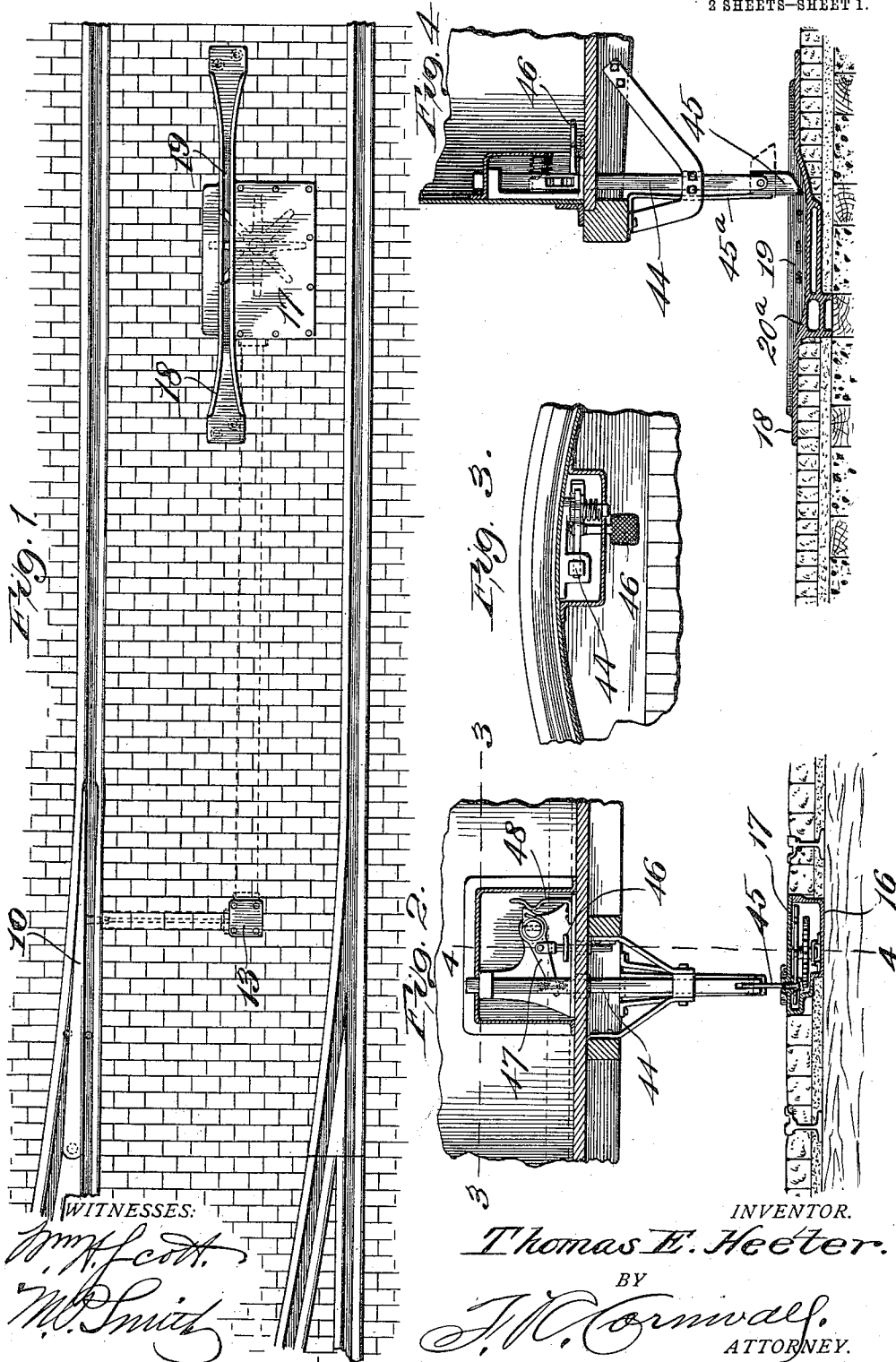


T. E. HEETER.
 SWITCH OPERATING MECHANISM.
 APPLICATION FILED FEB. 17, 1912.

1,042,435.

Patented Oct. 29, 1912.

2 SHEETS—SHEET 1.



WITNESSES:
Wm. H. Scott.
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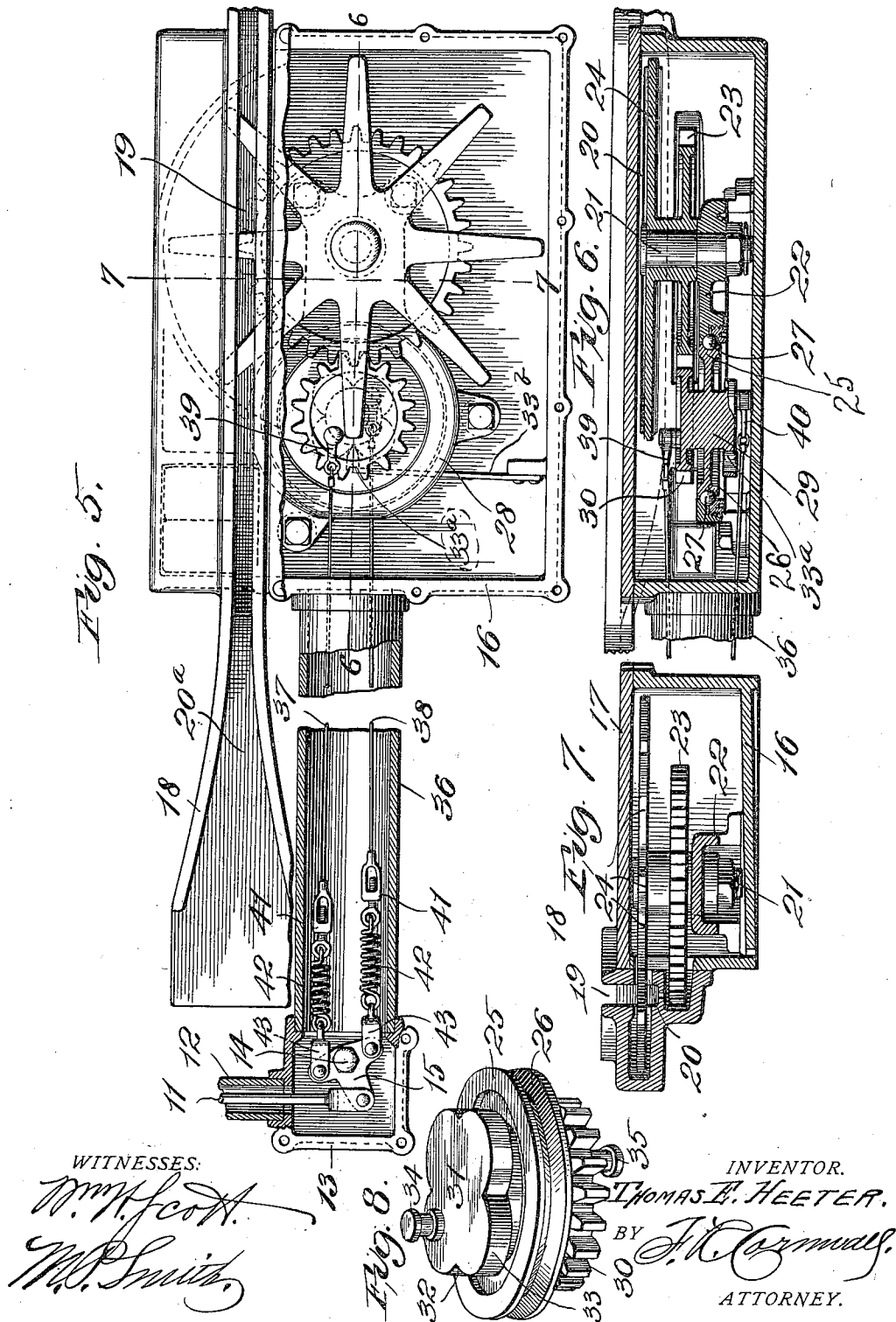
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THOMAS E. HEETER, OF ST. LOUIS, MISSOURI, ASSIGNOR OF ONE-HALF TO F. W. RISQUE,
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SWITCH-OPERATING MECHANISM.

1,042,435.

Specification of Letters Patent.

Patented Oct. 29, 1912.

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To all whom it may concern:

Be it known that I, THOMAS E. HEETER, a citizen of the United States, residing at St. Louis, Missouri, have invented a certain new and useful Improvement in Switch-
5 Operating Mechanism, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accom-
10 panying drawings, forming part of this specification, in which—

Figure 1 is a plan view of a portion of a street railway track including a switch or
15 turn-out and showing my improved switch-operating mechanism in connection therewith. Fig. 2 is a vertical section taken through the front portion of a car platform and illustrating the means employed for ac-
20 tuating my improved switch-throwing mechanism. Fig. 3 is a horizontal section taken approximately on the line 3—3 of Fig. 2. Fig. 4 is a vertical section taken ap-
25 proximately on the line 4—4 of Fig. 2. Fig. 5 is an enlarged plan view partly in horizontal section of my improved switch-throwing mechanism. Fig. 6 is a sectional view taken approximately on the line 6—6 of Fig. 5.
30 Fig. 7 is a cross-sectional view taken approximately on the line 7—7 of Fig. 5. Fig. 8 is a perspective view of a rotating member forming a part of the operating mechanism.

This invention relates generally to rail-
35 way switches and more particularly to mechanism for throwing or shifting the movable switch-point, which mechanism is operated by suitable means carried by an approaching car and controlled by the op-
40 erator thereof.

The principal objects of my invention are, to provide a comparatively simple, inexpensive apparatus whereby the switch-point or tongue can be positively shifted so that
45 the approaching car will continue on the main track, or will take the switch as desired; to provide means whereby the operating mechanism is yieldingly locked after each operation; to provide means whereby
50 the movable switch-point or tongue can be moved by the wheels of a car passing out of the switch onto the main track, irrespective of the operating mechanism and to arrange the operating mechanism and the
55 parts containing the same below the street

level so as to not interfere with the usual street traffic.

To the above purposes my invention consists in certain novel features of construction and arrangement of parts hereinafter
60 more fully described and claimed.

Referring by numerals to the accompanying drawings; 10 designates a movable switch-point of ordinary construction which is arranged in the usual manner between one
65 of the switch rails and one of the main track rails and connected to the underside of this movable switch-point is a rod 11 which extends through a tube 12 located
70 beneath the pavement or surface of the ground, and which tube connects with a housing 13 located beneath the pavement between the track rails. Fulcrumed on a
pin 14 within the housing 13 is a bell crank
75 15 to one arm of which the end of the rod 11 is pivoted.

Located beneath the pavement between the main track rails a suitable distance in advance of the end of the switch is a hous-
80 ing 16 having a removable cover plate 17, and formed integral with the top of this housing and at one side thereof is a longitudinally disposed plate 18 in the top of which is formed a groove 19.

An opening 20 is formed through the
85 lower portion of the plate 18 at the center of the groove 19 so as to establish communication between said groove and the interior of the housing 16. The bottom surface of the groove 19 at its ends curves
90 gradually upward, as designated by 20^a.

A short vertically disposed pin or shaft
21 is seated in a suitable bracket 22 within the housing 16 and journaled on the upper
95 portion of said pin or shaft is a hub with which is formed integral a gear wheel 23 and a star wheel or spider 24 having a series of radially arranged arms which are adapted to project through the opening 20 and
100 through the central portion of the groove 19.

A horizontally disposed disk 25 occupies a position to one side of the pin or shaft 21 and the edge of said disk is grooved, as designated by 26 to receive ball bearings 27,
105 which latter engage an annular support 28 that is a part of the bracket 22. The central portion of the disk 25 is provided with an integral hub 29, and formed integral with the upper end thereof is a pinion 30 which meshes with the gear wheel 23.
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Formed integral with the lower end of the hub 29 is a disk 31 in the edge of which is formed four notches 32 arranged at equal distances apart, and the edge of the disk between these notches is rounded or curved, as designated by 33. A pawl 33^a is adapted to engage in any one of the notches 32, said pawl being carried by a stiff flat spring 33^b. Formed integral with the underside of the disk 31 at a point between two of the notches 32, is a pin or trunnion 34, and formed integral with the upper side of the pinion 30 is a corresponding pin or trunnion 35, which latter occupies a diametrically opposite position relative to the pin or trunnion 34.

A tube 36 extends from the housing 13 to a suitable opening in the end wall of the housing 16, and extending through said tube is a pair of wires or cables 37 and 38. One end of the wire or cable 37 is connected by a link 39 to the pin 35, and likewise one end of the wire or cable 38 is connected to the pin or trunnion 34 by means of a link 40. The opposite ends of the cords or cables 37 and 38 are connected by means of turn-buckles 41 to retractile coil springs 42, and the opposite ends of these springs are connected by means of links 43 to the ends of the transverse arm of the bell crank 15.

In Figs. 2, 3 and 4 I have illustrated a simple mechanism adapted to be located on a car platform and controlled by the car operator for actuating the switch-point-throwing mechanism herein described, but it will be readily understood that other forms of mechanism can be used, or if desired, the switch-point operating mechanism can be thrown by means of a switch bar or like tool, the lower end of which is positioned in the groove 19 and moved therethrough with the car that is approaching the switch.

In the mechanism shown a vertically disposed bar 44 is arranged to move in suitable bearings through the car platform, and pivotally mounted on the lower end of said bar is a shoe 45 that is held in vertical alinement with the bar by means of a leaf spring 45^a. This spring has sufficient strength to hold the shoe 45 in its normal position under ordinary working conditions, but if said shoe strikes against an immovable object it will overcome the tension of the spring 45^a and swing upon its pivot point into the position shown by dotted lines in Fig. 4, thereby performing the function of a safety device to prevent breakage of the bar 44. The bar 44 is moved vertically in any suitable manner, preferably by means of a pedal 46 which is connected to a spring actuated arm 47, said arm being connected at one end to the vertically moving bar. A spring 48 yieldingly engages one end of the arm 47 so as to lock the same when the bar is moved downward.

The operation of my improved switch-point-throwing mechanism is as follows: With the switch-point 10 in the position seen in Fig. 1 all cars passing over said switch-point will remain on the main track. When an approaching car is to take the switch or siding and the switch-point is in the position seen in Fig. 1, the operator of the car moves the pedal 46 downward as the car approaches and moves over the grooved plate 20, and such action moves the bar 44 carrying the shoe 45 downward until said parts are in the position seen in Figs. 2 and 4. The spring 48 engages the lever 47 to temporarily lock the bar in its lowermost position. The lower end of the shoe 45 enters the forward end of the groove 19, and as the car moves forward said shoe passes through the groove, thereby engaging the arms of the star wheel or spider 24, thus rotating the same approximately a quarter of a turn. The gear wheel 23 which is formed integral with the hub of the star wheel is likewise partially rotated, and as a result, this rotary motion is transmitted to the pinion 30 and parts integral therewith. The disk 25 with which the pinion 30 is formed integral rotates in the ball bearings 27, and owing to the gear ratio between the wheel 23 and pinion 30, said pinion and integral parts are rotated approximately a half turn. During such action the links 39 and 40 which are pivotally connected to the pins or trunnions 34 and 35 are shifted to opposite positions with respect to the relative positions they previously occupied, and as a result, the wires or cables 37 and 38 are shifted so as to move the bell crank 15 into the position shown in Fig. 5. This movement draws the rod 11 laterally a short distance through the tube 12, thereby shifting or changing the position of the movable switch-point so that the approaching car is switched on to the side track or switch rails. If the succeeding car is to remain on the main track the operator of said succeeding car actuates the mechanism on the platform to lower the shoe 45 so that the same will pass through the groove 19, and as a result, the various parts are again actuated in the manner just described and the rotary movement imparted to the disk 25 and pinion 30 reverses the positions of the pins 34 and 35 with respect to the positions they occupied after the preceding operation, and as a result, the cords or cables 37 and 38 are shifted so as to actuate the bell crank 15, thereby moving the rod 11 toward the right hand which movement restores the movable switch-point or tongue 10 to the position seen in Fig. 1.

Inasmuch as there are no bearings for the hub 29 above the pinion 30 and below the disk 31 the links 39 and 40 are free to be intermittently rotated with the hub and carried parts, and with each partial rotary

movement of said hub said links change their respective positions, thereby reversing the position of the bell crank 15 and consequently changing the position of the switch-point or tongue 10. The hub 29 and carried parts are yieldingly locked after each movement by the engagement of the pawl 33^a with one of the notches 32. The coil springs 42 normally maintain the cords or cables 36 in taut condition and compensate for any variation of the distance between the pins 34 and 35 and the pivot points of the links 43 during the operation of the parts connecting said pins and links.

In case a car backs out of a switch onto the main track the flanges of the car wheels will shift the movable switch-point or tongue 10 from the position shown in Fig. 1, and such action will actuate the bell crank 15 together with the cords or cables 37 and 38, thereby partially rotating the hub 29 and parts carried thereby. This actuation rotates the gear wheel 23 and star wheel or spider, but after such actuation the various parts will be in proper position to be subsequently actuated to shift the movable switch-point or tongue 10 back into the position seen in Fig. 1. After the shoe 45 has engaged the star wheel or spider and partially rotated the same said shoe passes through the forward end of the groove 19 and engaging against the gradually inclined bottom 20^a thereof is moved upward, thereby elevating the bar 44 and moving the spring 48 so as to release the lever 47.

If a car is not equipped with the form of switch-throwing mechanism illustrated in Figs. 2, 3 and 4, the driver of the car can place the switch rod in a vertical position in front of the dash board and guide the lower end of said rod so that it will traverse the grooved plate and engage the arms of the star wheel or spider to partially rotate the same, thereby operating the switch-throwing mechanism.

In my improved mechanism the star wheel or spider is always in position to be engaged by the actuating mechanism upon the car platform, and if the movable switch-point is shifted from its position by the wheels of a car backing out of a switch or by the engagement of the wheels of a heavy vehicle, the change in position in no wise affects the operating mechanism other than a partial actuation thereof, and which partial operation in no wise affects the movements of the various parts of the mechanism when the same are subsequently actuated by a car approaching the switch.

An operating mechanism of my improved construction is comparatively simple, can be readily assembled, is particularly intended for use in connection with street railways and the star wheel or spider is always in position to be engaged by means carried in

the car for operating the mechanism to throw the movable switch-point or tongue.

It will be readily understood that minor changes in the size, form and construction of the various parts of my improved switch-throwing mechanism can be made and substituted for those herein shown and described, without departing from the spirit of my invention, the scope of which is set forth in the appended claims.

I claim:

1. The combination with a movable switch-point, of a member mounted to rotate freely in either direction, means connected to said member and adapted to be rotated freely in either direction by parts carried by a car for operating said member, a bell crank, a connection from said bell crank to the movable switch-point and connections from points on opposite sides of the fulcrumed point of said bell crank to diametrically opposite points on the rotatable member.

2. The combination with a movable switch-point, of a rotatable member, means coöperating with said rotatable member for imparting movement thereto, which means is adapted to be engaged by parts carried by a car, a switch rod connected to the movable switch-point, a pair of connecting members attached to the rotatable member at diametrically opposite points, and a fulcrumed member connecting the opposite ends of said connections with the switch rod.

3. A movable switch-point operating mechanism comprising a member adapted to be engaged by parts carried by a car which member is mounted to rotate freely in either direction, a second rotatable member operatively connected to the first mentioned rotatable member which second mentioned member is mounted to rotate freely in either direction, a switch rod connected to the movable switch-point to be actuated, a bell crank to which the switch rod is pivotally connected and operating connections between said bell crank and the second mentioned rotatable member.

4. A movable switch-point operating mechanism comprising a member mounted to rotate freely in either direction and adapted to be engaged by parts carried by a car, a second rotatable member operatively connected to the first mentioned rotatable member which second member is mounted to rotate freely in either direction, a switch rod connected to the movable switch-point to be actuated, a bell crank to which the switch rod is pivotally connected, operating connections between said bell crank and the second mentioned rotatable member, and means for yieldingly locking the second mentioned rotatable member after movement.

5. In a switch-throwing mechanism, a member adapted to be rotated, a rod con-

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ected to the switch-point to be operated, a bell crank to which the switch rod is pivotally connected, a pair of operating connections attached to the bell crank on opposite sides of the fulcrumed point thereof, and the opposite ends of which connections are attached to the rotatable member at diametrically opposite points.

6. In a switch-throwing mechanism, a member adapted to be rotated, a rod connected to the switch-point to be operated, a bell crank to which the switch rod is pivotally connected, a pair of operating connections attached to the bell crank on opposite sides of the fulcrum point thereof, the opposite ends of which connections are attached to the rotatable member at diametrically opposite points, a notched disk carried by the rotatably mounted member, and yielding means for engaging one of the notches of said disk to hold the rotatably mounted member after movement.

7. In a switch-point-throwing mechanism, a member mounted to rotate freely in either direction, a bell crank, a pair of connections between diametrically opposite points on the rotatably mounted member and said bell crank, retractile springs in said connections, and a switch rod connecting the bell crank with the switch-point to be actuated.

8. In a switch-point-throwing mechanism, a member mounted to rotate freely in either

direction, a bell crank, a pair of connections between diametrically opposite points on the rotatably mounted member and said bell crank, retractile springs in said connections, a switch rod connecting the bell crank with the switch-point to be actuated, and rotatably mounted means adapted to be actuated by parts carried by a car and operatively connected with the first mentioned rotatable member.

9. In a switch-point-throwing mechanism of the class described, a grooved plate, a horizontally disposed star wheel mounted to rotate freely in either direction, the arms of which extend through the groove in the plate, a gear wheel carried by said star wheel, a member adapted to be operated by said gear wheel which member is mounted to rotate freely in either direction, a rod connected to the movable switch-point and connections between said rod and diametrically opposite points on the rotatably mounted member whereby said rod is reciprocated as said rotatably mounted member is operated.

In testimony whereof I hereunto affix my signature in the presence of two witnesses, this 14th day of February, 1912.

THOMAS E. HEETER.

Witnesses:

M. P. SMITH,
C. S. BUTLER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."