(No Model.)

3 Sheets—Sheet 1.

G. H. POOR.

BRAKE FOR LOCOMOTIVES.

No. 346,441. Patented July 27, 1886.

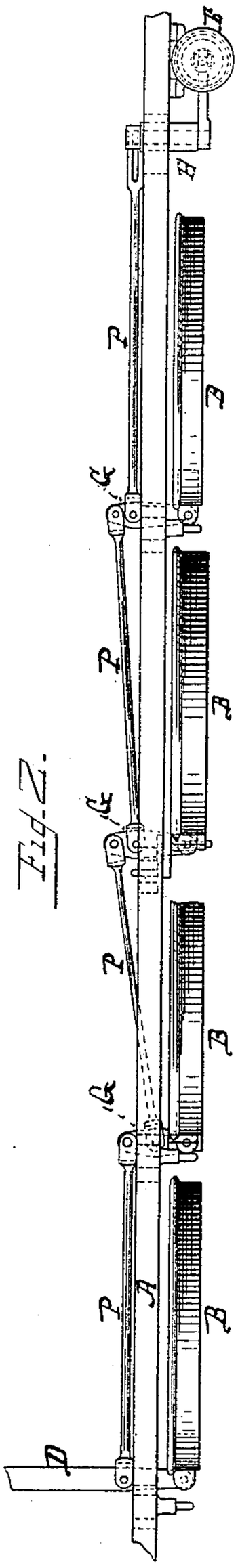

Fig. 7.

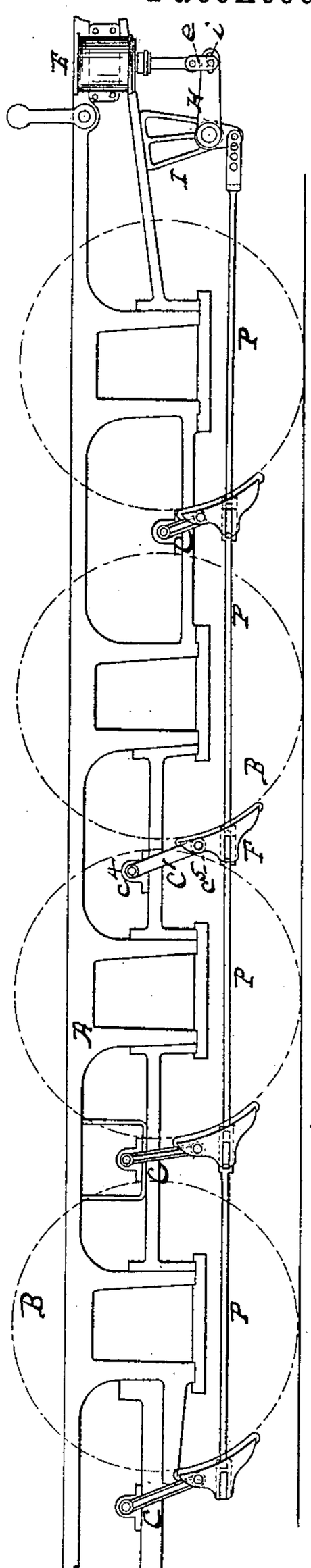

Fig. 1.

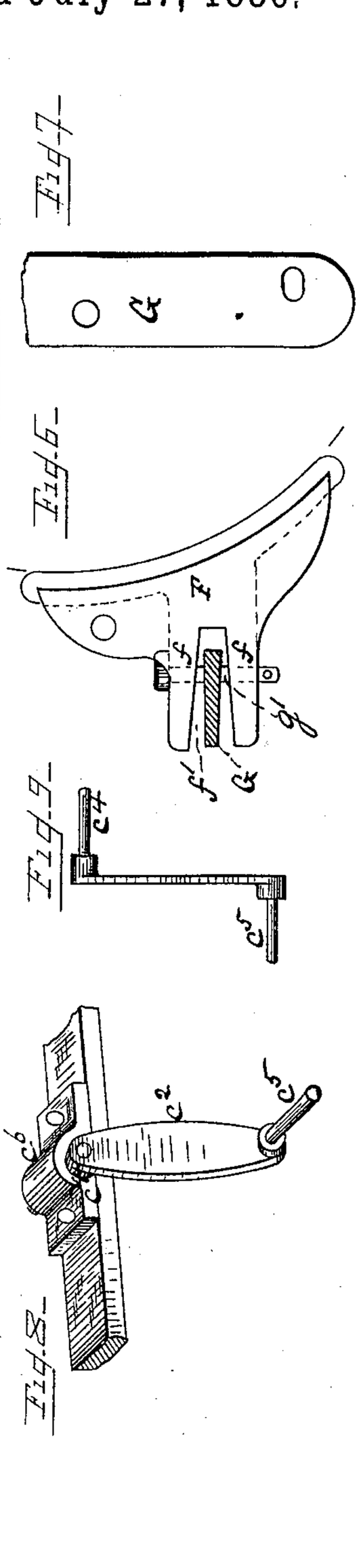

Fig. 2.

Fig. 5.

Fig. 6.

Fig. 8.

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(No Model.) 3 Sheets—Sheet 2.

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BRAKE FOR LOCOMOTIVES.

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Fig 4

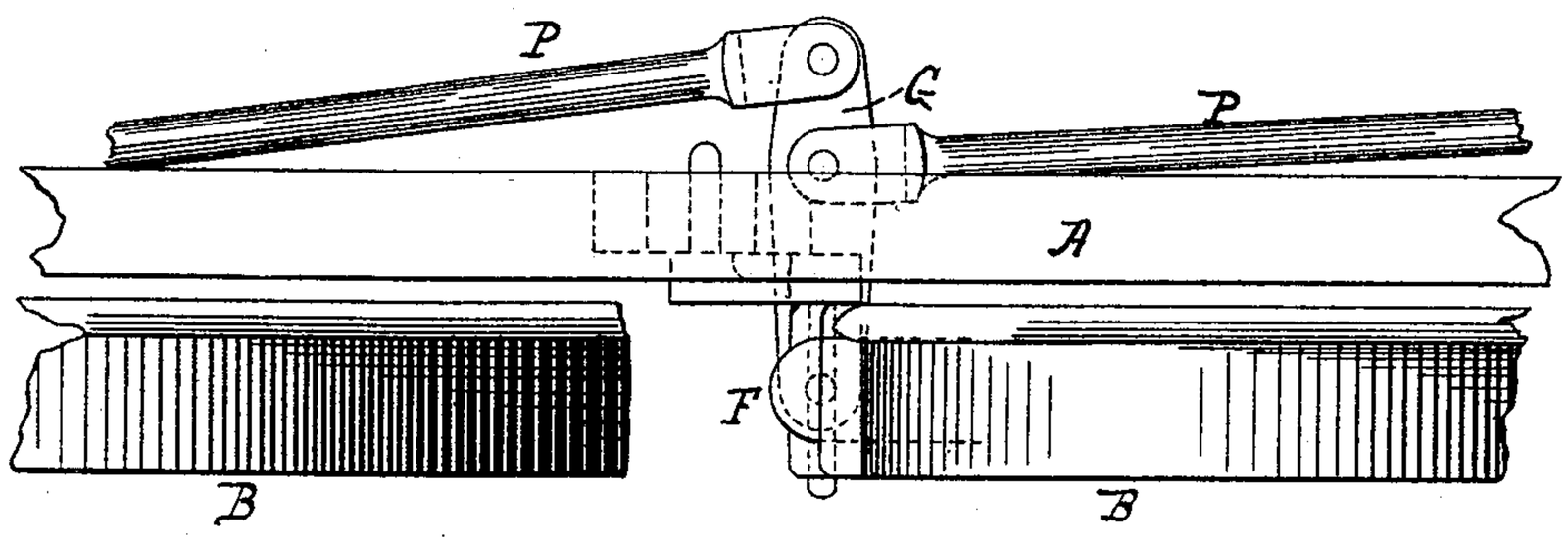
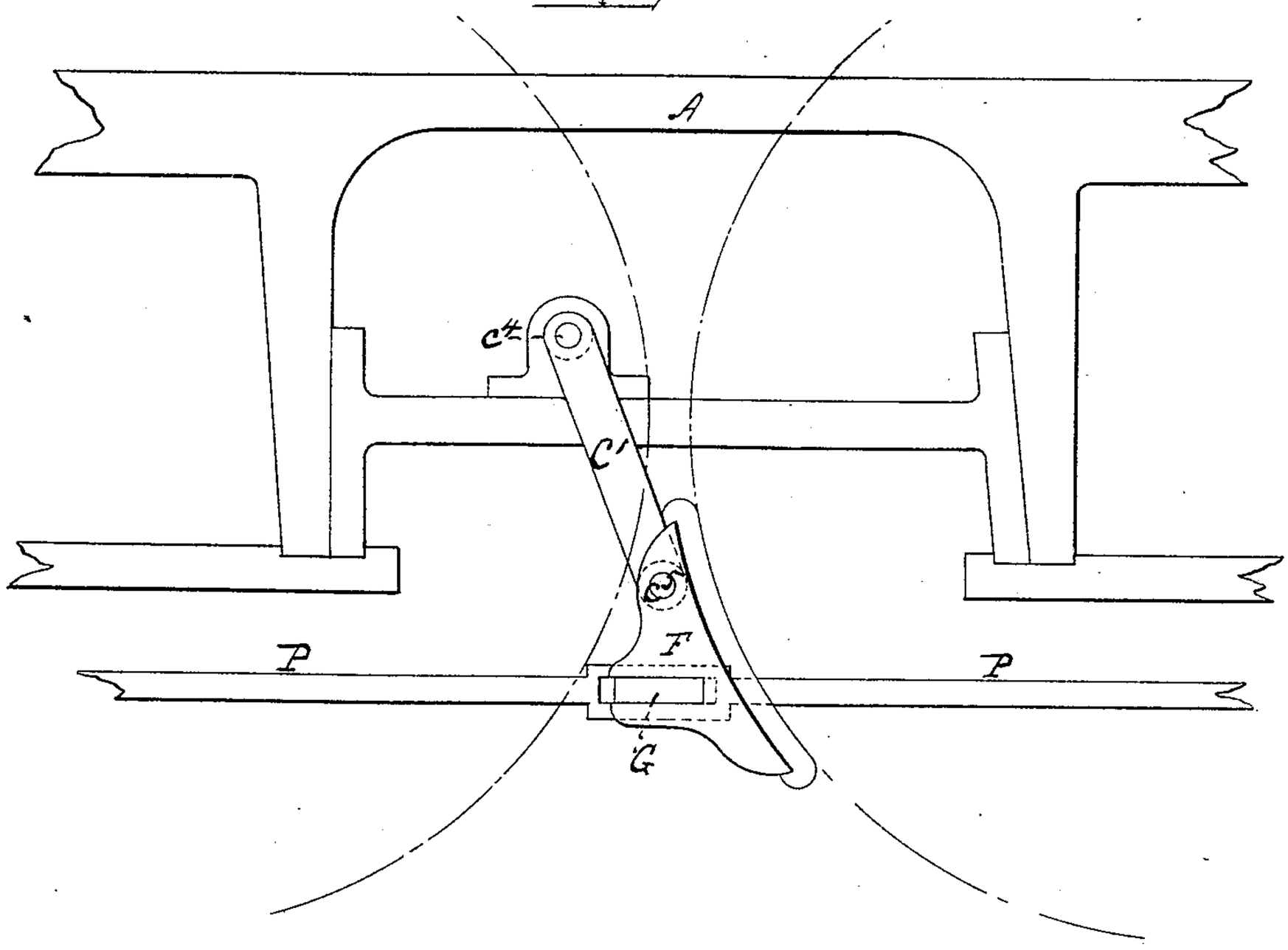


Fig 3



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(No Model.) 3 Sheets—Sheet 3.

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BRAKE FOR LOCOMOTIVES.

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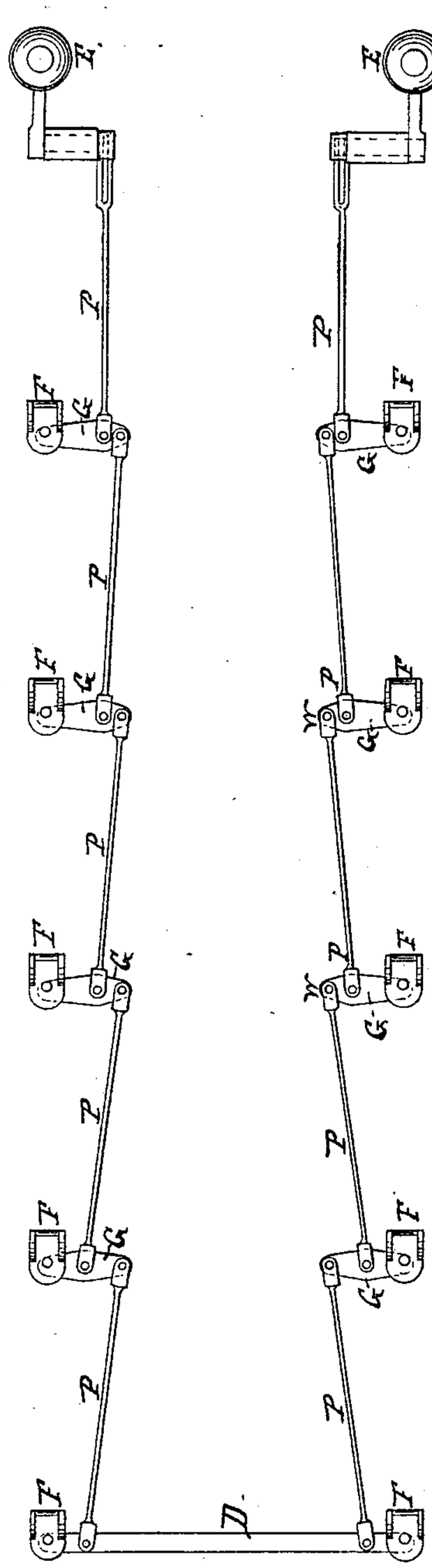
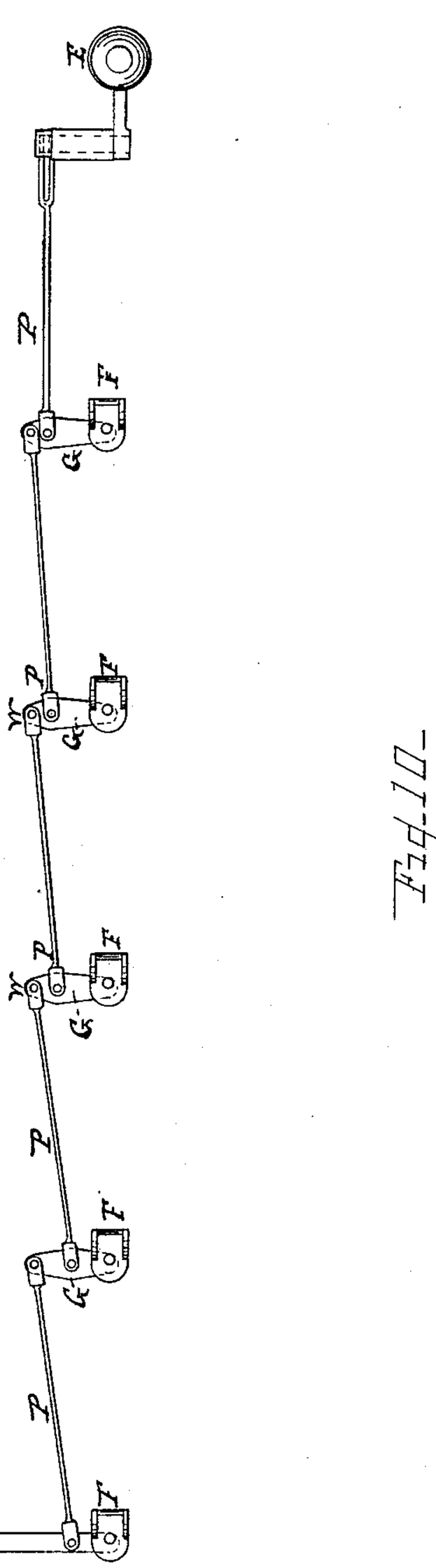


Fig. 5.



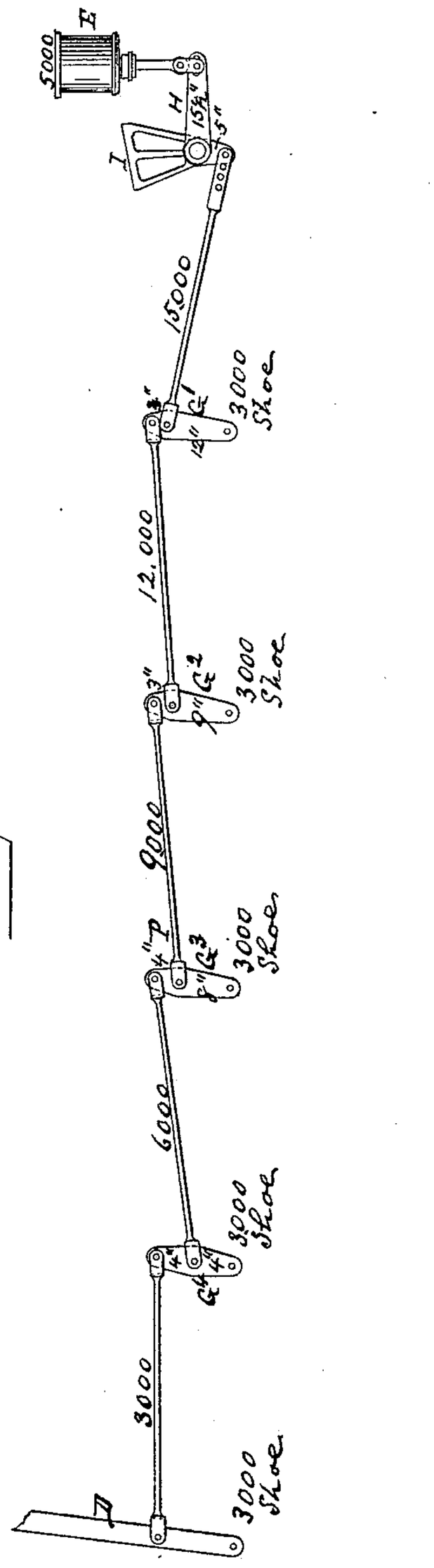


Fig. 10.

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UNITED STATES PATENT OFFICE.

GEORGE H. POOR, OF ST. LOUIS, MISSOURI, ASSIGNOR TO THE AMERICAN BRAKE COMPANY, OF SAME PLACE.

BRAKE FOR LOCOMOTIVES.

SPECIFICATION forming part of Letters Patent No. 346,441, dated July 27, 1886.

Application filed May 18, 1886. Serial No. 202,511. (No model.)

To all whom it may concern:

Be it known that I, GEORGE H. POOR, a citizen of the United States, residing at St. Louis, in the State of Missouri, have invented certain new and useful Improvements in Brakes for Locomotives and like Purposes; and I hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, wherein—

Figure 1 is a side elevation of a locomotive-frame and the drivers thereof having brakes embodying my invention applied thereto. Fig. 2 is a top elevation or plan view of the same. Figs. 3 and 4 are enlarged views of portions of what is shown in Figs. 1 and 2, to give a better idea of the connections of the individual pull-rod, floating lever, and brake-head as combined. Fig. 5 is a diagram or plan showing the brake mechanism as applied to both sides. Fig. 6 is a side elevation of the brake head and shoe, with sectional view of the floating levers for applying the power thereto, showing one means of compensating for the wear of the shoe and the position of the brake-heads. Fig. 7 is a detached view of the floating lever for applying power to the shoe. Fig. 8 is a perspective, and Fig. 9 a side elevation, of the hanger used to suspend the brake-head between the middle pair of drivers when the distance is too small to admit of the usual mode of hanging. Fig. 10 is a diagram of the floating levers, the bell-crank or power lever, and the pull-rods, showing the preferred connection, relative portions, and arrangement of the same, whereby the power is equally applied to the several brake-heads.

Like letters refer to like parts wherever they occur.

My present invention relates to the construction of brakes in general, but has been especially devised for use as a driver-brake for locomotives, and has peculiar advantages when applied to locomotives having four or five coupled drivers, or what is termed the "consolidation" type of locomotives; but I do not wish to be understood as confining the invention to any special type of locomotive, or even to locomotives of all classes, as the devices will be found of general application as a brake system, especially where obstructions prevent the use of brake-beams to advantage.

The object of the present invention is, first, to provide a brake system whereby the pressure may be applied upon one side only of the wheel, or, in other words, the brake-shoe may be applied only on one side of the wheel; secondly, so to arrange and proportion the levers of said system that no power is expended upon a fixed fulcrum, but that all the power is conserved and divided upon the wheels in succession, as desired, or applied equally to all the wheels; and, thirdly, so to combine the brake-heads with the system of levers that there shall be a compensation for any unequal wear of the shoes or other parts, that said wear may not affect the application of the desired pressure to all the shoes.

To accomplish said objects I employ a system wherein a series of brake-heads, each head of the series suspended on the same side of its respective wheel, are operated by a series of floating levers, consecutively connected by a series of pull-rods, so that the floating levers shall be levers of the third order, (see diagram, Fig. 5, where P indicates the pull-rod, W the end of the lever with which the next pull-rod is connected, and F the brake-head,) or, in other words, where the floating levers receive the power at a point intermediate between the brake-head end of the lever and that end of the lever which is connected with the next lever of the series; and this embodies the first feature of the invention.

When it is desired to apply the power equally and apply it uniformly to all the shoes, the arms of the several floating levers are so proportioned relatively to each other and the successive levers of the series as to accomplish that result. For example, in case it is desired to apply power equally to five drivers, the proportions of the arms of the floating levers will be substantially as follows: in the first, or that nearest the source of power, four (4) to one, (1;) second, three (3) to one, (1;) third, two (2) to one, (1;) fourth, lever equal, the long arms of the levers connected with the brake-heads, and the short arms of the levers consecutively connected by the pull-rods. As the number of

drivers decrease, the floating levers are consecutively omitted, commencing with the first of the series, or that nearest the power, then the second, and so on; and this illustrates the second feature of my invention.

As the shoes or wheels become worn or the frame is raised or lowered on the springs, the brake-heads will change and vary in position, and to compensate for this and avoid any irregular action between the levers, &c., various expedients well known to the skilled mechanic may be employed—as, for instance, a link or clevis; but I prefer to avoid loose or link connections, where practicable to do so, and have therefore provided the head with a wedge-shaped slot, and form the head end of the floating lever wedge-shaped in cross-section, so arranging the two that the thick end of the wedge of the lever rests in the narrow part of the slot in the head, whereby ample motion of the head on the lever is obtained to compensate for any and all changes in the relation of the parts, and at the same time the power of the lever is directly applied to the brake-head; and this constitutes the third feature of my invention.

There are other minor features of novelty pertaining to the details of construction, which will hereinafter more fully appear.

Having indicated the breadth or scope of my invention, I will now proceed to describe more specifically the preferred form illustrated in the drawings, so that others may apply the invention, either in that form or modified as circumstances and particular forms of cars of locomotives may render necessary.

In the drawings, A indicates the frame; B, the wheels or drivers of a locomotive; F, the brake-heads; C, the hangers by which the brake-heads are suspended from the frame A, which hangers may be of any approved form when the space between the drivers is sufficient; and C′, a special form of hanger adapted for use with the middle pair of drivers, or where the distance between the drivers is too small to use the present form of hangers. This hanger C′ (see Figs. 8 and 9) is of flat or plate form, of such thickness as will permit of its arrangement and free movement between the driver (or wheel) and frame A, so that its point, c^4, of suspension from the frame may be such as will permit the brake-head to swing back from the driver B when the brakes are released; and in order to give it the necessary strength to resist the strain necessarily brought on it when the brakes are applied, said hanger may be widened out at its middle, as at c^2. It may be provided with two pivot-pins, one of which, c^4, is journaled in a box, c^6, on the frame A, while on the other, c^5, the brake-head F is journaled. By means of the above or equivalent hangers the several brake-heads F are suspended in front of their respective wheels or drivers.

It will be noticed that the brake-heads are used only on one side of the wheels, and all on the same, preferably the front, side.

The forward brake-heads F of the two sides are connected by a brake-beam, D, as shown in the drawings, while the remaining brake-heads are each connected with the floating lever G.

The preferred form of the brake-heads F and the floating levers G is shown in Figs. 6, 7, and 8—that is to say, the brake-head is formed with the rearwardly-diverging lugs *f f*, or in any other manner which will form a wedge-shaped slot, *f′*, widest at its outer end, and the end of the floating lever G which is connected with the head F is tapered in cross-section, or is wider at one edge than at the other, and the bolt-hole *g*, which receives the bolt or pin *g′*, that connects the head and floating lever, is formed near the wider edge of the lever. (See Fig. 7.) The wide edge of the floating lever is toward the bottom or narrow portion of the wedge-shaped slot *f′* of the head F, and thus the power is applied directly to the head, and the floating lever can maintain any given position, while the head can rock or move to compensate for wear, say, of driver, &c. It is evident that a link or clevis connection which permitted motion between the brake-head and floating lever and between the floating lever and the pull-rod would accomplish similar results, but is not, in my opinion, as desirable as the construction shown, as there would be more lost motion between the brake-heads, power-levers, &c.

The floating levers G, I have numbered 1, 2, 3, &c., commencing nearest the source of power, and while the last in the series (see G^4, Fig. 10) should have its arms of substantially equal length, the arm which carries the brake-head F should gradually increase in length, and the arm to which the pull-rod is attached should gradually decrease in length the nearer to the power the lever of the series is—as, for instance, fourth lever, equal arms; third lever, two to one; second lever, three to one; first, four to one.

The several floating levers are successively connected by pull-rods P, which extend from the short arm of one lever to the point of applied power in the next lever of the series, so that I obtain a succession of levers of the third power so connected with each other and with the power as to divide up the power equally among all the shoes. The last of the levers of the series will be connected to brake-beam D.

As before pointed out, in case of an engine having four drivers, as shown in Figs. 1 and 2, which is the most common form of consolidation locomotives, the first lever of Fig. 10 would be omitted; if the engine had but three drivers, then the first and second levers would be omitted, and if the engine had but two drivers, then the levers G—first, second, and third—of Fig. 10 would be omitted. To this system the power may be applied by means of an air or steam cylinder, or by any other of the many well-known ways or means.

When an air or steam cylinder is employed,

as shown at E, I prefer to communicate the power through a bell-crank lever, H, having its shaft or pivot at the angle and carried on a fulcrum-bracket, I, projecting down from the frame A, as thereby the strain or pull from both piston-rod and pull-rods is rendered direct or in a right line, the arc movement of the outer end of the long arm or bell-crank lever I being compensated for by the links *e*, which connect the piston and bell-crank.

It will be noted that by applying the principle of a series of floating levers of the third power, and gradually decreasing the difference between the arms as the levers are placed more and more distant from the source of power, the shoes may be placed on one side only, the pressure equalized on all the shoes, loss of power avoided, and all wear on the shoes, whether the same be equal or unequal, can be compensated for, so as not to affect the equality of pressure.

I am aware that brake-shoes carried or supported by rock-arms fulcrumed on plates attached to the locomotive-frame have been actuated by means of equalizers or floating levers connected by rods, the terminal equalizer being anchored to or having a fulcrum on the locomotive-frame, and do not herein claim the same, for the reasons, first, because power is expended on a fixed fulcrum interposed between the floating levers and the shoe—viz., the rock-lever fulcrumed on the frame, and which carries the shoe; secondly, because power is expended on a fixed fulcrum at the point where the terminal equalizer is connected to the locomotive-frame, all of which it is the object of my invention to avoid; thirdly, because such a system as above disclaimed cannot be applied in a series to one side of the wheel only so as to give equal pressure upon each wheel; fourthly, such means of supporting the brake-shoes—viz., on pivoted rock-arms—can only be applied to locomotives having considerable space between the drivers, and prevents automatic adjustment of the shoes to compensate for wear. In my invention the shoe or brake-head is suspended by a link or hanger, or its equivalent, or is what may be termed a "floating brake-head," as no fulcrum is interposed between it and the floating lever by which it is operated. As a result, no power is lost or uselessly expended, and the shoe automatically adjusts itself to compensate for wear.

Having thus described the nature, operation, and advantages of my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination, in a brake system, of link-suspended or floating brake-heads and floating levers for actuating the brake-heads, said floating levers connected by pull-rods arranged so that all the levers shall be levers of the third order, substantially as and for the purposes specified.

2. The combination, in a brake system, of suspended brake-heads, floating levers for actuating the brake-heads, and pull-rods for connecting the floating levers, said pull-rods so connected with the floating levers that the difference in length between the arms of the levers shall decrease gradually from the first to the last lever of the series, substantially as and for the purposes specified.

3. In a brake system, the combination, with the lever of wedge-shaped cross-section, of a brake-head having a wedge-shaped slot, the thickest edge of the lever arranged in the narrow portion of the slot, and a pin for connecting the two, so that the head can rock on the lever, substantially as and for the purposes specified.

4. In a brake system, the combination of a series of floating levers and suspended brake-heads loosely connected to one end of the said floating levers, and pull-rods which connect the free end of one of the levers with the next lever of the series at a point between its two extremities, substantially as and for the purposes specified.

5. In a brake system, the combination, with suspended brake-heads, of a series of floating levers for actuating the same, a series of pull-rods which successively connect the free ends of the levers with the next adjacent lever, a fulcrum-bracket, and a bell-crank lever for applying the power to the brake system, substantially as and for the purposes specified.

6. The combination of two systems of brakes, one for the wheels of each side, each of said systems consisting of a series of floating levers, one end of each lever of the series connected with a suspended brake-head, while the free end of each lever is connected with the succeeding lever of the series at a point between its extremities, and the final levers of the two systems connected to a brake-beam which carries the brake-heads for the front wheels, substantially as and for the purposes specified.

In testimony whereof I affix my signature, in presence of two witnesses, this 13th day of May, 1886.

GEORGE H. POOR.

Witnesses:
O. E. NIEDRINGHAUS,
RALPH BROWN.