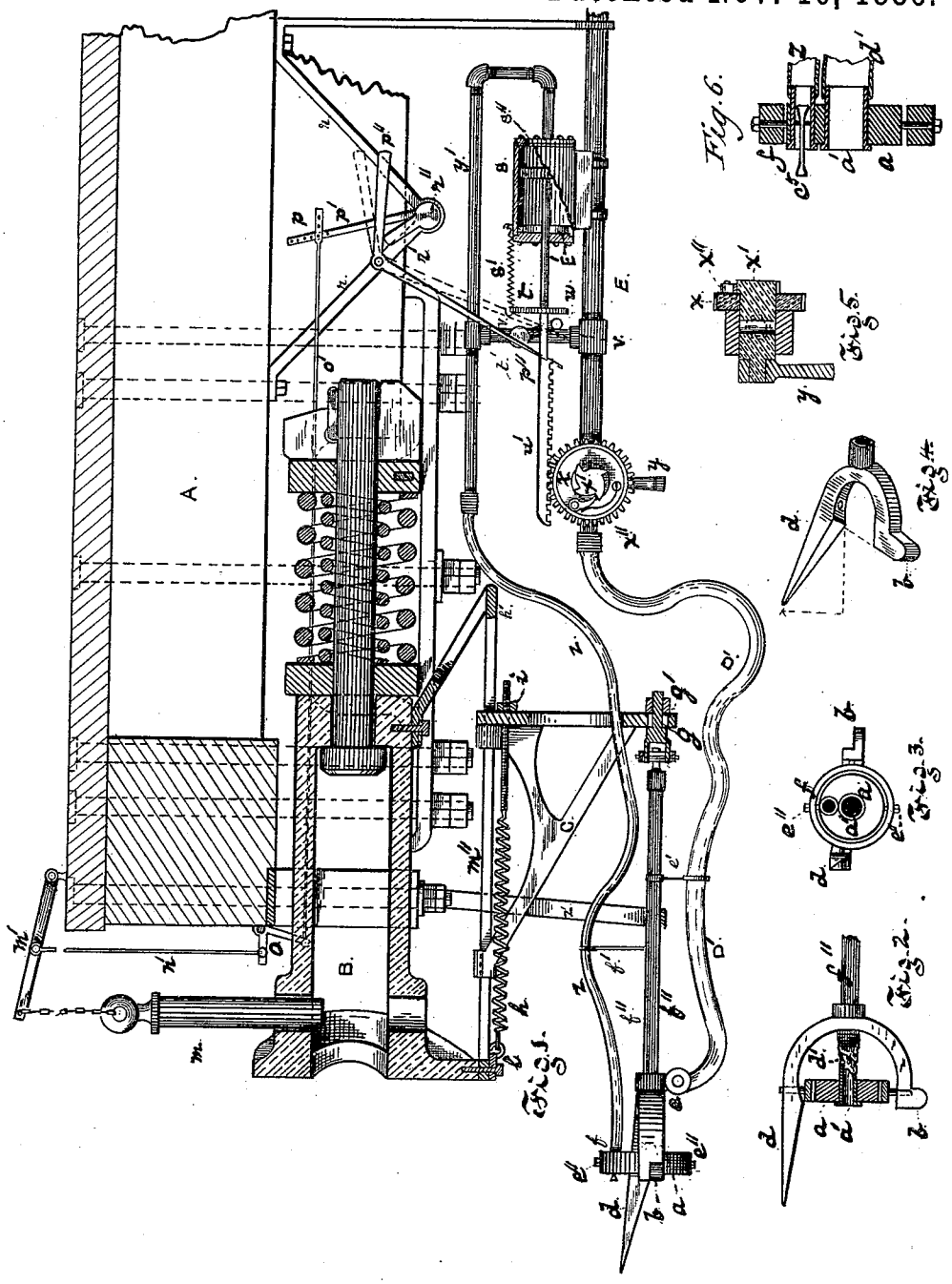
(No Model.)

2 Sheets—Sheet 1.

R. M. McKINNEY.

AUTOMATIC PIPE COUPLING.

No. 352,552. Patented Nov. 16, 1886.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 6.

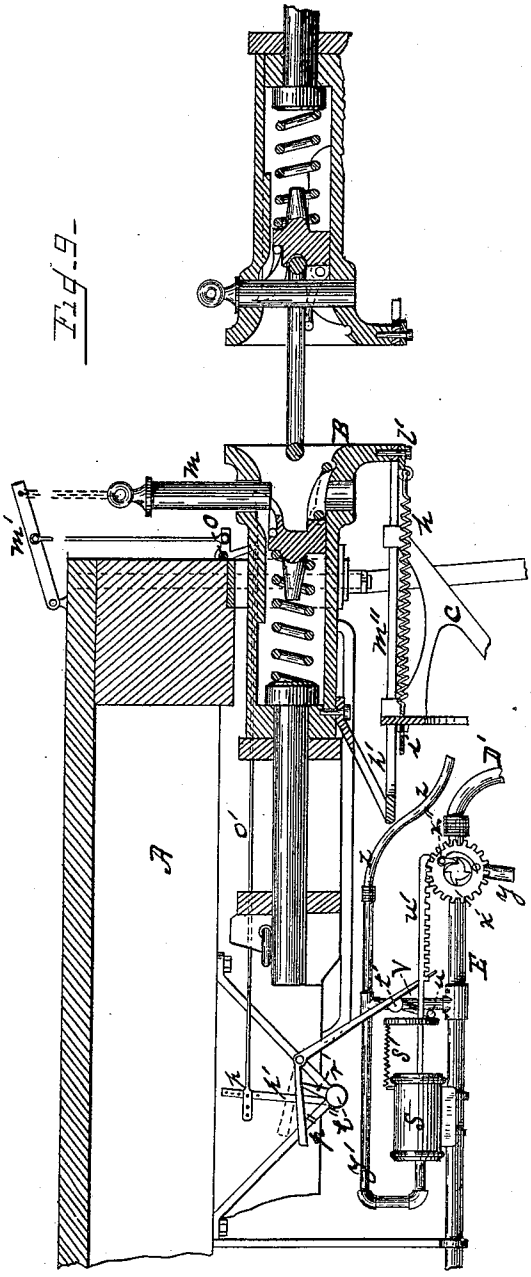


Fig. 8.

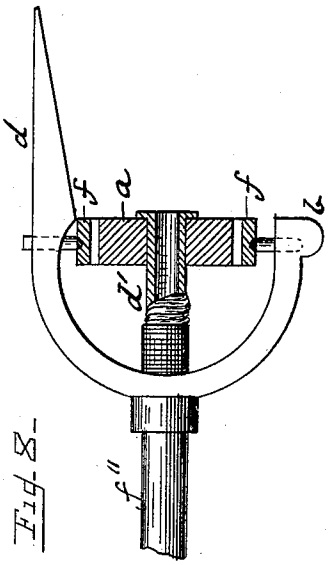
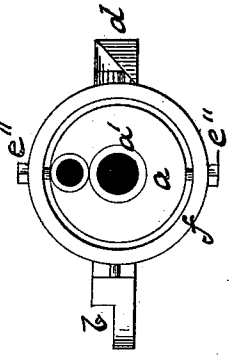


Fig. 7.



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UNITED STATES PATENT OFFICE.

ROBERT M. McKINNEY, OF ELIZABETH, PENNSYLVANIA.

AUTOMATIC PIPE-COUPLING.

SPECIFICATION forming part of Letters Patent No. 352,552, dated November 16, 1886.

Application filed March 6, 1886. Serial No. 194,313. (No model.)

To all whom it may concern:

Be it known that I, ROBERT M. McKINNEY, a citizen of the United States, residing at Elizabeth, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Automatic Pipe-Couplings for Plenum or Vacuum Brakes, and for like purposes where it is desirable to couple pipes by the contact of moving structures; 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 sectional view of part of a car and draw-bar having devices embodying my invention applied thereto. Fig. 2 is a detail plan view, partly in section, of the automatic pipe-coupling. Fig. 3 is an end view or face view of the coupling. Fig. 4 is a detail perspective of a modified form of coupling fork or guide for the coupling. Fig. 5 is an enlarged section of the valve or stop-cock of the main (or brake) pipe and its loose pinion and ratchet, as shown in Fig. 1. Fig. 6 is a vertical section of Fig. 3 on the line *x x*, showing a check-valve used for closing the end of pipe *z* when a car having devices embodying my invention is situated so that there is no like car with which it can be coupled. Figs. 7 and 8 are enlarged views of Figs. 2 and 3, showing the gimbal-joints of the coupling-disk to better advantage. Fig. 9 is a sectional view showing how my devices may be connected to and operated from an automatic car-coupling.

Like letters refer to like parts wherever they occur.

In all air or fluid brake systems, whether the same are plenum or vacuum systems, the pipe-couplings are commonly made and broken by hand whenever the cars are coupled and uncoupled. This has its disadvantages at all times, but is especially the case where it is desirable to make what is termed a "flying switch"—that is to say, to cut out and side track a car from the middle of the train without arresting the motion of the train, and without the loss of time. It is also a disadvantage when it is desirable to take up a car from a siding or in making up a train.

The object of my present invention is to provide means for effecting automatically the coupling and uncoupling of the pipes and the movement of the pipe-valves, so as to facilitate the making up of trains, making flying switches, &c. For such purpose there is required, first, an automatic hose or pipe coupling; second, an automatic mechanism for actuating the valve of the main (or brake) pipe; third, automatic mechanism for aligning the hose-coupling, so that differences between loaded and unloaded cars and cars of different constructions will be provided for.

The main or characteristic features of my present invention, generally stated, are, first, a pipe-coupling disk having gimbal or universal joints to compensate for the irregular independent movement of the cars; secondly, in a cylinder and piston for controlling the valve of the brake-pipe; thirdly, in controlling the valve of the branch pipe which supplies said cylinder from the car-coupling mechanism. Subordinate to this broad ground will be that of preferred construction of details, as well as arrangement of the several elements, which may be varied at will, according to the skill or fancy of the constructor or user without departing from the spirit of my invention.

I will now proceed to describe my invention more specifically, so that others skilled in the art to which it appertains may apply the same.

In the drawings, A indicates a portion of the car provided with the usual or any approved draw-bar—in the present instance a stem draw-bar of the pattern commonly used by the Pennsylvania Railroad—and provided with a portion of what is commonly known as the "McKean Automatic Coupler"—that is to say, lever *m'*, from which the coupling-pin *m* is suspended.

The other devices composing the car-coupler selected for illustration (see Fig. 9) may be briefly stated as follows: A sliding block arranged within the draw-head and forced outward by a spring, serving both as an elastic stop to the link when coupling and as a support for the coupling-pin when raised, and a cranked lever for raising, lowering, and directing the link.

As is well understood, the coupling of the cars is made by tripping the lever *m'*, either by hand or by the entering link, forcing the sliding block from under the pin and allowing the pin *m* to descend, (which will trip the

lever m',) and is broken (or uncoupled) by moving the lever m' in reverse direction.

I wish it distinctly understood that the above devices form no part of the present invention, and are not essential thereto; but inasmuch as it is convenient and desirable to use some form of automatic car-coupler with my devices, I have selected a part of the well-known McKean devices for purposes of illustration only.

My devices can be used without an automatic car-coupling, or may be adapted to be used with the Janney, Miller, or any other at the will of the user.

Secured to the under side of the movable draw-bar B are supports or bars m'', movable with the draw-head B, and so arranged with relation thereto and to the adjacent parts as to avoid any interference with or limitation of the movement of the draw-head.

Suspended from and movable longitudinally on the bars or track m'' is a carriage or carrying-frame, C, and said frame is controlled by the tension spring h, which tends to draw the carriage forward, and said tension-spring h is secured at one end, as at l', to the front of the draw-bar B, and at the other to the carrying-frame C by the threaded bolt and nut i, which permits of the adjustment of the tension of the spring. The rear of track m'' is extended, as at h', to permit a free rearward movement of carrying-frame C.

Secured to the lower part of frame C by a bolt, g, and a nut, g', is a tubular rod, f'', the bolt passing through a vertical elongated slot in the frame, so that the connection of said rod f'' may be adjusted up or down to suit various heights of cars and draw-bars above the track. Between the tubular rod f'' and its connection to frame C is a universal joint, which permits free play of the tubular rod in all directions, while the tubular rod passes through a stirrup or U-shaped carrying-iron, e', which may depend from the carrying-iron of draw-bar B. This or equivalent construction is necessary in order to accommodate the variations in height between loaded and empty cars and cars of different heights; also, to provide for change of position or relation of the cars in sags or on curves, as will be understood by railroad men.

Upon the outer end of tubular rod f'' is a fork or bifurcation having secured thereto on suitable pivots a ring, f, within which is a disk, a, having pivots e'' at right angles to the first set of pivots, the whole forming a coupling-disk with a gimbal or universal joint, so that the said disk can assume any required position or plane. Extending through disk a, either at the center or above or below the center, is the opening of the main pipe, as at a', and from the rear end of said pipe-section a' of the coupling-disk, a flexible connection, d', extends to the tubular rod f''. This permits the disk to adjust itself with relation to its fellow on the other car.

Directly over the main opening a' of the disk is another opening which connects with the pipe z, leading to the air-cylinder S, which controls the valve of the main pipe, as will hereinafter be more fully described.

In order not to prevent the adjustment of the coupling-disk, the connection between pipe z and disk a should be flexible.

As before specified, it may happen that when two cars are to be coupled there will, owing to position, condition, or construction of the two cars, be want of alignment between the hose or pipe couplings, and this difference may be in either horizontal or vertical planes, or both, so that the adjustment, to obtain alignment, may have to be vertical or lateral, or both. In order to accomplish this and render the adjustment automatic, one arm of the fork d is extended and provided with two inclines, one horizontal, preferably on its under side, (see Fig. 1,) and the other vertical, preferably on its inner side, (see Fig. 2,) or the extended end of the fork may be bent upward and outward (see Fig. 4) to accomplish the said purpose; and the other arm of the fork is provided with a laterally horizontally-extending lug or arm, b. The length of the extension d and arm b may be as great or as little as found necessary to accomplish the result.

In order to make the above description clear, I will here state the operation of the device just described.

When two cars having these devices approach each other, if the forks and coupling-disks a are in alignment, the two disks will register. As the forks and disks are made to project some distance beyond the outer ends of the draw-bars by means of springs h, it will be evident that both disks will recede the necessary distance, but while the cars remain coupled will be held in position and close contact, face to face, by the action of spring h, and this contact is sufficiently close to maintain the through connection or continuity of the main pipe E of the air-brake system. If the two disks and forks are not in line but require adjustment, either lateral or vertical, the fork d of one coupling striking the projecting arm b of the opposite coupling will, by means of the inclines before mentioned, force or bring the disks into alignment before the disks meet, and without friction on the faces of the disks. Owing to the universal joint g, the gimbal-joints of the disks, and the flexible connections before specified, this is all possible, as will be readily perceived.

I will next describe the connection of the coupling to the main pipe E, and also the means for controlling the valve of main pipe E.

It will be understood that the usual brake-cylinders and auxiliary reservoirs (not shown) are employed, and that E indicates the main pipe leading thereto. The main pipe E is connected with the coupling-disk a, or with the tubular rod f'', by a flexible connection, and the connection, as at e, may be of any desired character—such as is well known and used in the Westinghouse or any other system. Its

particular character is not material. The object in using a known or common coupling to couple the flexible pipe D′ to the automatic coupling-disk *a* or tubular rod *f″* is as follows: In case a car having my automatic devices comes next in a train to a car having the devices of any air-brake system, I can detach the flexible pipe D′ from the bifurcated rod and automatic coupling-disk *a* and couple it by hand, in the usual manner, to the main pipe of the other car, so that the automatic devices never interfere with the use of the car in an ordinary air-brake system not provided with automatic pipe-couplings.

X′ indicates the valve of the main pipe E, provided at one end with the usual handle, *y*, so that the valve may be turned by hand, if desired, and at the opposite end with a ratchet, while journaled on the ratchet end of the valve is a loose pinion, *x*, having a pivoted spring pawl or dog, *x″*, which engages with the ratchet on the valve, so as to rotate the valve in one direction only. The teeth of the ratchet are usually four in number, so that the valve makes one-quarter rotation at each movement.

Clamped to the main pipe E, or otherwise supported in suitable relation to the valve X′, is a small cylinder, S, whose piston-rod is provided with a rack, *u′*, which engages with the loose pinion *x*, journaled on valve *x′* of the main pipe E. The movement of the piston of this cylinder S is a little more than that required to rotate the valve *x′* one quarter turn, so that on its return-stroke the loose pinion *x* shall be reversely rotated more than one-quarter turn, and thus assure the spring-pawl *x″* always engaging with the next tooth of the ratchet. The throw of the piston may be regulated by the ring E′, or any other suitable stops arranged in the cylinder S.

y′ indicates a pipe, which is connected at one end with the head of the cylinder S, and at the other end, by means of a flexible connection, *z*, with the coupling-disk *a*, as before specified, while it is also connected directly with the main pipe E by a valved branch pipe, V. In order to free the cylinder S of air and permit the return of the piston, which return-stoke is effected by spring S′, I provide a leak-port, S″, in the head of cylinder S; and in order to prevent the escape of air from pipe *z*, when the devices are used in a train having no corresponding devices on the adjacent car, I provide a check-valve, c^5, in the opening or mouth of pipe *z* at the coupling-disk *a*, as shown in Fig. 6. These check-valves open inward and have stems which project as shown, so that when two coupling disks *a* are in contact the check-valves c^5 are both forced off the valve-seats, and there is a continuous open pipe from the cylinder S on one car to the cylinder S on the other car.

t′ indicates a two-way valve in branch pipe V, which valve has a crank-pin, and is controlled by the following or equivalent devices: From one crank-arm of rock-shaft O (or equivalent mechanism for actuating the same) a rod, *o′*, extends to a crank-arm, *p′*, in a rock-shaft, *r″*, journaled in suitable supports secured to the car. The connection between the rod *o′* and the crank-arm *p′* is adjustable, as shown at *p*, to permit of adjustment to suit the throw of the various levers used to actuate automatic car-coupling devices.

r′ indicates a cam or tappet on the said rock-shaft *r″*, and pivoted upon the bracket or support *r* over said cam, so as to be struck thereby, is a bent lever, *p″*. Said bent lever *p″* is pivoted by its angle with one arm extending over the cam *r′* and the other or longer arm projecting down, so as to strike the crank-pin *u* on two-way valve *t′* of branch pipe V when the bent lever is struck by the cam *r′*. This mechanism opens the two-way valve *t′* and permits the cylinder S to communicate with main pipe E. In order to reverse the valve and close it, so as to cut off communication between cylinder S and main pipe E, a cross-head, *t*, is secured to the piston-rod, which on the outward movement of the piston strikes the crank-pin *u* and reverses the valve *t′*.

The above devices embody my invention in its preferred form, and said or equivalent devices are applied to each end of the car. As shown in the drawings, Fig. 1, the devices are in position to make a coupling with a car on the left, and having similar devices, which being understood, the operation will be as follows: Before the draw-heads B meet, the coupling-disks *a* will have met, their alignment having been corrected and insured by the parts *d* and *b*, as hereinbefore specified, and the disks being held up to each other by the springs *h*. In other words, the pipe or hose of main pipe E has been automatically coupled before the draw-bars bump and the cars are themselves coupled. Then as the coupling between the cars is made by an automatic coupling mechanism or otherwise, rock-shaft O is moved, and through crank-arm *p′*, rock-shaft *r″*, and cam *r′*, bent lever *p″* is actuated, and through crank-pin *u* turns two-way valve *t′* of branch pipe V, which permits air from the main pipe E to enter pipe *y′*, fill cylinder S, and force the piston thereof outward. The rack *u′* on the piston-rod rotates pinion *x* one-quarter turn, and that moves valve *x′* of the main pipe E one-quarter turn, (so that the handle *y* is in line with pipe E,) and establishes the communication through the main pipe E from car to car. The air also passes by flexible pipe *z* through coupling disks *a* into the corresponding cylinder, S, on the next car with which the coupling is made, and operates the devices of said car in like manner. When the piston reaches the end of its stroke, the cross-head *t* will have struck the crank-pin *u* on valve *t′* and turned the valve so as to cut off the communication with pipe E, (the same thing occurs on the other cars,) the piston is gradually retracted or drawn back by spring S′, the air escapes from the cylinder S through leak-ports S″, the pinion *x* turns loosely on the valve *x′* of the main pipe E, (more than one-

quarter revolution,) until the pawl x'' slips past the next notch of the ratchet, and so communication of main pipe E is established and maintained. As before specified, when the adjacent car is not supplied with the automatic devices, the flexible pipe D′ may be separated from the hollow rod f'' and coupling-disk a, and coupled by hand directly to the main pipe E of said car in the usual manner, and the check-valve c^5, Fig. 6, will close the end of pipe z and permit the devices to operate as usual. Now, in uncoupling or cutting out a car the rock-shaft O is rotated as before, the rod o' rocks the shaft r'', the cam r' again strikes bent lever p'', it in turn operates two-way valve t', air enters cylinders S and forces outward the piston, whose rack u' rotates pinion x another quarter rotation, which closes valve x' and cuts main pipe E out of the connection. The piston at the end of its stroke reverses or closes valve t', as before, the air leaks out of cylinder S, as before, and the devices return to the position shown in Fig. 1, and are ready for again operating in coupling up the car when required.

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

1. In an automatic pipe-coupling, the combination, with the perforated coupling-disk, of a ring wherein the disk is pivoted, and a fork wherein the disk-ring is pivoted, substantially as and for the purposes specified.

2. The combination, with the perforated pivoted pipe-coupling disk, of a bifurcated rod wherein the disk is pivoted, said rod having a universal joint, and a stirrup for loosely supporting the disk-rod, substantially as and for the purposes specified.

3. An automatic coupling for train-pipes, consisting of two disks having gimbal-joints, springs for holding the disks together, and flexible connections with the train-pipes, substantially as and for the purposes specified.

4. In an automatic coupling for train-pipes, coupling-disks having gimbal-joints, and a fork wherein the disk is pivoted, said fork having a universal joint, and guide-projections for correcting the alignment of the coupling-disks, substantially as and for the purposes specified.

5. The combination, with the draw-bar, of a sliding carrying-frame, a tubular rod supported thereby and having universal-joint connections, a coupling-disk secured to the tubular rod by gimbal-joints, and a tension-spring for controlling the carrying-frame, substantially as and for the purposes specified.

6. The combination, with the main air-pipe and its valve, of a secondary pipe, a cylinder whose piston actuates the valve of the main pipe, and cam or tappet mechanism for controlling the valve of the secondary pipe, substantially as and for the purposes specified.

7. The combination, with a main pipe and its valve, of a secondary pipe and its valve, a cylinder and its piston, a rack actuated by the piston, a loose pinion journaled on the valve of the main pipe, and a pawl and a ratchet mechanism, substantially as and for the purposes specified.

8. The combination of the main pipe and its valve, a secondary pipe and its valve, a cylinder whose piston actuates the valve of the main pipe, a lever, and a rod for actuating the rock-shaft, substantially as and for the purposes specified.

9. The combination, with the secondary pipe and its valve, of a bent lever for actuating the valve, a rock-shaft and cam for actuating the bent lever, and a rod and crank-arm having adjustable connections for actuating the rock-shaft which carries the cam, substantially as and for the purposes specified.

10. The combination, with the frame C, having an elongated slot therein, of the bolt and nut $g\ g'$, the rod f'', having a universal joint, a pivoted coupling-disk, and a stirrup for loosely supporting the rod f'', substantially as and for the purposes specified.

11. The combination, with an automatic car-coupler, of a main air-pipe and its valve, secondary air-pipe and its valve, a cylinder whose piston actuates the valve of the main air-pipe, a rock-shaft, and cam and lever mechanism for actuating the valve of the secondary pipe from the automatic coupler mechanism, substantially as and for the purposes specified.

12. The combination, with the coupling-disk, the main pipe, a valve therein, the secondary pipe, and the cylinder and piston which actuate the valve of the main pipe, of a check-valve arranged in the secondary pipe, substantially as and for the purposes specified.

13. The combination, with a car, of an automatic car-coupling, a valved air-pipe, an automatic pipe-coupling, and intermediate mechanism, consisting of rock-levers, tappets, and connecting-rods, for actuating the valve of the air-pipe from the car-coupling devices, substantially as and for the purposes specified.

14. The combination, with the fork having an upward and outward projecting or horizontally and vertically inclined projecting guide on one side, and a horizontal laterally-projecting arm on the other, of a coupling-disk pivoted in the fork or bifurcation between the guides, substantially as and for the purposes specified.

15. In an automatic pipe-coupling, the combination, with a tubular bifurcated rod having a coupling-disk pivoted in its fork, of a flexible pipe, D, and a common coupling for coupling the flexible pipe to the tubular rod, substantially as and for the purposes specified.

In testimony whereof I affix my signature, in presence of two witnesses, this 4th day of March, 1886.

ROBERT M. McKINNEY.

Witnesses:
PETER C. BAIN,
F. W. RITTER, Jr.