No. 887,489. PATENTED MAY 12, 1908.

N. E. MARVIN.

AUTOMATIC TRAIN PIPE COUPLING.

APPLICATION FILED NOV. 19, 1907.

3 SHEETS—SHEET 1.

Fig. 1.

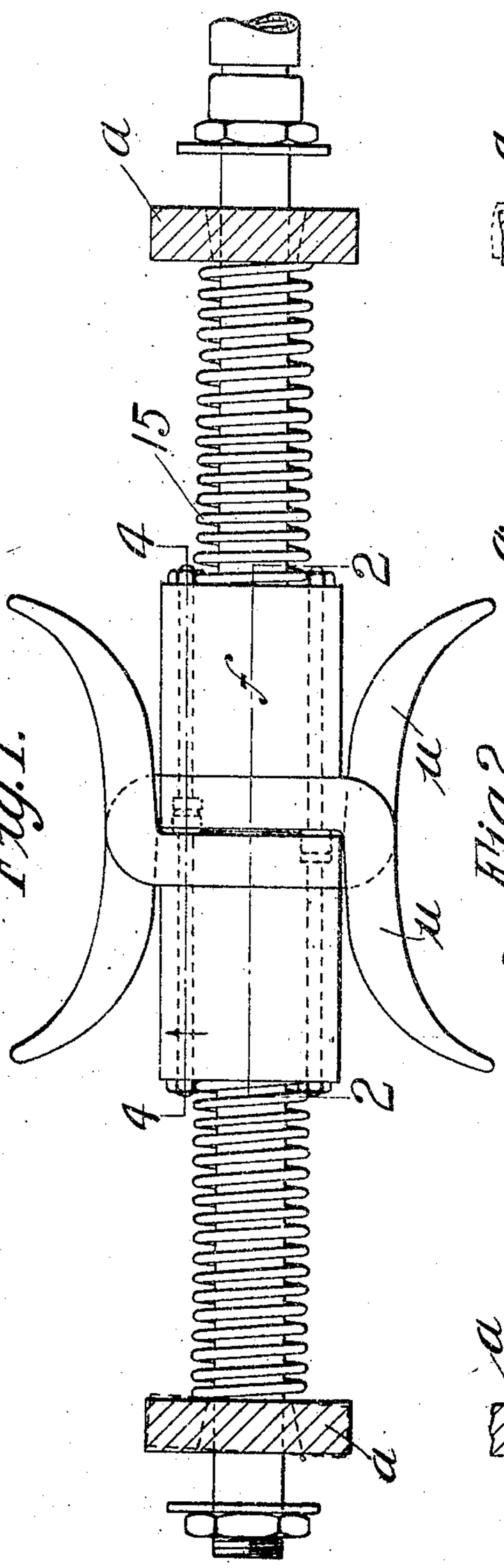
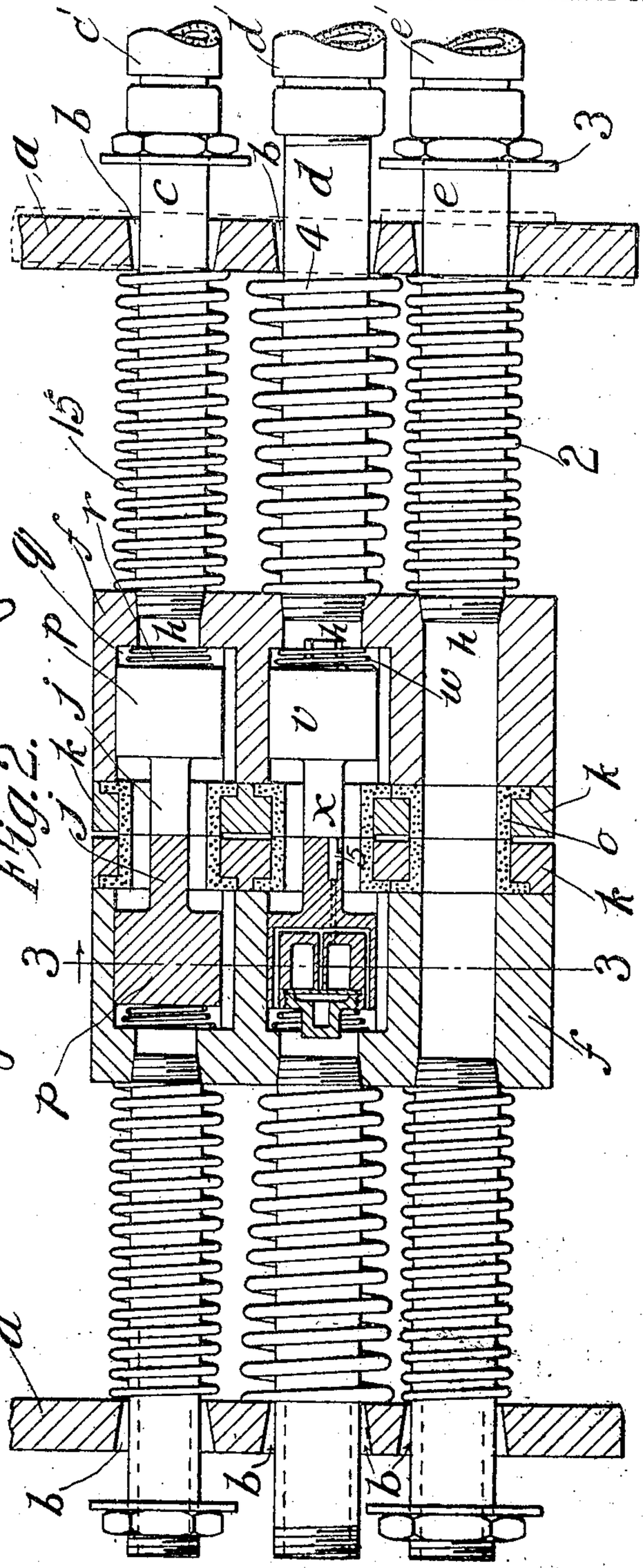


Fig. 2.



Witnesses:
H. L. Sprague
H. C. V. Bowen.

Inventor:
Norman E. Marvin.
by Chapin & Co.
Attorneys.

No. 887,489. PATENTED MAY 12, 1908.

N. E. MARVIN.

AUTOMATIC TRAIN PIPE COUPLING.

APPLICATION FILED NOV. 19, 1907.

3 SHEETS—SHEET 2.

Fig. 4.

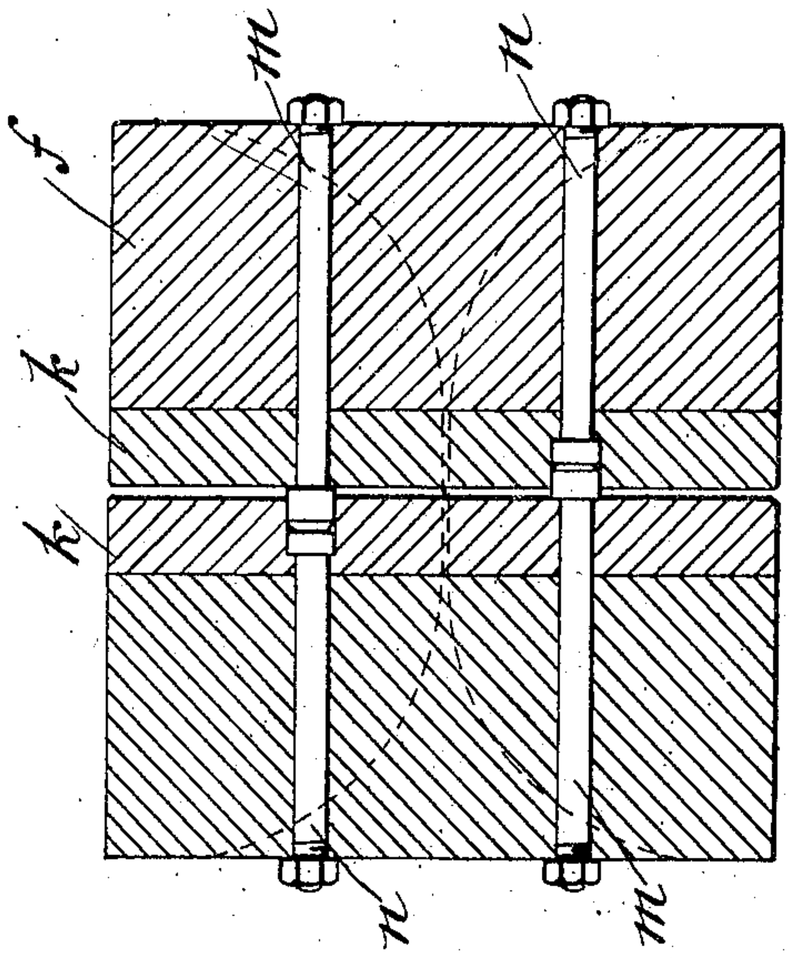


Fig. 3.

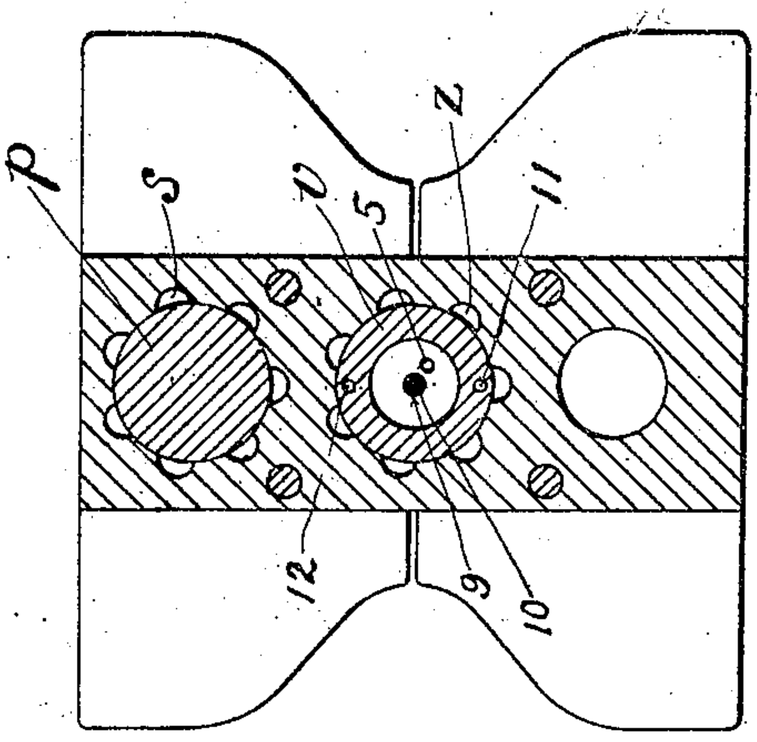
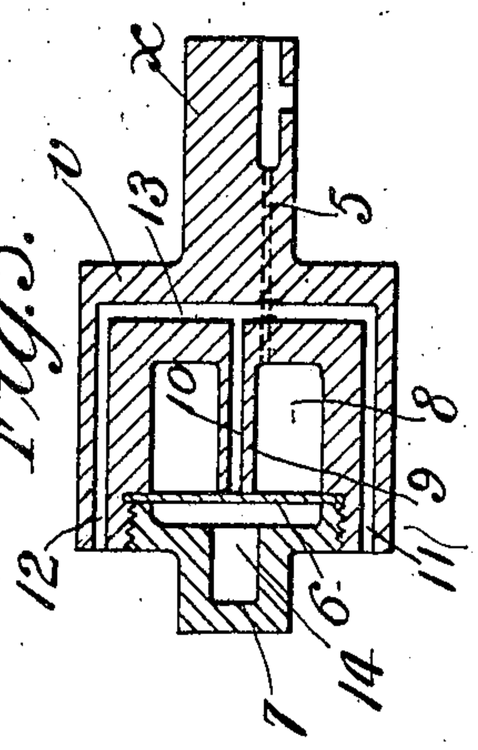


Fig. 5.



Witnesses:
H. L. Sprague
H. W. Bowen

Inventor;
Norman E. Marvin
by Chapin & Co.
Attorneys.

No. 887,489. PATENTED MAY 12, 1908.

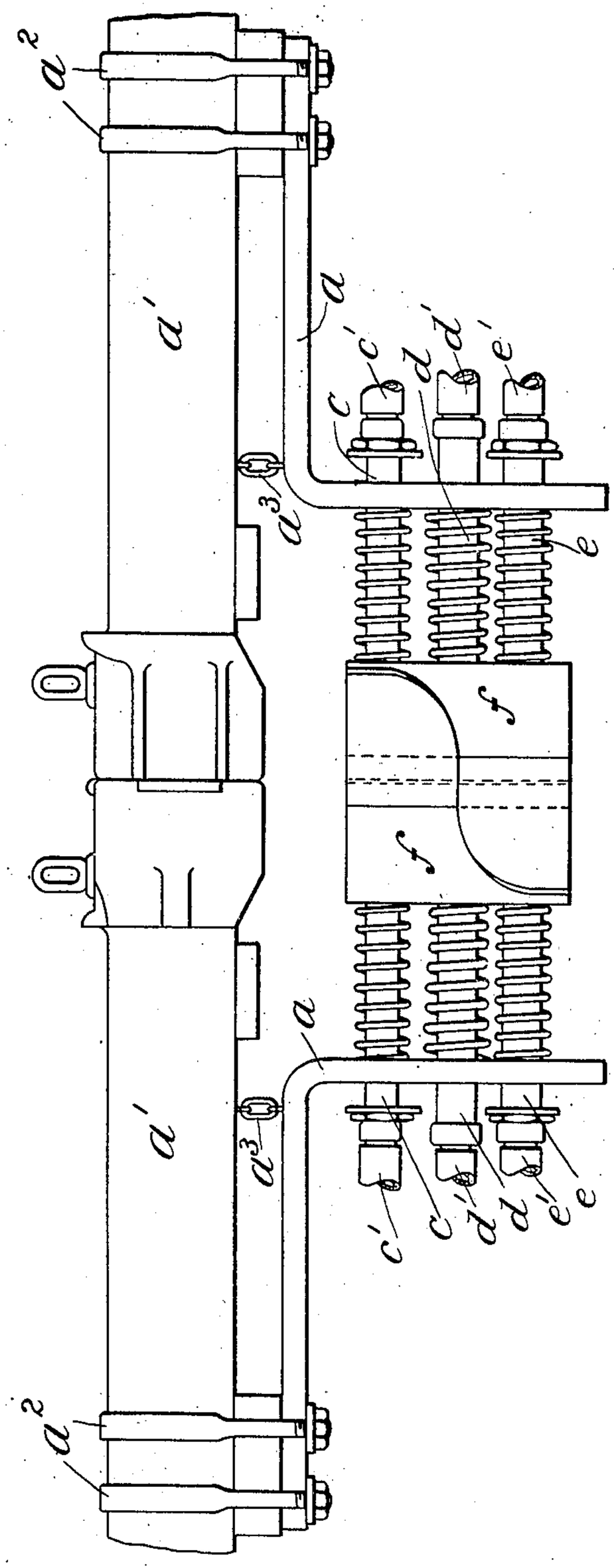
N. E. MARVIN.

AUTOMATIC TRAIN PIPE COUPLING.

APPLICATION FILED NOV. 19, 1907.

3 SHEETS—SHEET 3.

Fig. 6.



Witnesses:
H. L. Sprague
H. W. Bowen

Inventor;
Norman E. Marvin
by Chapin & Co.
Attorneys.

UNITED STATES PATENT OFFICE.

NORMAN E. MARVIN, OF SPRINGFIELD, MASSACHUSETTS.

AUTOMATIC TRAIN-PIPE COUPLING.

No. 887,489. Specification of Letters Patent. Patented May 12, 1908.

Application filed November 19, 1907. Serial No. 402,812.

To all whom it may concern:

Be it known that I, NORMAN E. MARVIN, a citizen of the United States of America, residing at Springfield, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Automatic Train-Pipe Couplings, of which the following is a specification.

This invention relates to improvements in means for automatically coupling together the signal line-pipe, train line pipe, and steam-pipe of railway cars.

It has for its object to do away with all angle cocks; also to avoid the necessity of the trainmen going between the cars to effect these connections.

Further objects of my invention are as follows:—first: to automatically operate the valves in the several pipes in order that an unobstructed communication through the train in the several pipes may be had; second: to provide means that will automatically permit the rising and falling of the pipe coupling in unison with the movement of the coaches when the train is in motion; third: to provide means that will permit the couplings to move sidewise in passing around the various curves in the track without destroying the air or steam-tight connections of the coupling; fourth: to provide an automatic air-retaining and reducing valve in the train line pipe so that should the train for any reason break in two or become separated, the pressure in the train line would be sufficiently reduced to automatically apply the brakes in the usual manner; fifth: to so construct this valve that when a coach equipped with my invention is placed at the end of a train the train-line pipe will be automatically closed at the rear end of the coach, thus preventing the escape of the compressed air therefrom, and sixth: to provide means for holding the adjacent ends of the coupling elements in horizontal alinement, thus preventing the sagging of the ends and breaking of the apparatus when in operation, and more particularly when it is not connected to a companion coupling.

In the drawings forming part of this application,—Figure 1 is a top plan view of my invention showing the adjacent ends of the coupling device locked together when in use. Fig. 2 is a partial vertical longitudinal sectional view on the line 2—2, Fig. 1. Fig. 3 is a transverse sectional view on the line 3—3 of Fig. 2 looking in the direction of the arrow and clearly showing the channel construction surrounding the valves. Fig. 4 is a vertical sectional view in the plane taken on the line 4—4 of Fig. 1. Fig. 5 is a detail view of my automatic reducing valve. Fig. 6 is a side elevation showing the manner of attaching my improvements to the draw-bar.

Referring to the drawings in detail, *a* designates a bracket-arm that is adjustably connected to the draw-bars a^1, a^1 of the coach by means of the strap irons a^2 and links a^3 in order that the arm may have imparted thereto the same movements as the draw-bars. This bracket-arm is provided with conical openings *b* for receiving the pipes *c*, *d*, and *e* which are respectively the air signal-pipe, the train-line or air-brake pipe, and the steam-pipe for heating the coaches. These three pipes are connected by means of the usual flexible or hose connections c^1, d^1 and e^1 with the various train-pipes which terminate at opposite ends of the coach. These flexible pipes may be provided with the usual angle-valves or cocks for cutting off communication through the pipes, but my improvement permits doing away with them entirely. These pipes are screwed into a head or casting *f*, as indicated at the point *h*.

The conical openings *b* permit the pipes to move in any direction, that is either upward or downward or sidewise, when the device is in use on a moving train. This construction is necessary in order to permit the head pieces *f* to maintain a rigid locked engagement with each other during the various movements of the train and over any unevenness of the road-bed, and in order to prevent leakage of air or steam. The end of the head or casting piece *f* is provided with a valve *p* that has a stem *j* extending through and beyond the face-plate *k*, as clearly shown in Fig. 2.

It will be observed that the face-plate *k* is secured to the outer portion of the head piece *f* by means of the bolts *m* and *n*, and located between the edges of the head *f* and the face plate *k* is a packing or gasket *o*. The valve is slidably mounted within an opening *q* of the head-piece *f*. This valve is normally pressed outward to its seat on the gasket *o* by means of a weak spring *r*, and also by the compressed air on the back of the valve. In Fig. 2, which shows the device in use, this valve is forced away from its seat on the

packing *o* by means of the stems *j* engaging each other when two coaches are coupled together.

Referring to Fig. 3, of the drawings, it will be noticed that the valve *p* is surrounded by a series of passages or semi-circular grooves *s* that are cut in the head-piece *f*. This is for the purpose of permitting the compressed air to pass freely through the signal pipe from one end of the train to the other.

The face-plates *k* are provided with oppositely extended horns *u* in order to cause the head pieces *f* to accurately come together when two coaches are connected to each other in the usual manner by means of the draw-bars a^1, a^1.

The head pieces *f* at the outer end of the air-brake pipe *d* are further provided with an automatic air-reducing and air-retaining valve *v*, which is normally forced outwardly to its seat on the gasket *o*, by means of a weak spring *w*, together with the pressure of compressed air on its rear face. This valve is also provided with an outwardly extending stem *x* so that the same will be engaged by the stem of the opposite valve when the train is coupled together and the valves forced away from their seats on the gaskets *o*.

Referring to Fig. 3 of the drawings, it will be seen that the valve *v* is surrounded by a series of semi-circular grooves or passages *z* for permitting the free passage of the compressed air in the air-brake pipe or train line. The details of this valve and its operation will be referred to later in the description in connection with Fig. 5. As the steam-pipe *e* is not provided with a valve at its outer end, a free unobstructed passage-way is afforded through the head *f* and face-plate *k*, as shown in Fig. 2, for the steam; and the steam-tight joint is provided between the oppositely disposed face-plates *k* by means of the gaskets or packing-rings *o*.

The supply of steam to the pipe *e* is controlled by the engineer's valve while the valves in each coach, which control the supply of steam to the coils located therein, are under the control of the trainmen.

The spring 2, which encircles the steam-pipe *e*, and spring 4, which encircles the train line *d*, that are located between the bracket-plate *a* and the head-piece *f* are normally under compression, and when the coaches are not coupled together these springs serve the purpose of drawing the check-washers 3 firmly against the bracket-plate *a;* but when the coaches are coupled and the device is in the position shown in Fig. 2, the springs 2, 4, and 15 are placed under compression and the pipes *e*, *d*, and *c* forced or moved through the bracket-plate *a* forcing the check-nuts away from the plate and allowing the pipes to play through the tapered holes. The spring 2 also serves the further purpose, as does the spring 4, to elevate the outer end of the head *f* and thus prevent the same from sagging, and possibly result in breaking the coupling device by reason of the great leverage exerted by the weight of the heads *f* at their outer ends.

Referring now to the construction and operation of the valve *v*, as shown in the sectional detail views in Figs. 2 and 5, the stem *x* of the valve is provided with an opening or passage-way 5 which communicates with the interior of the valve. 6 designates a diaphragm that is secured to the main body of the valve by means of the threaded plug 7. 8 designates a cavity or opening within the valve *v* into which the passage-way 5 opens, and 9 designates a stem within this cavity or opening 8. This stem is provided with a passage-way 10 which communicates with the two passage-ways 11 and 12 by means of the passage-way 13. It will be noticed that the passage-way 5 is much smaller in diameter than the passage-ways 11 and 12. The operation of this valve *v* is as follows: When the plug 7 is threaded into the body portion of the valve for securing the diaphragm 6 therein, the pressure of the confined air in the recess 14 of the plug 7 will be greater than 15 lbs., or atmospheric pressure, thus forcing the diaphragm 6 against the end of the stem 9 and closing the passage-way 10, since the area of the passage-way 10 is much less in extent than the area of the diaphragm 6 on the cavity side 14 thereof. This is the normal position of the diaphragm before the train is coupled together. After the coupling takes place the train-pipe pressure, which is 70 lbs., or over, to the square inch, can pass through the passage-ways *z* in the head-piece *f* and through the passage-way 5 into the chamber 8. This operation, by reason of the high pressure in the train line, will lift the diaphragm 6 from its seat on the end of the stem 9 and uncover the passage-way 10. The compressed air can now freely pass through the ports or openings 11, 12, 13 and 10 to the chamber 8.

Should an accident occur, or the train be disconnected for any reason, the spring *w*, together with compressed air behind the valve, will force the same to its seat on the gasket or packing *o*, thus closing the passage-ways *z*. This operation will permit the air in the chamber 8 to gradually leak therefrom through the passage-way 5 to the atmosphere, and when the pressure in the chamber 8 becomes less than the pressure in the chamber 14 the diaphragm 6 will close the port 10 and prevent any further leakage or reduction of air from the train-pipe. This operation or movement of the diaphragm 6 and the small leakage passage-way 5, causes the brakes to be applied by reducing the pressure in the train pipe line in the ordinary way, thereby setting the brakes. The diaphragm 6 is aided in its closing movements towards the stem

by reason of a partial vacuum being produced in the chamber 8 on account of the compressed air rapidly passing through the ports 11, 12, 13, 10 and out to the atmosphere through the passage-way 5.

In making up the train, should a car or coach that is equipped with my invention be placed at the end of the train, the valves *p* and *r* will be forced against the packing or gasket *o* by reason of the springs *r* and *w* and the compressed air back of them, thus preventing any escape of the air to the atmosphere from the coupler when it is not in use. The diaphragm 6 will close the port 10 when one reduction of air is made in the train line and the port will remain closed until connected to the companion coupler on another car.

Referring to Fig. 4 of the drawings, it will be noticed that the bolts *m* and *n* are so arranged as to form a dowel and pin connection between the face-plates *k* of the adjacent coupling so that when these face plates come together, the heads of the bolts will serve as additional means for maintaining the coupling in horizontal alinement and also do away with friction on the packings or gaskets.

It should be stated that the horns *u* are so shaped that when in locked position they maintain the face-plates *k* in a rigid and immovable position against any movement and thus prevent leakage of air or steam between the face-plates. This is a very important feature of my improvement and all movements of the coupling device are taken up by the pipes *c*, *d*, and *e* in the conical openings *b* of the bracket-arms *a*.

The center spring 4 on the air-brake pipe *d* being a stiff compression spring, exerts the greatest pressure when the head pieces *f* are coupled together and serves, with the help of the springs 2 and 15 to hold the face-plates *k* solidly together, which maintains an air and steam-tight joint.

What I claim, is:—

1. In an automatic train pipe coupling device, a valve normally closing communication between the brake-pipe and the atmosphere, said valve having a chambered-out portion, a diaphragm, means for securing the diaphragm to the body portion of the valve, passage-ways in the body portion of the valve and communicating with the chambered out portion of the valve, the valve also having an additional communication with the chambered portion to the atmosphere, whereby when the pressure within the chambered-out portion equals that of the atmosphere, passage-ways will be closed and when the pressure is greater than the atmosphere the passage-ways will be opened.

2. In an automatic coupling device for train-pipes in combination with the draw-bar, a bracket-arm carried by said draw-bar, the bracket-arm being provided with conical-shaped openings, pipes slidably engaging the openings, a head-piece secured to the pipes, valves therein and having a projecting stem portion, whereby when two coaches are coupled together the stems will engage and the valves be opened, and whereby said openings will permit the head-piece to follow the movements of the draw-bar and road-bed.

3. An automatic coupling device in combination, a draw-bar, a bracket-arm adjustably connected thereto, a head-piece, a face-plate secured to said piece, means for maintaining the face-plate in the same horizontal plane, the bracket-arm having conical openings therein, and connecting means between the bracket-arm and the head-piece and engaging the conical openings, whereby the head-piece may move in unison with the draw-bar and road-bed.

4. In a coupling device, head-pieces having channels therein, a valve in each head-piece and surrounded by the channels, said valves normally closing the channels, means forming a part of the valves and projecting beyond the face of the head-pieces for operating oppositely disposed valves, and simultaneously uncovering the channels.

5. In a coupling device, an automatic reducing and retaining valve, the valve having a chambered portion and having a stem located in said portion, a flexible member for closing the chambered portion, the stem having an opening therethrough, means for moving the flexible member against the stem and closing the opening.

NORMAN E. MARVIN.

Witnesses:
K. I. CLEMONS.
H. W. BOWEN.