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THESIS,

AUTOMATIC CAR-COPLERS,

FOR DEGREE OF B.S. SCHOOL OF C.E.

BY

W. F. KENDALL,

1885.
Automatic Car Couplers

During the past few years attention has been prominently directed to the dangers attending the coupling of cars. It is estimated that during the last seven years in the United States alone there have been not less than 11,936 persons killed and 11,305 injured from coupling cars. The men thus injured are as a rule young men of intelligence and energy. To lessen this fearful loss of life some change must be made, either in the building of cars or in the method of coupling, or it may be in both. Inventors recognizing the necessity have concentrated their energies upon the subject and today car coupling devices are numbered by the thousands and each week sees the number increased by one or more new inventions.

Adoption. Among so many inventions the question is which one shall be adopted? And if a particular one
is adopted may not some later invention fulfill the conditions necessary to a good coupling better than the one approved. While this may be true it would seem that so far as the matter of safety to the brakeman is concerned, and this should be the chief point kept in view, that some one of the many good forms which we now possess should be adopted and then the inventors instead of wasting their energies in devising new forms would concentrate their powers upon the one form and thus bring it to a high degree of excellence.

But in adopting a car coupling should each railroad adopt the one which seems to it the best? Manifestly not, for by the present method of using the cars of one company upon the roads of other companies such a multiplicity of couplings is not to be thought of.
Legislation concerning their adoption. Again several of the state legislatures have taken the question of safety couplers into consideration, and laws have been enacted compelling the rail-road companies to equip all their cars with safety couplers. It is questionable whether such isolated state legislation will furnish the happy results expected from it.

If the question is to be settled by legislation, it would seem as if the general government would be the most proper body to make such legislation. For if one state should make the rail roads within its boundaries adopt safety couplers, and thus lessen the rate of killed and wounded within its borders, the rate will be increased in the adjacent states having no such laws, where the cars thus equipped will be largely used, on account of the
increased difficulty in making the coupling with the link and pin, the presumption of course being that the safety coupling is made so as to couple also with the link and pin as it must while cars are exchanged with different roads. Hence nothing is gained for suffering humanity and much is lost by the rail road corporations.

Finally it is hoped that through the combined action of the legislatures and rail road companies there will ultimately result the adoption of a standard automatic coupler for all the roads of the United States. In Massachusetts in the latter part of 1884 a commission was appointed to examine into the merits of the various couplers brought before them. Commissioners from several states were present during the investigation and hence the action of Massachusetts
in this matter will probably be felt all over the United States.

Division into classes. - The couplings favorably reported upon by this commission may be divided into two general classes. I Automatic couplings proper, or those in which the link and pin is done away with entirely. II The modified link and pin.

The Janney Coupler. - Of the first class is the Janney coupler, the principal feature of which is the pivoted hook or knuckle. Plate 1. represents the Janney coupler.

Fig. 1. is a top view of the two couplers as approaching each other for coupling. Fig. 2. shows the two couplers united, one in section to show the internal arrangement of the parts. Fig. 3. shows the knuckle which when in proper position holds the couplers together. The knuckle B. represents a pinion with two teeth
B, and B' (the other teeth of the series being dispensed with).

and the drawhead, A, and tooth or nose, B', of the
other coupler representing the rack.

Coupling.—When the couplings are forced together
the teeth engage each other. The hub revolves and the
long tooth B', is carried around into a locking
position. The catch, C, is forced back by the tooth B'
in passing after which the catch is returned to
its locking position by the catch spring. The un-
coupling is effected by a lever at the side of the car
which forces the catch C, back so as to allow the tooth
B' to revolve outward. To prepare the cars for coupling
one or both of the knuckles on either car must be
open, and the levers on both cars should be set for
coupling. If the lever on either car is not set to couple
the lever must be released before the cars come together.
This can be done from the side of the car. It will be seen that the two couplers, when united form a perfect and close-fitting knuckle joint and therefore give perfect freedom in carving.

The Cowell Coupler.

**Description**—The Cowell coupler is also of the first class. It consists of a hook with a pivoted head and it is free to move in a horizontal plane. The head may be used as a hook in one position and in another position it represents the head and form of the ordinary link and pin draw-bar.

**Coupling**—Two Cowells coming together force the head into the hook position by reason of the shape of the head itself, and the partially open position it assumes when uncoupled. It is claimed it will couple whether both heads are open (as in fig. 1, plate 2).
one open and the other closed or both closed (fig 2, plate 2). To uncouple lift the lever at the side of the car as shown in fig 1, plate 2, which draws the key from the shoulders of the head allowing it to swing back. Only one lever is used to uncouple and it is immaterial which one or on which side of the train.

As a link coupler, the cowell is simply opened or left in the uncoupled position, the head standing as in fig 1. In this position an exact link coupler with its usual face and buffer is presented to the opposing car. Coupling the cowell in this position to a link coupler, and uncoupling is the same as though two link couplers were used. To hold the head steadily in position when used as a link coupler a pin is usually inserted, (shown in fig 1.)
If it is desired the Bowell is also fitted up with a device for coupling automatically with the common link and pin (shown fig 5 plate 2). This device forms no part of the Bowell coupler proper. It consists of a slide-bar in an inclined groove cast in the draw-head. This slide-bar holds the ordinary pin up until struck by the link of the link coupler approaching it for coupling up. When the link strikes the slide-bar the latter is forced back and up allowing the pin to drop into the link and the cars are coupled. To uncouple the pin is raised by a lever at the side of the car or by hand. This device is probably of very little value.

Merits of the Janney and the Bowell couplers—Of these two couplers the New England rail-road companies show a preference for the Bowell. Both of these couplers have the
conditions requisite for a good coupler, with but a few exceptions; that is, I. They allow the cars freedom of vertical motion independent of each other, when coupled so that the passage of one car over depressions in the track does not throw any part of the weight of one car upon the draft rigging of the next. II. They are easily uncoupled when desired. III. They can be easily fixed so as not to couple. IV. Each will couple with its own kind higher or lower than itself. With the janney this difference in height can be as much as 6 inches. The Dowell will probably couple when there exists a difference in height to the extent of 6 inches or even more as the width of the hook may be made as large as desired. V. Each will couple when brought together either forcibly or slowly. VI. They are not liable to uncouple on rough track. Experiments were made with the janney to test
its ability to fulfill this requirement. The two rails of the track were elevated above the track at level (triangular blocks being used to aid the wheels in mounting and descending), and the train ran over the obstruction several times without being uncoupled. I do not know that the Bowell has been tested upon this point, but if it should be I should judge it would stand the test with credit. 

VII Both ensure absolute safety to the men while coupling the cars.

The objections to these couplers are: I. They will not couple with other automatic couplers. II. They will couple with the common link and pin draw-head only when the heights of the two draw-heads are approximately equal. This objection is not true for the Bowell, but is for the Bowell, although the difference in height of the two draw-heads may be greater than would seem
probable because the distance from the pin in the end of the knuckle to the face being smaller than in the ordinary draw-head, the link can move through a greater angle. Also the coupling can be made only from one side. III The weak points in the Bowel are its movable head and the spring attachment to the stay which keeps the head from swinging back when the cars are coupled.

IV Cost. The cost of applying an automatic coupler to cars is without doubt one of the greatest objections to their adoption by the rail road companies. The cost of applying the Janney to a car will depend upon the kind of car it is to be applied to, i.e. the amount of changes which will have to be made in the draft rigging. The cost of the coupler itself will be considerable on account of there being so many pieces and the
greater the number of parts, the probability is, the greater will be the expense of keeping the couplers in repair. As the Corwell has a less number of parts than the Janney and can be applied to cars without any change of timbers it is evident it will cost less to fit a car with it. It is for this reason perhaps more than any other that rail road companies prefer the Corwell to the Janney.

The United States Coupler.

Description. - This coupler is of the second class. It has a loose link and a fixed pin. The draw-bar is one solid casting and weighs about 175 lbs. The mouth of the draw-bar is of a form which enables it to self couple with draw-base having a difference in height of 6 inches. The link is of the usual size and one smaller than the standard can be used.
The pin is of drop-forged steel and is made with a flange on the front side which prevents its turning and increases its strength. The pin passes through the draw-bar the same as in the common draw-bar. A dog (a fig 2 plate 3) is bolted to the flange of the pin and hangs in front of its foot resting on the inclined plane of the draw-bar. This prevents the pin from being detached from the draw-head.

Coupling.—In coupling the link enters the mouth of the draw-bar, (b, fig 2 plate 3) pushes against the dog a, which raises the pin c, which then drops through the link into its place and the coupling is made. In uncoupling the pin is fixed to a lever which is worked either from the top or side of the car.
The James Coupler.

Description.—The James coupler is also of the second class. It has a keyed link and a fixed pin. It consists of the draw-head B, fig. 1, plate 4, made of malleable iron, to which is attached the coupling link B, having on its lower side, a sort of lug, which engages in the link of the other car. The rear end of the link or the uncoupler, B, is weighted and thus keeps the link always in a horizontal position. The link rests in a slot a, in the draw-head which allows the coupler to recede with-in the draw-heads, when it comes in contact with obtrusive obstacles, thereby giving protection to the couplers.

Coupling.—In coupling with a car also fitted with the James coupling, one link, no matter which,
will press the inclined front of the hook b. Thus raising the hook until its end slips over that of the link, when the coupling will be completed. To uncouple lift the rear ends of both links, and thus cause the other ends to be depressed. This can be done from the side of the car by means of levers suitably arranged. This coupling will also couple automatically with most of the ordinary draw-heel couplers and can be uncoupled without going between the cars.

Advantages: The United States and the Bowes couplers possess all the good qualities of the Jumney and the Bowell couplers and in addition they will couple automatically to a limited extent with other automatic couplers. II They are strong and simple, and have no springs or complicated
Joints to get out of order.

III Cost. They do not require any change into the draw-timbers of a car. The cost of fitting up a car with the tones coupler is from $12.00 to $15.00. For the United States coupler it is for two draw-bars $7.00 and two pins complete with dog $6.00 making a total cost of $13.00. This is about twice the cost of fitting up a car with the common draw-bar.

Of these two couplers the New England railroads show a preference for the tones. There seems to be no especial reason for this preference unless it is thought that the method of fastening the dog to the pin in the United States coupler is weak. Of the two couplers reviewed, the Gowen and the tones are perhaps the best, and of these two the tendency seems to be towards adopting the tones coupler.
as with it is obtained safety to the men, despatch in the process of coupling and uncoupling, and certainty of action. It consists of few working parts and these are not liable to derangement in the ordinary working of rail road cars.

Finis.