ALL STEEL PASSENGER SERVICE CARS.

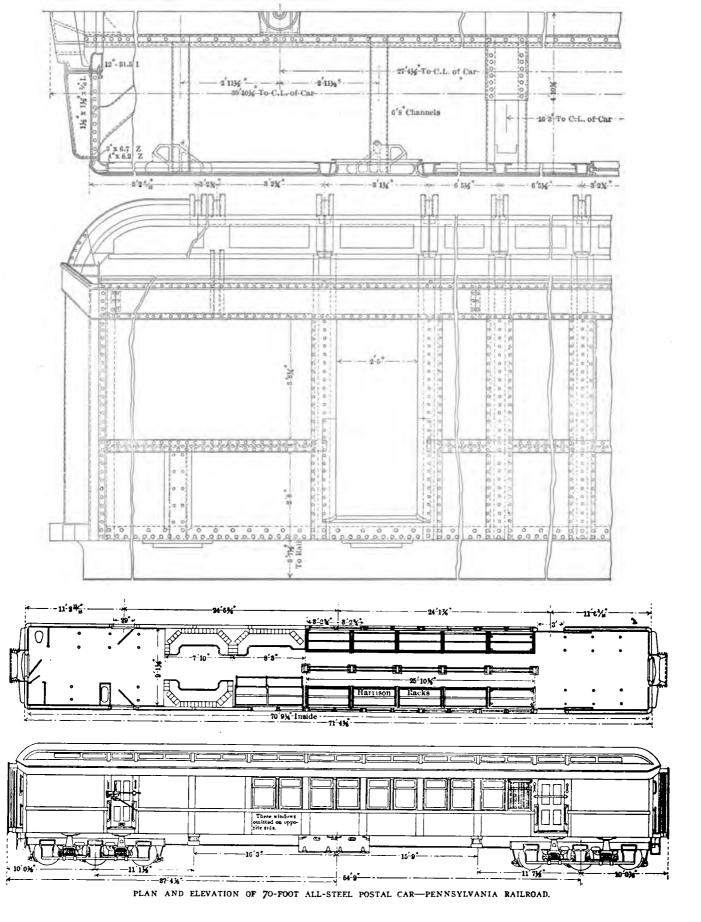
PENNSYLVANIA RAILROAD.

POSTAL CAR.

These cars, which follow very closely the general principles used in the passenger coach, were briefly described and illustrated

on page 136 of the April issue of this journal. At that time, however, drawings were not available and the description of the general structure will be repeated. Reference should be made to the previous article for views of the exterior and interior of the car and of its framing.

These cars are 70 ft. long, inside measurement, or 10 ft. longer than the present standard postal car. This extra length is used



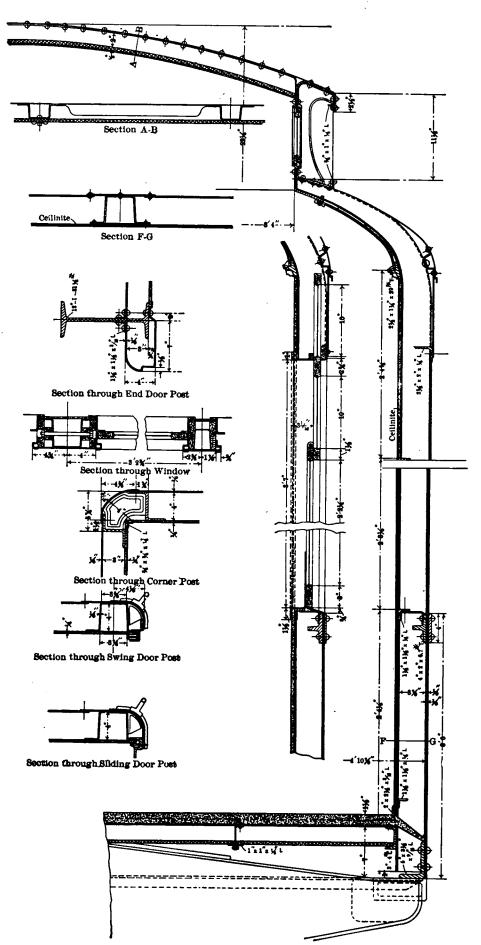
for storage space, thus giving the car a storage space at either end and placing the sorting and distributing sections in the center.

The underframe, which is practically identical with the 70-ft, passenger coach, with the exception of the modifications necessary on account of the omission of the vestibule and side steps, consists of two 18-in. I-beams, with 1/2-in. cover plates top and bottom, thus forming a box girder center sill which is set at a height above the rail permitting the draft gear to be enclosed in the girder and eliminaing the necessity of auxiliary draft sills. The whole weight of the car is carried on the center sills, being transferred to them by the end sills and by two cross bearers which are placed about 19 ft. from the end sills and about 32 ft. apart. These are made up of pressed steel shapes, with cover plates top and bottom. No body bolsters are required in this design and the center plate is fastened directly to the center sills and the side bearings to the side sills.

The superstructure is the same as that used on the passenger coaches with the exception that the belt rail is a flat bar instead of a formed section and is reinforced with a T-section between the posts. The end structure also differs somewhat from the passenger coach and is provided with two 12-in. I-beam door posts set with the web parallel to the sides of the car and securely fastened to the end sills and the end plate in such a manner as to make it practically impossible for the superstructure to be swept from its underframe by the adjoining car in the event of a collision. The side posts are of sheet steel pressed in channel section with the edges flanged out to connect with the side sheathing, thus forming a box girder structure. The side posts are narrowed down and bent inward at the top, forming the lower deck carlins. They are connected at the upper ends to the combined deck sill and plate formed of a sheet steel member pressed into a special channel section. The openings for the deck windows are cut in the web of this member, which is reinforced by malleable iron posts of special design between the window openings. upper deck carlins are of a structure similar to the side posts, being secured to the upper flange of the deck plate.

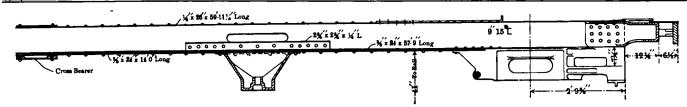
The side and roof sheathing is of steel plates, the roof being 3/32 in. thick and the side 1/8 in. in thickness. The inside sheathing below the eaves is of 1/16-in. steel plate to the unexposed face of which is cemented 3/16-in. asbestos.

All of the interior furniture is of steel, and conforms to the regulations of the post-office department. The letter cases



SECTIONAL ELEVATION AND DETAILS OF FRAMING-70-POOT ALL-STEEL POSTAL CAR.

are built up of steel plates and wire and the larger cases are car contains but 370 lbs. of wood, is lighted by electricity and made of 1/16-in. sheet steel reinforced with angle irons. This heated by steam. It weighs 128,000 lbs.



CENTER SILL CONSTRUCTION-ALL-STEEL SUBURBAN CAR.

SUBURBAN CAR.

The general structure of this car is the same as for the heavier type of equipment, but the car is lower, shorter, and the space allowed each passenger is less than in the larger cars.

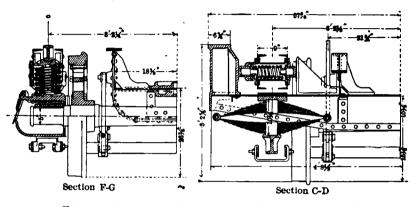
The underframe differs from the heavier equipment principally in the center sills, which in this case are formed of two 9-in, channels with a single 1/4-in. cover plate on top and two 3/8-in. cover plates on the bottom. This arrangement is neces-

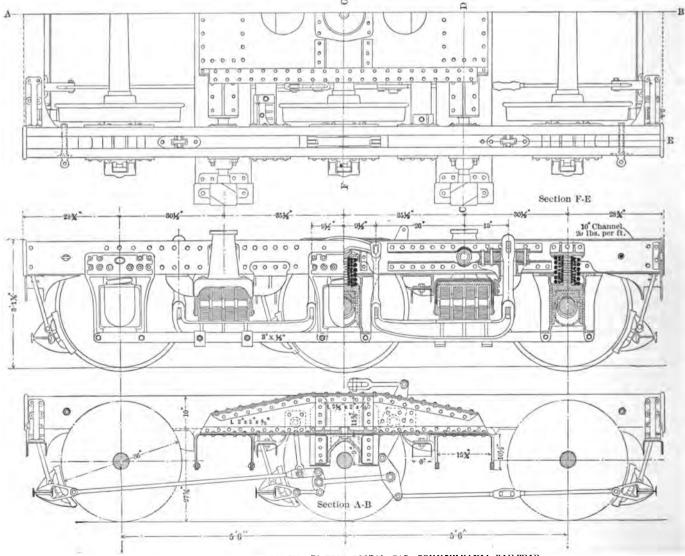
sary in order to provide room for the motors on motor trucks, which may be used under these cars on electrified sections of the road. This construction makes it necessary to use auxiliary draft sills on these cars, the arrangement of which is shown in one of the illustrations. The center plate is of a special form adapted to reach the same trucks used under the heavier equipment. The upper structure of these cars corresponds very closely with the 70-ft. passenger coach.

SIX-WHEEL TRUCK.

The six-wheel truck which is used under the baggage and postal cars is designed along the same lines as were used in the four-wheel truck previously described.

The very deep center sills used on this equipment give the truck center plate but little clearance with the center axle of the truck and much care in designing was required in order to secure sufficient strength. The design adopted, as is clearly shown in the illustration of the truck, consists of built up steel girders resting on the two truck bolsters and carrying between them in the center a short connecting girder, for carrying the center plate, which is built up in channel shape with the lower





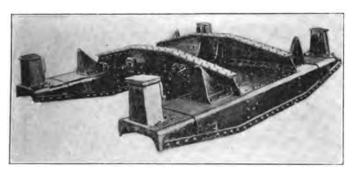
SIX-WHEEL ALL-STEEL TRUCK-70-FOOT POSTAL CAR, PENNSYLVANIA RAILROAD.

flanges spanning the center axle. A heavy horizontal steel plate binds and stiffens this whole, structure as is shown in the illustrations. The two truck bolsters are of the same design used on the four-wheel truck and rest on sixteen elliptical springs, four at each end of each bolster. The wheel pieces consist of two 10in. channels and are spaced and secured by four cross bars of a special pressed steel shape, being dropped down in the center to clear the center sills. The weight is transferred directly to the journals of the outer two wheels through the wheel pieces

SIX-WHEEL TRUCK, STEEL POSTAL CAR—PENNSYLVANIA RAILROAD.

and the nests of coiled springs on each box in the same manner as for the four-wheel truck. The center wheel, however, receives its load through similar coiled springs, the spring cap of which is connected through a short equalizer by hangers to the 2: I equalizers on which the bolster springs rest. The shorter arm of these equalizers is connected directly to the wheel piece. In this manner each journal box receives 1/6 of the total weight brought to the truck.

The bolsters have a spring centering device of the same type

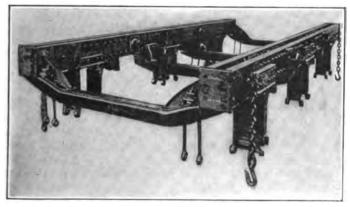


DOUBLE TRUCK BOLSTER-SIX-WHEEL TRUCK.

as used on the four-wheel truck and carry side bearings at their outer ends in a similar manner. This truck requires the use of brake beams, the connections to which, however, are made very close to the brake head instead of at the center as is usually done.

COUPLER AND DRAW BAR.

A special design of spring centering draw bar and coupler head has been applied to these cars. This will permit an 8-in. lateral motion of the draw bar on either side of the center with-



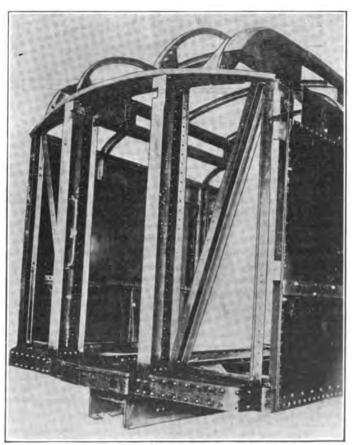
FRAME-SIX-WHEEL TRUCK.

out binding. The details of the design are shown in one of the illustrations. It will be seen that the draw bar is pivoted to the yoke at its inner end and to the coupler at its outer end. The socket in the coupler head in which the draw bar enters is broad enough to allow considerable radial movement of the coupler head. Within this socket pivoted around the same pin are two levers, the outer ends of which extend back and rest on a bear-

ing fastened to the webs of the center sills. These two ends are held apart and against their bearing by a large helical spring. Both levers have another arm extending back and bearing on the opposite sides of a pin in the draw bar which is shown just within the ends of the center sills.

The operation of the device is such that a movement of the draw bar as a whole operates through the pin just mentioned to one of the levers and the motion is then transferred to and resisted by the helical spring. The motion of the coupler head in rotating about its pivot is also transferred to these levers by the sides of the cavity in the head coming into contact with the lever and moving it against the resistance of the spring. Thus one spring acts as a centering device for both the draw bar and the coupler head.

To prevent trouble with the uncoupling connections when so large an amount of motion is provided for, they have been carried back to a bell crank pivoted around the inner draw bar pivot and by a series of bell cranks and rods, connection is made to the head and the uncoupling shaft from this point. The steam and air pipes are also connected so as to allow a certain amount of lateral motion and prevent interference with the coupler. They are connected, as is shown in the illustration, by a cast steel yoke having a bearing in lugs secured to the center sills and spanning the draw bar. Helical springs are arranged to keep this



BODY END FRAMING-70-FOOT STEEL POSTAL CAR.

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yoke central except when the draw bar has moved a certain definite amount and strikes the yoke carrying it along against the resistance of the springs.

A UNIT OF COMPARISON.*

By GEO. G. YOEMANS. †

One of the gravest difficulties which confronts anyone who is attempting to exercise a general supervision over the supply department of a railroad, and to direct its operations without being intimately connected with the details of daily routine, is to determine definitely, and within reasonable limits, whether or not the total amount of supplies carried in stock is greater than it should necessarily be.

In other words, whether the interest charge on the money invested in supplies is warranted expense—and whether or not any portion of the amount so invested could be profitably released and diverted into other channels, where it would bring larger returns, without detriment to the service.

With the best intentions in the world the storekeeper is in

the unfortunate position of being thrown in constant contact with those officials whose interests demand that there should always be "plenty" of everything available at a moment's notice, and while one of the fundamental duties of the position is to see that all reasonable demands of this nature are fully met, the daily surroundings of the storekeeper lead him to be on the safe side, and to frequently have more than "a plenty."

The measure of efficiency in this respect would naturally be the average amount of material carried in stock per something—PER WHAT? Copies of the annual reports of 33 different railroads in all sec-

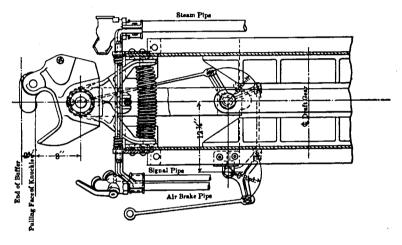
Tested by this unit it is surprising to see what a wide variation exists among the leading railroads of the country in this respect, and while a portion of it is undoubtedly due to dis-

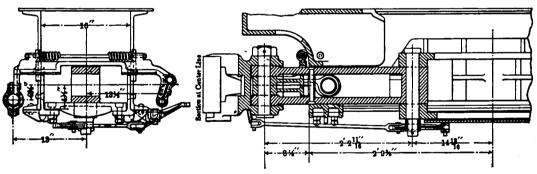
cumstances behind which the supply agent may take refuge.

respect, and while a portion of it is undoubtedly due to discrepancies of accounting, more is undoubtedly due to the degree of organization, methods, and efficiency which have been reached by the department in charge of this important branch of the

service

The total amount of money invested in material on the thirty-three roads under consideration is over one hundred and four millions of dollars. As between the two roads which, tested by this method, show the best and the poorest performance, the latter company, if its stock of material could be reduced to the same relative basis as that shown by the former, would be able to release over nine millions of dollars; and if its stock of material was reduced only to the average amount per unit shown as carried in stock by all of these lines, it would still be able to release over six millions of the money it now has so invested, the interest on which is in the nature of a fixed charge against its operation. If the total stock reported on hand by all of the thirty-three railroads could be reduced to the basis





RADIAL COUPLER AND DRAWBAR-PENNSYLVANIA RAILROAD ALL-STEEL CARS.

tions of the country were obtained and a number of theories were considered and tested out in an attempt to reach a satisfactory conclusion, but in every instance we seem forced to the opinion that the only measure, which may be considered as approximately meeting all conditions, is the measure of work performed; namely the total number of tons moved one mile, and the total number of passengers carried one mile, added together; and that the percentage which the average amount of stock carried bears to the sum of these two factors expressed for convenience in "10,000 ton and passenger miles" may be considered as a guide to the amount of material necessary to be carried in stock, to meet the requirements of every-day operation.

The efficiency of the department must be judged upon the basis of the amount of miscellaneous stock material such as is commonly used in the ordinary every-day operations of the road and there should be no shelter of "extraordinary cir-

on. † Assistant to the President, Wabash Railroad. of the best performance over sixty millions of dollars would be made available for other uses.

These are startling figures. I do not claim that they accurately represent actual conditions, but I do claim that they clearly point to conditions that actually do exist. Allow, if you please, fifty per cent. of these amounts for discrepancies in the accounting methods on which this comparison is based, and the remainder is of sufficient importance to awaken the interest of managing officials. Don't make the mistake of thinking that this is a little thing. Every hundred dollars intelligently released from unnecessary duty adds at least four dollars to the net income of the company at the end of the year, and the figures I have given indicate the number of times by which it may be possible to multiply that hundred dollars perhaps in your own department.

The Pennsylvania Railroad has 45,496 shareholders, the average number of shares held by each being 137.



^{*} Extracts from a paper read before the Railway Storekeepers' Associa-