ary two flue boiler, was in keeping with the condition of the engine. The front had a desire to part company with the rest of the boiler, but was prevented from doing so by two posts propped against it. Water was dripping from the gauge cocks and from under the soft patches on different parts of the boiler. The steam gauge was in such a condition that I could see no figures on it. A place in the delivery pipe from the pump had evidently been cracked, and was repaired with a piece of leather bound on with rope, and every stroke of the pump served to increase the general dampness of the place.

"The engineer, having finished the whip, and the log being nearly set, came over to the engine, and while squirting oil over it, we engaged in a general conversation. Presently I remarked that he had been in charge there a long time. 'Yes,' said he, 'I have been here twelve years, and I know every joint in this machine (I did not doubt that, for every joint was speaking for itself.) Yes, sir, for twelve years I have stood at that throttle. In fact, I have worn out three throttles on her, so you can judge how much I have pulled it. Turning to the boy he said: "Whoop her up, Jim, they have got an old butt cut on there and we'll need more gas."

"'How much steam do you usually carry?" I asked.

"Well, about eighty pounds. I don't know exactly, for the gauge ain't as good as it used to be. We had a little fire here two years ago that burned it some, so you can't see the figures, but I put that big black mark on it where the eighty was, and I tell Jim to keep her up to that.

"'Don't you fear that she will let go some time?' I asked.

"'Oh, no, a boiler can't bust if you keep plenty of water in it, and I always see that Jim keeps two gauges in her.'

"'Well, I suppose living out here, where you see so few people, you must read a good deal; do you take any mechanical or engineer papers?'

"'No, sir, no. I got no use for book learning. I believe in learning everything by experience. Experience is the best teacher in the world, sir. That is where I got mine, and I don't take a back seat for any of 'em. Book learning is for them soft fingered kind that's got gall enough to make some city man thinks he needs a fine-haired man to stand in his high-toned engine room and do nothing but boss the men that do the dirty work. No, sir, I don't want no books in mine.'

"The sawyer now gives the signal for more speed, and telling Jim again to 'Whoop her up!' he pulls the throttle with a jerk, and the engine, giving a loud groan at such treatment, gets away at a speed that sends the saw flying into the log, and the bystanders looking admirably on exclaim: 'My, don't she hum!'

"When the cut is finished with steam cut down at least thirty pounds, and the speed of the engine to less than half of the starting speed, the engineer turns to me and says: 'That's the way we do it here. You can't learn that out of books, now, can you?' I sorrowfully answer no, and bidding him good-bye I turn to pursue my benighted way. People there speak of him admiringly as the engineer. By courtesy we also call him the engineer. Stationary he is as regards the years in which he has stood by this his only engine, and stationary he is and always will be in his ideas. Is he an engineer or not? Echo answers, Not."

NINETY MILES AN HOUR BY RAIL.

Recently we gave accounts of three very remarkable runs. The Philadelphia & Reading run was made with one of the class "D" 33 engines with four $68\frac{1}{2}$ inch driving wheels, the total train load being about 169 tons. The fastest time made was $90\frac{1}{2}$ miles per hour for about one mile, on a level immediately following a descending grade of 37 feet per mile. The fast run on the New York Central, with a Schenectady engine, was more difficult, owing to the long time and distance from start to final stop. In that run $436\frac{1}{2}$ miles was made in an actual running time of 425 minutes and 14 seconds, giving an average speed, excluding stops, of 61·56 miles per hour.

The maximum speed between stations on the Central run is unknown. It is said that the fastest mile was made in 47 seconds, or at the rate of 76·6 miles per hour. It is to be regretted that in such cases as this, and the fast run on the Reading, a speed recorder was not used on the engine or one of the cars. An analysis of a diagram made by a recorder on these runs would have permitted an extremely satisfactory investigation to be made of the detail of the velocities and rates of acceleration and retardation. Such a diagram taken in connection with the profile of the road would solve one or two perplexing questions which inevitably arise when reports are made of fast runs. However, this much is certain: A speed of 90 miles an hour has been attained, and the possibility of it is proved beyond question. This will settle once for all the argument of those who have heretofore held that speeds above 70 miles an hour were not only impracticable, but impossible, in spite of the fact that trains run short distances at over 70 miles an hour every day in the year. While there are conditions which would prevent the common adoption of a 90 mile an hour speed, yet it is possible to so improve the permanent way and the coupled locomotive as to make such a speed perfectly feasible.

It will be noted that this fast time was made with locomotives having parallel rods, and as this is essentially a feature of American locomotives, it would appear that our engines are well adapted for high speeds, and we shall not be compelled to resort in the future to single pairs of drivers with the necessary loss of traction. Our locomotives stand to-day as the most powerful in the world, as the most economical under equal conditions, and last, but not least, capable of making the highest maximum and average speed. These two instances of high velocities were not with light train loads; the loads were not equal to our heavy passenger traffic loads, but compared to English and foreign train loads for high speed they are certainly not to be termed "light loads." The New York Central train weighed about 230 tons; the Reading train weighed about 169 tons.

During the past two years we have reviewed at different times some of the necessary changes that must be made in locomotives to adapt them for extremely high speed. Of all of these changes the most important ones are in the counterbalances and reci-