

**Electric Locomotives That Are Still Larger and More Powerful**

By William H. Easton

THE main reason why electricity is superior to steam for operating railroads lies in the fact that much more power can be applied to a train when electricity is used than is possible with steam operation.

The limit in the size of the steam engine—which is restricted mainly by clearances—has been reached at around 3,000 horse-power, but much more powerful electric locomotives have already been built and their maximum capacity is not yet in sight. Indeed there is no reason why as high as 50,000 h.p. cannot be used for train operation when electricity is used. With more power per train, heavier trains can be operated at higher speeds and thus the traffic capacity of a given railroad can be greatly increased without a proportionate increase in expenses.

The tendency is, therefore, towards larger and larger electric locomotives. For some time past, almost every year has seen "the largest locomotive in the world" produced and it is probable that this pace will be kept up for some time to come. But this means progress and is the best of evidence that the railroads have no intention of standing still.

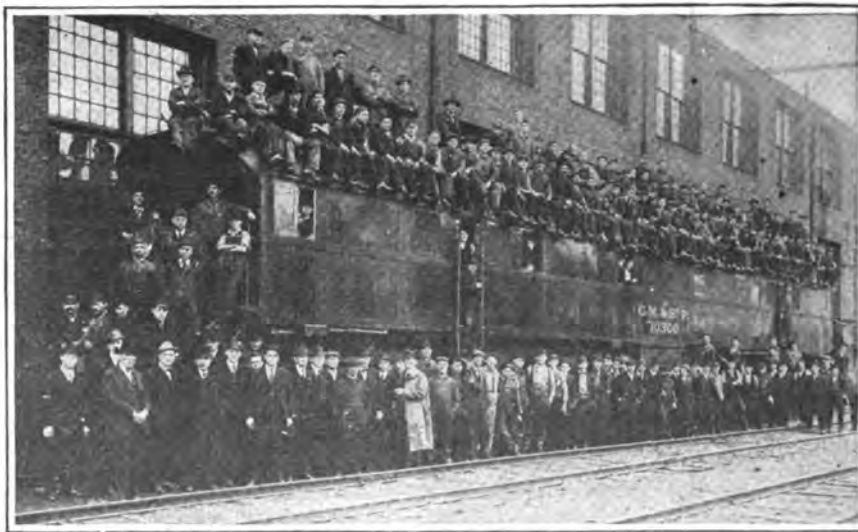
The present holder of the power championship for passenger locomotives is a type being built by the Baldwin Locomotive Works and the Westinghouse Electric and Manufacturing Company, for the Chicago, Milwaukee and St. Paul Railroad.

As most railroad men are aware, this railroad has recently extended its electrification, and in addition to the famous division over the Continental Divide, it is now using electricity to handle traffic over the Cascade Mountains, from a point near Seattle to Othello, Washington. This extension has necessitated additional electrical equipment of which the new locomotives form a part. Ten are being constructed altogether, and one was recently delivered to the railroad and at present writing is being tried out.

The most striking feature of this new type of locomotive is its great length. It consists of two duplicate Pacific type running gears, placed back to back and covered by a single cab, the over-all length being just under ninety feet. It is therefore, undoubtedly the longest, and in many respects the most remarkable looking thing on wheels. One would think that so long an affair would have trouble in going around sharp curves, but each of its several trucks is independent and takes care of itself so that there is no difficulty in this respect. In fact, those who have ridden on this locomotive, especially commend its easy riding qualities and have nicknamed it the "Pullman locomotive."

There are twelve drivers altogether, each 68 inches in diameter, driven through gears by six electric motors. These motors can develop a total of 4,200 horse-power for one hour and a normal starting drawbar pull of 100,000 pounds, though this pull can be increased up to the point of wheel slippage without injury to the electrical apparatus. The total weight of the locomotive is 275 tons, and weight on drivers 336,000 pounds.

The speed of the locomotive, when hauling a heavy all steel Pullman train, is 56 miles an hour on level tracks and 20 miles an hour up the steep grades. On the down grades, regenerative braking is used in which the engineer controls the speed by merely changing electrical connections, without the use of air except to make full stops. A control station for the engineer is located at each end of the cab, with an aisle connecting the two. This particular type of locomotive will be used on the original Continental Divide section and the present locomotives will be re-gearred for freight service. A different type is being constructed for use on the Cascade Section where the curves, grades and loads are such as to impose different requirements.



At the present writing this electric locomotive is the world's largest, but for how long will it remain so?

**Starting from Cold on Alcohol**

THE problem of starting internal combustion engines from cold on alcohol has been solved by Ralph McKay in experimental work for the Australian Institute of Science and Industry. The compression was reduced by controlling the admission of air and it was found that the engine fired regularly with pres-

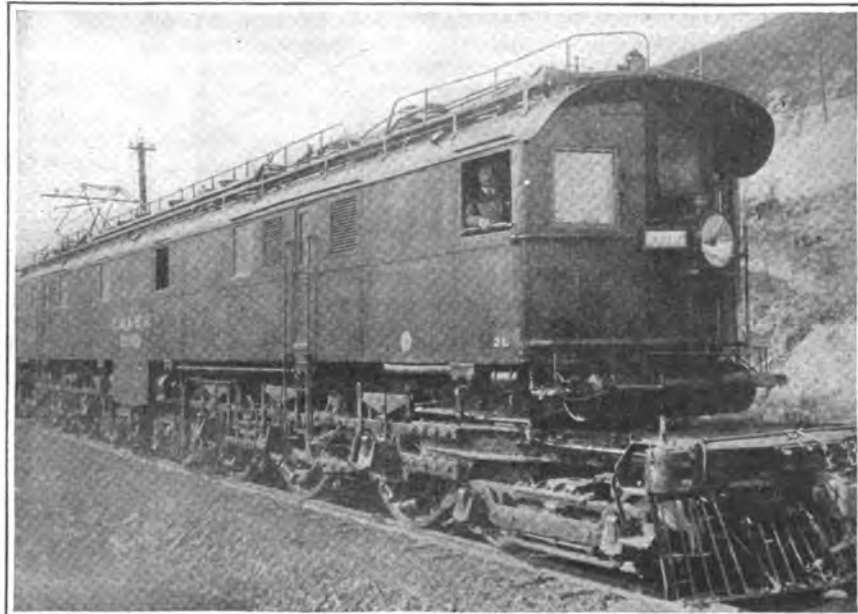
aroused considerable interest because of the unusual character of the phenomena mentioned. The one which led to the writing of this article I will let Mr. Flint describe in his own words: "As the subject selected offered considerable range in the gradations in the greens, it was decided to make two exposures, one with and the other without a ray-filter; in each case employing double-coated orthochromatic plates. After developing and fixing, the first surprise came, when, after the plates had been allowed to soak in the washing-sink for about an hour, it was found that the upper film of one of them had separated from the lower one and was curled up in another corner by itself. Further investigation disclosed a faint image remaining on the lower film which still adhered to the plate. Efforts to develop this image by intensification and sepia-touching were unavailing. On examination, the top film was found to be in good condition, whereupon an old plate, size 12 x 16.5 cm., was stripped, the film carefully floated upon it and allowed to dry horizontally. When dry, it had firmly attached itself to the plate, but altered its dimensions—having stretched from 6.5 x 9 cm. to 8.2 x 11.4 cm.—without any appreciable evidence of distortion. Thus we have at hand a method of enlarging not advocated in books."

Mr. Flint's interesting experience led me to investigate this matter of obtaining an enlargement by the removal or stripping of the emulsion from the plate. Apparently, Mr. Flint was under the impression that he had unearthed something new; and others more experienced than he, were of the same

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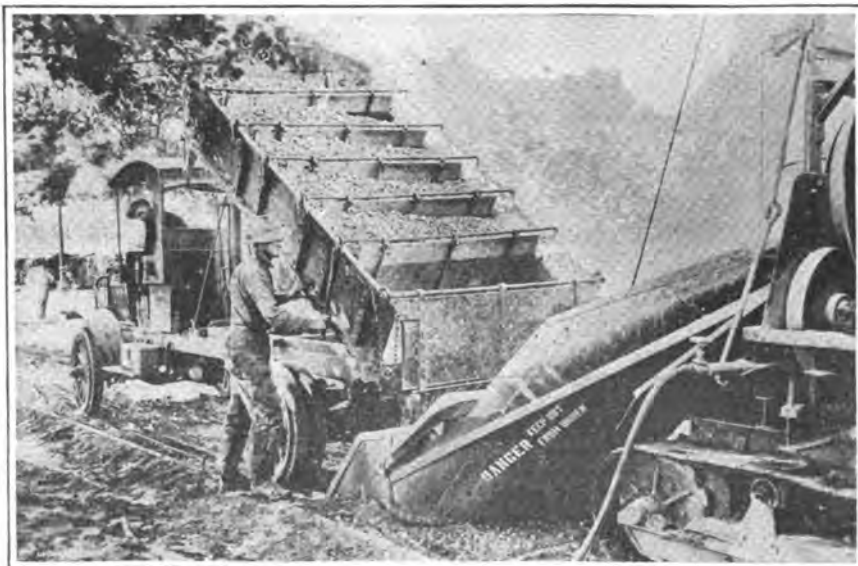
**The Mathematical Motor Truck**

AN ingenious scheme for facilitating the mixing of concrete is seen in the motor truck illustrated herewith, which has its body divided into compartments, each of a capacity exactly accommodated to the charge of stone, or sand, or mixed stone and sand, which the mixer requires for a single filling. In operation the truck is run under the bin and the material run into it by a chute—and of course, no measuring of any sort is necessary, the compartments of the truck automatically attending to that, regulating the whole load and dividing it into exact fractions by the mere process of being filled. Then the truck is run to the mixer on the job, backed up to it, and hoisted into dumping position. The rear compartment is emptied into the mixer by releasing the tailboard; and when the charge has been manufactured into concrete, the next one is delivered by dropping the partition between the rearmost two compartments, just as the tailboard was dropped. In this way the process continues until the entire load of the truck has been delivered and converted into concrete; and all hand dumping and measuring is eliminated.



This 275-ton electric locomotive hauls through trains over the Great Divide

ures of from 35 down to 25 pounds per square inch. With a leather disk, punctured to allow enough air to be drawn to provide the correct mixture, placed over the air intake on the carburetor a 25 horse-power car was started without difficulty on methylated spirit. Another engine was started from cold without fail on the first attempt on 70 consecutive mornings.



The truck body that delivers to the concrete mixer just the amount of material required for one charge

**Photo Enlargements by Expansion of Negative Emulsion**

By A. H. Beardsley

WHEN the average amateur photographer obtains an unusually good picture he likes to have an enlargement of it. He may do the enlarging himself or he may take the negative to a photo-finisher. If he does the work himself, he may use one of the convenient daylight-enlargers or he may employ one of the many excellent electric enlarging outfits. In either case, the process is simple and the directions so explicit that there is little likelihood of failure. A recent unusual experience of an amateur photographer brought to light a remarkable though unreliable method of enlarging which was in vogue many years ago and which is of interest and value today by way of contrast to our present methods.

In the January issue of *Photo-Era Magazine* there appeared an article, "A Photographic Gamble" by L. B. Flint, an amateur photographer. This article has

aroused considerable interest because of the unusual character of the phenomena mentioned. The one which led to the writing of this article I will let Mr. Flint describe in his own words: "As the subject selected offered considerable range in the gradations in the greens, it was decided to make two exposures, one with and the other without a ray-filter; in each case employing double-coated orthochromatic plates. After developing and fixing, the first surprise came, when, after the plates had been allowed to soak in the washing-sink for about an hour, it was found that the upper film of one of them had separated from the lower one and was curled up in another corner by itself. Further investigation disclosed a faint image remaining on the lower film which still adhered to the plate. Efforts to develop this image by intensification and sepia-touching were unavailing. On examination, the top film was found to be in good condition, whereupon an old plate, size 12 x 16.5 cm., was stripped, the film carefully floated upon it and allowed to dry horizontally. When dry, it had firmly attached itself to the plate, but altered its dimensions—having stretched from 6.5 x 9 cm. to 8.2 x 11.4 cm.—without any appreciable evidence of distortion. Thus we have at hand a method of enlarging not advocated in books."

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