

I.—THE LOWER FRAMEWORK IN POSITION AT THE END OF THE FIRST HOUR.

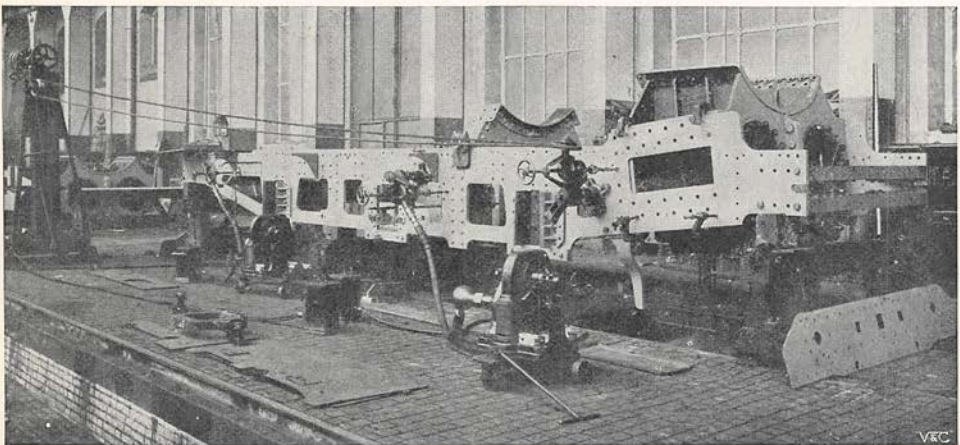
## A FEAT IN RAPID ENGINE-BUILDING.

BY H. C. FYFE.

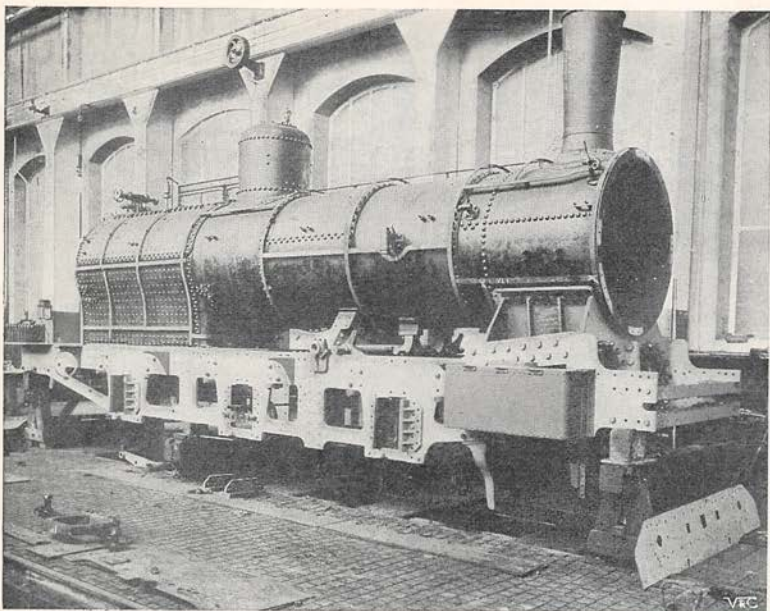
**T**HERE are occasionally to be read in the newspapers accounts of engineering feats being executed in wonderfully short periods of time, and their perusal never fails to excite admiration for the ingenuity and resource of the modern up-to-date engineer. As a rule, it is usually in replacing an old bridge by a new one that such celerity is displayed, and in the annals of several of our railway companies one may read of rapid bridge-replacing feats; but our concern, for the moment, is with the

putting together of locomotives in the shortest possible space of time, and I venture to think that the photographs which illustrate this article will be found of great interest as illustrations of the various stages in the rapid mounting of a French locomotive.

The feat dealt with here differs in a great measure from all those of the kind previously executed. The London and North-Western Railway Company, the Great Eastern Railway Company, and the Pennsylvania Railroad Company have all indulged in the game of



II.—AT THE COMPLETION OF THE ELEVENTH HOUR.



III.—TWENTY-TWO HOURS OLD.

rapid engine-building; but in all these cases a large number of men were employed in the work—many more, in fact, than would be put to construct a locomotive in the ordinary course of events.

The Great Eastern Railway beat the world's record by putting an engine and tender together in nine hours and forty-seven minutes. The number of men employed in constructing the locomotive was eighty-five, including thirty-nine fitters, assisted by three boys, two smiths, and forty-four boilermakers, riveters, etc. With so many hands at work, it was not surprising that such a record should have been made.

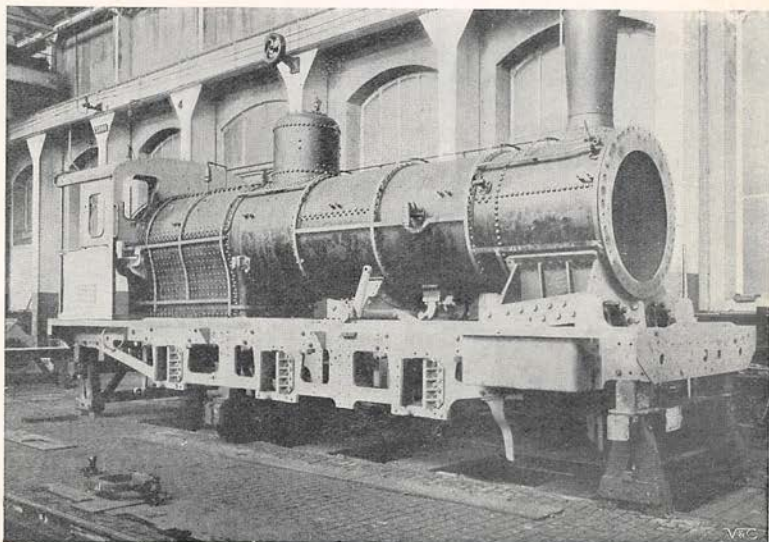
The locomotive figuring in these pages was mounted by an ordinary gang of workmen, whose daily labour lasted ten hours, and on the seventh day the engine was put on its trial trip. In its way, then, this

engineering feat is quite as wonderful as the case of the Great Eastern Railway mentioned above, and, so far as we are aware, stands alone in the annals of the railway, for no other company has undertaken the rapid mounting of locomotives without calling in the assistance of a number of extra men besides those ordinarily employed in the shop.

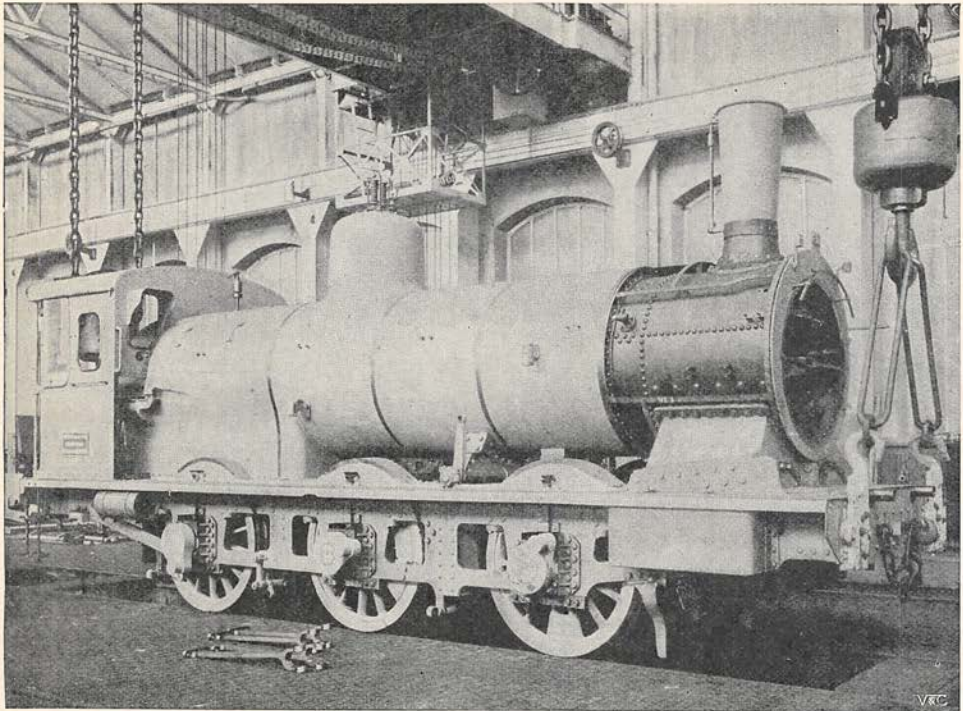
Rapid locomotive building is not much indulged in now by our own railway companies, but apparently the

case is different with the "Compagnie des Chemins de Fer de l'Est." Some little time back this company put together an engine and tender (known as No. 722) in 107 hours, and more recently another engine was mounted in sixty-six hours at the works of the company at Épernay.

It is said that these tests are of great value, not only because they allow the heads of the departments to judge of the capabilities of



IV.—THIRTY-THREE HOURS OLD.



V.—FORTY-NINE HOURS OLD.

their workmen, but also because by these means the engineers are enabled to see if it is possible to introduce improvements in the construction of the various parts of the engine with a view to its speedier fitting together.

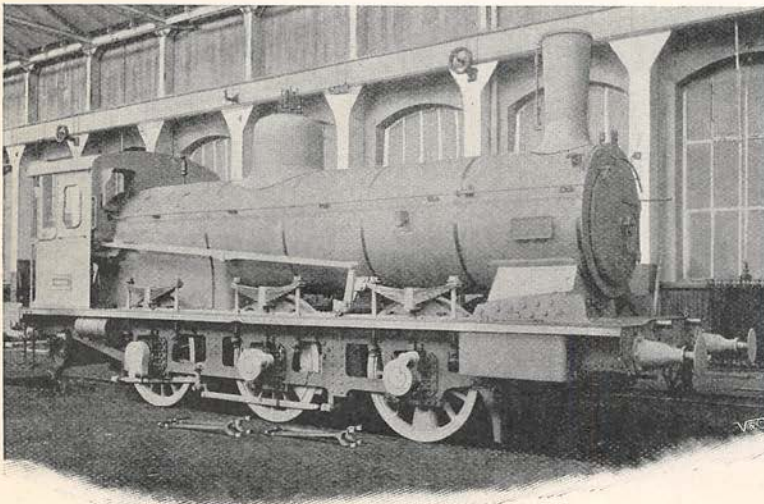
The rapid building feats to which reference has been made above proved valuable in many

ways, and led to certain important modifications in the making of the several portions of the locomotive. In order still further to improve on the work, it was determined to institute another trial, and this took place at Epernay, where are situated the works of the "Compagnie des Chemins de Fer de l'Est."

It is through the kindness of M. Ed.

Lamau, who holds the post of "L'Ingénieur Principal des Études du Matériel et de la Traction," that we are able to publish the interesting and curious photographs showing the various stages in the fitting together of the pieces of the high-speed freight "Locomotive No. 3008." The entire operation from start to finish took sixty-six hours.

The engine in question is of fairly simple construc-



VI.—FIFTY-EIGHT HOURS OLD

tion; it is fitted with three coupled wheels, without a trailing axle, its total length is thirty-two feet, it is nine feet in width outside the footboards, its weight, when empty, is 9,420 lb., and when loaded, 10,760 lb. It is provided with two sand-boxes and a Westinghouse brake. The boiler is twenty-five feet in length, with a mean diameter of four and three quarter feet. It has 272 thirteen-foot tubes. It will be unnecessary to enter into any further details, for the photographs will give the best idea of the engine, and will enable the reader to appreciate the exceedingly rapid manner in which it was put together.

The operations were superintended by M. Desbordes (*chef monteur*), who had under him his ordinary staff, composed of sixteen men—eleven *monteurs*, four apprentices, and one common workman, a “helper.” From time to time this number was supplemented by men from the other shops, but the sixteen men mentioned were employed during the whole of the work. The working day was ten hours. It will, of course, be understood that all those parts which could be finished before being fitted into their places were completed beforehand and brought to the required spot by a thirty-ton crane. The “cab,” for instance, had been made first, and all the workmen had to do was to fit it into position. The task of putting an engine together is not quite so easy a task as many might imagine, even for skilled operatives. Each man must be thoroughly competent, and know exactly what his own particular business is, and do it in the quickest time compatible with thoroughness of execution.

The first photograph shows the progress of the work at the end of the first hour. The first day's labour consisted in putting the lower framework of the engine in position, in fixing the frame plates, and mounting the cylinders.

The second picture shows how far the work had progressed at the end of the eleventh hour after the commencement of the experiment. To those who know little of the way a

locomotive is made, there may not appear to be any very great difference between this photograph and the first one, but in reality steady advance has been made.

A close inspection of No. II. shows that the drills for boring and piercing the holes have been requisitioned.

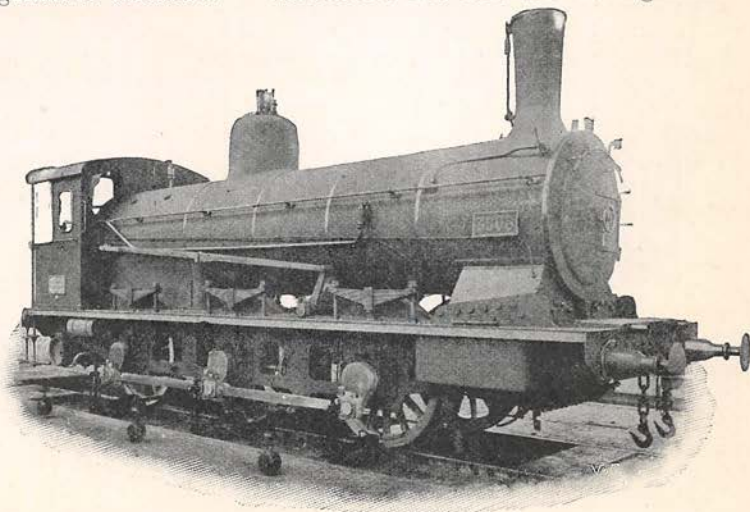
In our third illustration (taken at the end of the twenty-second hour) Locomotive No. 3008 is beginning to take definite shape. The reversing-shaft has been mounted and the supports adjusted, while the boiler has been put in its place on the frame-plates.

The state of the engine at the end of the thirty-third hour is shown in the fourth picture. The boiler is now firmly fixed on the frame-plates; the driver's “cab” has been shut up at the rear.

At the end of the forty-ninth hour No. 3008 really begins to look like a locomotive capable of drawing a train; the three sets of wheels have been attached, and the outer covering of steel has been nearly completed. After this the workmen began upon what may be termed the details—the mounting of the air-pump, the distributing movement, and the boxes upon the axle-journals.

At the end of the fifty-eighth hour the engine, to the non-technical mind, would seem to be almost complete. The outer covering is finished, and she is now resting on her wheels alone, instead of being held up, as in the former picture. Still there are some important items to be added—the connecting-rods, for instance.

The last photograph was taken at the end of the sixty-fourth hour, and two hours later Locomotive No. 3008 left the engine-sheds



VII.—FULL-GROWN AT SIXTY-FOUR HOURS.

at Épernay for a trial run on the line as far as Jalons-les-Viques. The trial passed off quite satisfactorily and no flaws were discovered in the workmanship. Although every effort was made to put the engine together in the shortest possible time, great care was taken that the work should be done as thoroughly as if no departure were being made from the ordinary routine of the shops. In order to appreciate fully the rapid engineering feat it is necessary to take note of the number of men employed. The duration of each day's work, it has been already mentioned, was ten hours. During the first day seventeen men were engaged on the work. Thus for the first day, with each of the seventeen men working for the whole ten hours, the total number of hours worked by the whole staff was 170. On the second day, and, in fact, on each day following, some extra men were

employed. The totals for the seven days' labour, according to the number of workmen engaged each day, come out as follows:—

First day	..	..	170 hours.
Second	..	..	206 "
Third	..	..	250 "
Fourth	..	..	240 "
Fifth	..	..	296 "
Six	..	..	300 "
Seventh	..	..	148 "

Grand total 1,610 hours.

Although Locomotive No. 3008 was put together forty-one hours quicker than Locomotive No. 722, the engineer in charge of the works of the "Compagnie des Chemins de Fer de l'Est," at Épernay, is not satisfied, but hopes still further to lessen the time required.

