

## TRANSFORMATION OF PHYSICAL FORCES.

One of our readers communicates to us an arrangement of the Bunsen battery by means of which he performs a very curious experiment on the transformation of physical forces. The annexed figure shows the gen-

The zinc, instead of being tubular and surrounding the porous cup, is a solid cylinder, and is suspended beneath a bell glass, which is itself fixed to a wooden cover that hermetically closes the vessel through the intermedium of wax or cement. The bell glass is closed by a rubber stopper provided with two tubulures. One of these latter gives passage to the copper rod which supports the zinc, and which serves as an electrode, while the other is provided with a tube and cock that gives exit to the hydrogen gas formed. The cock, when opened or closed, opens or closes the circuit. In effect, in the first case, the hydrogen escapes, and, in the second, having no exit, it accumulates in the bell and expels the liquid. The pile then ceases to work, as the zinc is

containing the acid are arranged alongside of the bell in the usual manner.

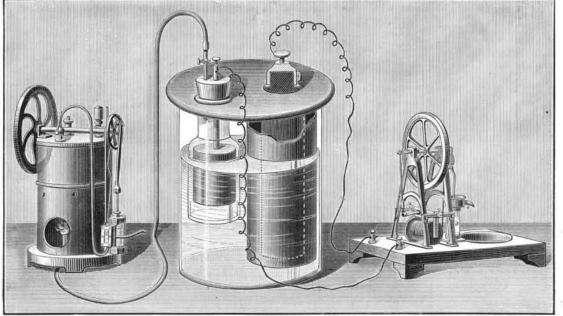
The experiment that this pile permits of performing is as follows: The metallic conductors fixed to the two poles are connected with a small electric motor, which operates as soon as a contact is established. The disengaged hydrogen is led by means of a rubber tube beneath the boiler of a small steam engine, and, when lighted, soon boils the water and sets the engine running.

We thus have at the same time a generator of heat and electricity. This is a pretty lecture experiment, and we recommend it to physicists.-La Nature.

## ESTRADE'S HIGH SPEED LOCOMOTIVE.

Our collaborator Mr. Audra has already described\* Mr. Estrade's conception of a type of railway rolling \* See SUPPLEMENT, D. 8556.

stock of a speed such as has never as yet been at- already arisen. It is to be wished that some experitained. Such conception is at length a reality, and ments shall soon be performed, either upon the lines there may now be seen in the shops of Messrs. J. Bou- of our large companies or upon those of the State. let & Co., of Paris, the locomotive and its tender en-| They will be deeply interesting and instructive. It tirely mounted and ready to operate. It is impossible does not appear doubtful that it will be possieral arrangement. The pile is constructed as follows: not to be struck by the character of grandeur and power ble to reach the high speeds of from 72 to 78



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no longer immersed. The carbon and the porous cup of this beautiful engine, with its six driving wheels, of one diameter in common of 81/4 feet, mounted upon three coupled axles.

The inventor's idea, it will be remembered, consists in generalizing the use of wheels of large diameter, in the extension, to high speeds, of the coupling of the axles of the motor, and in the adoption of a new and well studied style of double suspension.

The principal dimensions are as follows: Total length. 33 feet; width between longitudinals, 4 feet; at the moment when Mr. Crampton, the eminent diameter of the wheels, 8¼ feet; weight of engine, English engineer, improving upon the beautiful and empty, 38 tons; weight of engine, loaded, 42 tons.

We shall not now return to a theoretic discussion of the qualities of this engine. Mr. Estrade has peremptorily answered this with faith and generosity by having built, as carefully as possible, and of true size, the one-tenth size model that he had deposited in the galleries of the Conservatoire des Arts et Metiers, and concerning which quite a number of controversies have

spaces between centers of population. Were it from but this standpoint, Mr. Estrade's rolling stock would

merit being taken into serious consideration; and it is very desirable that the experiment shall be performed in France, since it is a question of a French idea, all the expenses attending the carrying out of which have been liberally defrayed by one of our compatriots. These experiments will give us new hints, and will permit of passing a definite opinion very opportunely

> effective engine to which he has given his name, is proposing a new model with three axles, of which two are to be coupled, and which are to carry wheels 63/4 feet in diameter.

miles, for which this locomo-

tive has been constructed.

The equal size of the loco-

motive wheels, and of those

of the cars, will, doubtless, in

a great measure diminish the

resistances of friction, and

It must be noted that the

fore axle of the locomotive,

although coupled with the

others, is provided with hinged grease boxes. On

properly slowing up, then, it

does not seem that it will be

impossible to turn curves of

This granted, we can appre-

ciate what peculiar services

will be rendered by rolling

stock of this kind in the India

mail service and on the great rectilinear lines of Russia,

Asia, and the New World, and

everywhere, in fact, where it

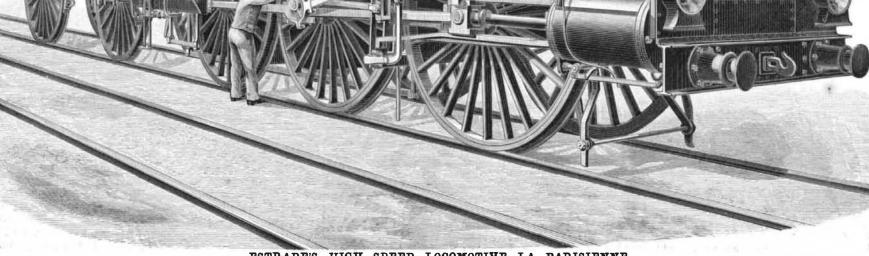
is desirable to cross with ex-

ceeding rapidity great desert

the usual radius.

permit of gaining in speed.

In Mr. Estrade's materiel, the Westinghouse brake has gained a new success, since it has been selected after a study of all the devices capable of braking these high speed trains.-Le Genie Civil.



PARISIE

ESTRADE'S HIGH SPEED LOCOMOTIVE LA PARISIENNE.

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