times their own average working weight of useful load at from 50 to 60 miles per hour is scarcely likely to have an equal even in the United States, leaving aside the question of coal economy. This is equal to saying —and any contradiction thereto would be exceedingly interesting and therefore welcome—that for a given number of thermal units expended these Italian engines pull more weight at a given speed than any other locomotive in the world. Thermal units are mentioned, and not coal quantities—than which nothing more misleading could ever be introduced in the estimate of a locomotive's fuel-value consumption, unless the caloric value of the coals actually used is reliably given.

These engines were designed for all speeds up to 82 miles per hour, but the state of Italian tracks and works prohibits more than 56½ miles per hour; but the writer has sometimes seen the tachograph recording 62 miles per hour with 400 tons on the tender drawbar; that is to say, 440 U. S. tons; or with the engine fully loaded, a gross load of over 550 U. S. tons. In freight service they pull gross loads of up to 1,030 U. S. tons.

The "Adriatic" compound system comprises four cylinders—two high-pressure on one side and two low-pressure on the opposite side of the locomotive—each pair having only one piston-valve operated by one valve-gear—Walschaert's.

With this arrangement of one valve distributing to the high-pressure and one to the low-pressure, it is possible to set the valves for different relative degrees of cut-off, according to the average velocities to be made by the locomotive. In the original Vauclain compound this was impossible. In French locomotives the engineers, although they have two sets of distributions in their hands, do not vary the relative cut-offs, once they have found the best relative points of cut-off for the four valves. Other four-cylinder locomotives require either four valve gears or else rocking-shafts; but in the "Adriatics" all this extra mechanism is avoided, and the dissymmetrical arrangement of the cylinders has not, in practice, been found to entail any inconvenience, the motion of the engine being, on the contrary, much steadier at high speeds, and in passing through curves, than any other locomotive known to the writer, including American types, which are in general such rough-riders as to bear no more comparison with the "Adriatics" than with the motion of a Pullman car. The explanation is that the "Adriatic" footplate is suspended over the long swing links of the front truck, where the shocks are completely dissipated before reaching the main frames.

LOOPING THE DOUBLE LOOP.

In the field of loop-looping which has become so immensely popular of late, professional as well as amateur wheelmen have developed an amount of zeal which is without doubt worthy of a better cause.

All of the most recent achievements, such as, for example, the ride through a loop of which a portion of the upper part has been removed, or looping a complete loop and then over a gap in the second ascent, or looping the gap without the attendant loop, are fundamentally questionable acrobatic feats, that always present more or less danger to the life of the performer.

As has already been remarked, the spectators lose interest in them more and more, and as a novelty of the season they will soon disappear from the programmes, particularly since they are too often attended with trifling and even serious accidents.

The latest novelty in this line is the invention of an ingenious wheelman of Berlin, Böttner by name, who has constructed a double loop, and happily performed the feat of passing through it on his wheel. It is most certainly the pinnacle of mad daring, and will at all events not very soon witness a rival in popular favor.

In this new loop, as we show in the cut, the performer, after he has passed through half of the large loop and with his head still down, must guide the wheel into the smaller loop and out of it again, his head being again turned toward the earth, upon the finishing arc of the larger loop. Just imagine with what velocity the performer is hurled through these two loops, and perhaps it may be possible to appreciate the stoical quietude of his nerves, his rare skill in managing his wheel, and above all the presence of mind necessary to a successful exit from the whirl.

Since the greatest possible speed is necessary to overcome the resistance offered by the two loops, the starting point is placed somewhat higher than ordinarily, and the first descent quite a little steeper; the retarding stretch is also built steeper than heretofore.

The whole performance is a ride of death in the true sense of the expression.

If this new sensation be exhibited in the Schumann circus, according to present plans, the intrepid wheelman will surely not finish without the most vociferous applause on the part of the breathlessly expectant public.

For the present Böttner has erected his double loop in an open lot in the southeastern section of Berlin, where he practises daily.—Illustrirte Zeitung.

A PHOTO-RELIEF MADE BY THE AUTOPLASTIC PROCESS.

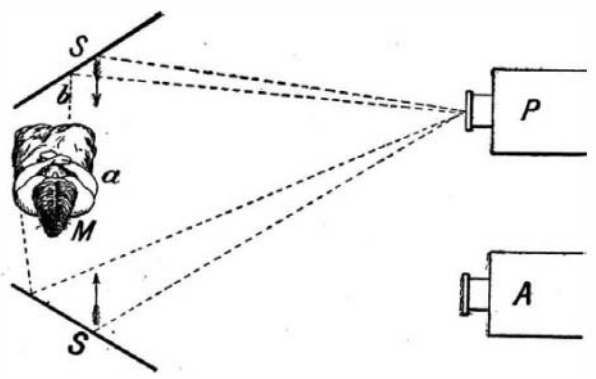

DIAGRAM SHOWING THE UNDERLYING PRINCIPLE OF THE AUTOPLASTIC PROCESS.

LOOPING THE DOUBLE LOOP.

THE AUTOPLASTIC PHOTOGRAPHIC PROCESS OF PRODUCING SCULPTURAL PORTRAITS.

BY DR. ALFRED GRADENWITZ.

Many attempts have been made to reproduce plastically the external shape of a model. The photographic camera has been used in this connection as far back as in 1861 by the Parisian sculptor Willème, by taking as many views as possible of the same object from different positions. These different views were then used in calculating the various dimensions of the model, and were translated to the molding block with the aid of a pantograph. The "photo-sculptures" produced in this way attracted, it is true, not a little attention. But the skill of the artist played a more important part in the process than the actual mechanical methods employed. In fact, in all of these methods, light alone by no means produces the plastic effect.

An interesting novel process was recently presented to the Berlin public, when Signor Carlo Baese, of Florence, delivered a lecture at the Urania. The new process necessitates only the taking of ordinary views of the object, whereupon, by means of photography, without any retouching or any correcting on the part of the artist, a relief corresponding perfectly to nature is obtained by employing the swelling property of chromium gelatine.

It has been known for some time that chromium gelatine will lose more or less its power of swelling according to the intensity of the light to which it is exposed, so that a layer of that substance, on being printed beneath a negative, will reproduce the different shades of the negative in relief. Heights of the relief upward of 1 centimeter (0.3936 inches) may thus be obtained readily, while the clearness of details is such that an artist would have the greatest difficulty in securing similar results. Attempts hitherto made to utilize this property, in connection with the production of plastic pictures, failed to give any positive results, as the principal condition, namely, the existence of a negative of a transparency proportional to the relief of the model, was not fulfilled. Mr. Carlo Baese has shown how success may be attained.

With ordinary negatives, the darkening of the plate, as need hardly be mentioned, depends on a multitude of factors other than the plasticity of the model. In the first place, the colors of the model play an important part, while the actual distribution of light is not without its influence.

In the Baese process the model is illuminated by means of a projection lamp, the light rays striking it at right angles to the direction in which the photograph is to be taken. This is insured by the arrangement represented in the diagram. *P* is the projection lamp, throwing the light on the mirrors, *SS*, the rays being reflected to the model *M*. *A* is the camera. By means of a light filter, inserted in the projection apparatus, the light is graded so that the illumination decreases in intensity gradually from the left to the right, the model being illuminated so as to have the foremost parts struck by the brightest and the back parts by the darkest portions (point *a* bright, point *b* dark).

This gradation of light, which is noted on the model rather distinctly in the direction of the arrows, is so modified by the different inclination of the surfaces on which it is distributed, as to be hardly recognizable from the photographic camera. A view obtained with a similar illumination will therefore by no means reproduce the most salient portions as the most opaque; this would, by the way, not be obtained if the model were uniformly illuminated with white light. The coloring of the model, as a matter of course, would also have its influence on the plate, so as to give values quite independent of the height of the points in question.

Now, if after the exposure of this first plate, the gradation filter in the projection lamp be inverted so as to have the most transparent portion replaced by the darkest, and *vice versa*, the luminous intensity on the model will augment from the front toward the back. After a second exposure is made with this new illumination, no further views will be necessary. The transposition of the plate and the light filters is effected automatically,