

B 14. Plate 8.

The subject of this article is a pantograph, as improved by Langlois, a mathematical instrument maker. A detailed account of this instrument may be seen in the *Machines approuvées par l'Académie des Sciences*, Vol. vii, No. 460. It is used for the purpose of tracing similar figures of any description in any relative proportions which may be required, and with any given velocities.

In the *Annales des Arts et Manufactures*, vol. v, page 59, we find the description of a machine for copying drawings and writings, which the inventor terms an Autograph. It is a modification of the Pantograph.

SECTION XV.

To convert direct motion in a given curve, and of velocity either equable, or variable by a given law, into alternate motion in a given curve, of velocity similar to that of the original motion, either equable, or variable according to a given law, and in the same, or in different planes of direction.

THE given direct motion in a curve may be converted into alternate circular motion by the methods shewn in Section VIII.; and the alternate circular motion so obtained, into an alternate motion in a given curve, by the methods shewn in Section X.

SECTION XVI.

To convert alternate rectilinear motion, of velocity either equable, or variable by a given law, into alternate rectilinear motion, of velocity similar to that of the original motion, either equable, or variable according to a given law, and in the same, or in different planes of direction.

THE given alternate rectilinear motion, may be converted into circular motion by the methods given in Section VII.; and the motion so obtained, into alternate rectilinear motion, by the subjects of the same Section.

All the movements described in Section I. will also furnish a solution of this problem.