lead a choral dance, even although the altar itself be of transparent glass or horn. Through the epipyrus a pipe is to be let down to the base of the altar, where it is to

revolve on an iron pin, the other end being passed through a tubular fitting attached to the epipyrus. And this pipe is to have other little bent pipes attached to it, and perforated so as to communicate with it, which are to radiate opposite to one another around it, and turned alternately in opposite directions. There shall likewise be a drum attached to it, upon which the figures of the dance are to he set. Then, by the action of the kindled fire, the air, being warmed, will proceed into the pipe, and, from it being driven out through the bent tubes into the base of the altar, will turn round the pipe and its drnm."

The following is probably the most excellent of all Hero’s apparatus, inasmuch as in it the action of steam produced by fire from water is employed for the pur pose of elevating a fluid above its level, and transferring it from one place to another. The design of the apparatus is still, unhappily, to serve the purposes of superstitious worship. “ The fire of an altar having been lighted, two figures of living things are to assist at the sacrifices, and the figure of a dragon is to sybillate,” (or give forth sounds to be interpreted as oracles.)

“ There is to be a hollow basis or pedestal ***λ*** *β,* (fig. 7.) upon which is set the altar y, having a tube δ ε descending to the middle of the basis, and

is there separated into three

branches; the tube ε ζ passing

to the mouth of the dragon,

the tube being carried

to the vessel « λ containing

wine, and placed at the top

of the figure*,* and accu

rately joined into its cover;

and into the third tube a » ς,

which, in like manner, as­cends into *ξ,* another vase holding wine, and is also accurately united to the top of the vase. Both ends of the two vases are to be carefully closed. There are to he in both the wine vessels

bent syphons, of which the one extremity is in the wine, and the other extremities, proceeding by an opening rendered perfectly close through the covers of the vases, are conducted to the hands of the figures officiating at the sacrifice. When, therefore, you are about to sacrifice, you must pour into the tubes a few drops lest they should be injured by heat, and attend to every joint lest it leak ; and so the heat of the fire, mingling with the water, will pass in an aerial state through these tubes to (he vases, and, pressing on the wine, make it pass through the bent syphons, until, as it flows from the hands of the living creatures, they will appear to sacrifice as the altar continues to burn, and the other tube being carried to the mouth of the dragon, will make it give forth sybilline sounds.”

There appears to be considerable reason to suppose that, to their knowledge of the mechanical powers and the elements of machinery, the Egyptians added some acquaintance with the power of steam, applied, however, only to the degraded service of superstition. The statue of Memnon is said to have emitted sounds which Pausanias compares to those produced by the snapping of the strings of a harp. Strabo expressly states that he heard them ; and Philostratus states, that when the sun shone strongly on the statue, sounds proceeded from its mouth similar to those of a stringed instrument. Hero of Alexandria in his *Pneumatics,* Salomon de Caus in his *Raisons des Forces Mouvantes,* Athanasius Kircher in his *Œdipus Egyptiacus,* and Cribellus in his *Machinosa Miracula Mem­nonis,* have all explained in different ways the mechanical arrangements by means of which effects of this kind might have been produced from the steam raised by the heat of the sun in close vessels contained in the statue, and having communication with organ pipes of different kinds.

The Romans appear to have done little for the mechanical arts, and nothing for the improvement of steam apparatus. It was not until the dawn of knowledge succeeded the darkness of the middle ages, that the light reflected from the works of Hero, and the older mechanicians, rekindled the flame of mechanical invention. The works of Archimedes and of Hero were read with great avidity, and formed some of the most popular productions of the young art of printing. The flame seems first to have been lighted in Italy, for we have editions and translations of Hero’s *Pneumatics* rapidly succeeding each other ; the Bologna edition of 1547, translated by Giov. Baptista Aleotti, was reprinted at Ferrara in 1589 ; Commandine’s translation was published in 1575, Alessandro Giorgi’s in 1592. There were other editions of less note ; and thus in a single century eight or nine editions were issued. It was not to be expected that the seeds of mechanical knowledge, so widely sown, should not falI on some rich spots of soil, where they should bring forth fruit with increase.

Giambattista della Porta was one of the ablest and