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***A HISTORY OF INVENTIONS, DISCOVERIES, AND ORIGINS*** BY JOHN BECKMANN, Professor of Economy in the University of Göttingen.

Translated From The German by William Johnston.

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## JUGGLERS, ROPE-DANCERS, AUTOMATA, ETC.

UNDER this title I comprehend not only those properly called jugglers, who, for the sake of money, by quick and artful motions of their hands, bodies, and limbs, and by various preparations, delude the senses in an agreeable manner, or practise an innocent deception on the spectators, so that they think they hear and see what they do not really hear and see, but also rope-dancers; people who place their bodies in positions according to all appearance dangerous; and those who for pay exhibit animals taught to perform uncommon tricks, as well as automata, which by their concealed construction seem to produce wonderful effects.

But is it worth while to inquire into the antiquity of all these arts, unprofitable to the public, which form the favourite amusements of the populace? The selfish question *cui bono*, which is often thrown out by way of reproach to men of letters, but oftener to naturalists, and even to jurists, when, in their researches, they advance beyond the beaten track, I might easily get rid of by civilly telling the querists to pass over this article if they think they are not likely to derive benefit from it. I might also apologise for employing my time and labour on this subject, by using the words of a certain historian: "*Frivola hæc fortassis cuipiam et nimis levia esse videantur, sed curiositas nihil recusat.*" I shall however adopt neither of these methods; as I flatter myself that this essay may afford as much amusement as many that are read daily; and that therefore it may not only be excused, but even justified.

Those arts and employments which are most necessary in life were undoubtedly the earliest, and they have still continued to be the most important; but when these were sufficiently occupied, or carried on by as many persons as could live by them, the rest, who were excluded from them, conceived the idea of amusing the former when tired with their labour, that by these means they might obtain from them a part of the fruits of their industry. I request my readers to reflect how many occupations have been devised for no other purpose. They will find that several of these have acquired



a pre-eminence over the necessary or useful arts; and to the same class belong jugglers.

All political writers tell us, as a fundamental principle of government, that population ought to be increased. This maxim however is just only under certain circumstances; that is, when employment can be procured to a greater number of inhabitants than a country already possesses. Of beggars we have to maintain too many. All our trades and occupations are not only filled up with workmen, but overflow. Our farmers can employ no more labourers, and our manufacturers no more hands than they have at present; our regiments are full; and in every employment there are more candidates and more supernumeraries than is consistent with the good of the public. Must it not therefore give us pleasure, when necessity invents new means of acquiring a livelihood, although they could be dispensed with? It is much better that those who have learned no useful art; who have lost their youth in the service of others; or who are destitute, through any other cause, should gain their bread by amusing their fellow-citizens, than that they should either beg or steal.

These arts are indeed not unprofitable, for they afford a comfortable subsistence to those who practise them; but their gain is acquired by too little labour to be hoarded up; and, in general, these roving people spend on the spot the fruits of their ingenuity; which is an additional reason why their stay in a place should be encouraged. I have however known some who saved so much from their earnings, that, in their old age, they were enabled to enter into some business more certain as well as more profitable.

People of this description will never want encouragement and support while they exhibit with confidence anything uncommon, and know how to suit the nature of their amusements to the taste of the spectators. The greater part of mankind love deception so much, that they reward liberally those who impose on their senses, as is proved by the ready sale of gilt articles, artificial gems, and a thousand other things which are not in reality what they appear to be. I do not know whether Montagne is right in considering it as a sign of the weakness of our judgement, that we take a pleasure in beholding objects on account of their rarity, novelty, or the uncertainty that attends them, though they may be subservient



to no useful purpose<sup>1</sup>. This appears to me to proceed from that innate curiosity which serves as a spur to incite us to enlarge our knowledge, and to engage in researches and undertakings that often lead to discoveries of greater importance.

Jugglers indeed seldom exhibit anything that can appear wonderful to those acquainted with natural philosophy and mathematics; but these even often find satisfaction in seeing truths already known to them applied in a new manner; and they readily embrace every opportunity of having them further illustrated by experiments. Many however are too precipitate, and attempt to explain before they have sufficiently examined, of which the golden tooth at the end of the sixteenth century, the conjuring-rod at the end of the seventeenth, and the chess-player and speaking-machine at the end of the eighteenth, may serve as instances. But it often happens, that what ignorant persons first employ, merely as a show, for amusement or deception, is afterwards ennobled by being applied to a more important purpose. The machine with which a Savoyard, by means of shadows, amused children and the populace, was by Lieberkühn converted into a solar microscope; and to give one example more, which may convince female readers, if I can hope for such, the art of making ice in summer, or in a heated oven, enables guests, much to the credit of their hostess, to cool the most expensive dishes. The Indian discovers precious stones, and the European, by polishing, gives them a lustre.

But if the arts of juggling served no other end than to amuse the most ignorant of our citizens, it is proper that they should be encouraged for the sake of those who cannot enjoy the more expensive deceptions of an opera. They answer other purposes however than that of merely amusing; they convey instruction in the most acceptable manner, and serve as a most agreeable antidote to superstition, and to that popular belief in miracles, exorcism, conjuration, sorcery, and witchcraft, from which our ancestors suffered so severely. Wherever the vulgar were astonished at the effects of shadows, electricity, mirrors, and the magnet, interested persons endeavoured by these to frighten them; and thus misapplied the powers of nature to promote their own advantage. The

<sup>1</sup> *Essais*, i. 54.



pontiffs and their clergy ought, undoubtedly, to be detested for discouraging experimental philosophy. That science they considered as a formidable enemy; and they thought they gained no small advantage when they induced the house of Medici, by granting it the cardinalship, to suppress the Academy del Cimento. When Gasner exhibited his deceptions, some one proposed to him to try his art at Berlin or Göttingen, and to drive out there if it were only the smallest of all the devils; but these cities were not theatres where he was likely to succeed, and he never ventured to appear in them<sup>1</sup>. It is however better that the populace, if they will absolutely pay for being deceived, should be exposed to a momentary deception from jugglers than to a continual deception from priests. As the former are not covered with the sacred cloak of religion, their deceptions are more easily seen through and detected; and they consequently soon cease to be hurtful. So late as the year 1601, a horse, which had been taught to perform a number of tricks, was tried, as possessed by the devil, and condemned to be burnt<sup>2</sup>. At present horses of this kind are so often exhibited publicly in the heretical countries of Europe, that the Spanish Inquisition, perhaps, will soon be ashamed of considering such proofs of the docility of these animals, and of the patient dexterity of their teachers, as the work of the devil, as they did at the above period. Those who view the art of the juggler in the same light as I do, will, I hope, forgive me for introducing these observations, and allow me to continue them while I inquire into the antiquity of this employment; especially as I shall endeavour by these means to illustrate more fully my subject.

Had that book which Celsus wrote against the Magi been

<sup>1</sup> The juggler mentioned in Xenophon requested the gods to allow him to remain only in places where there was much money and abundance of simpletons.

<sup>2</sup> *Le Siècle de Louis XIV.* Berlin, 1751, 12mo, i. p. 44. This horse was seen in the above-mentioned year by Casaubon, to whom the owner, an Englishman, discovered the whole art by which he had been trained. See *Casauboniana*, p. 56. We are assured by Jablonski, in his *Lexicon der Künste und Wissenschaften*, p. 547, that he was condemned to the flames at Lisbon. In the year 1739, a juggler in Poland was tortured till he confessed that he was a sorcerer, and without further proof he was hanged. The whole account of this circumstance may be found in the *Schlesischen gelehrten Neuigkeiten* for the year 1739.



preserved, we should have been much better acquainted with the art of the ancient conjurors or jugglers. This Celsus, without doubt, is the same author whose virulent attack against the Christians was refuted by Origen; and we have, therefore, greater cause to regret that a work on the above subject, by so learned and acute a philosopher, should have been lost. He is mentioned with respect by Lucian, and even by Origen; and the former derived from him the account which he gives of Alexander the impostor<sup>1</sup>. More ancient authors also wrote upon the same subject. Some of them are mentioned by Diogenes Laërtius in his preface; and Suidas quotes the *Magicon* of Antisthenes, though neither of these speaks of Celsus; but of all those writings none are now extant.

The deception of breathing out flames, which at present excites in a particular manner the astonishment of the ignorant, is very ancient. When the slaves in Sicily, about a century and a half before our æra, made a formidable insurrection, and avenged themselves in a cruel manner for the severities which they had suffered, there was amongst them a Syrian named Eunus<sup>2</sup>, a man of great craft and courage, who, having passed through many scenes of life, had become acquainted with a variety of arts. He pretended to have immediate communication with the gods; was the oracle and leader of his fellow-slaves; and, as is usual on such occasions, confirmed his divine mission by miracles. When, heated by enthusiasm and desirous of inspiring his followers with courage, he breathed flames or sparks among them from his mouth while he was addressing them. We are told by historians, that for this purpose he pierced a nut-shell at both ends, and, having filled it with some burning substance, put it into his mouth and breathed through it. This deception, at present, is performed much better. The juggler rolls together some flax or hemp, so as to form a ball about the size of a walnut; sets it on fire; and suffers it to burn till it is nearly consumed; he then rolls round it, while burning, some more flax; and by these means the fire may be retained in it for a long time. When he wishes to exhibit, he slips the ball unperceived into his mouth and breathes through it; which again revives the fire, so that a number of weak sparks pro-

<sup>1</sup> See *Luciani Opera*, ed. Bipont. v. pp. 388, 407.    <sup>2</sup> *Florus*, iii. 19, 4.



ceed from it; and the performer sustains no hurt, provided he inspire the air not through the mouth, but the nostrils<sup>1</sup>.

By this art the rabbi Bar-Cocheba, in the reign of the emperor Hadrian, made the credulous Jews believe that he was the hoped-for Messiah<sup>2</sup>; and two centuries after, the emperor Constantius was thrown into great terror, when Valentinian informed him that he had seen one of the body-guards breathing out fire and flames in the evening<sup>3</sup>.

For deceptions with fire the ancients employed also naphtha, a liquid mineral oil, which kindles when it only approaches a flame. Galen informs us, that a person excited great astonishment by extinguishing a candle and again lighting it, without any other process than holding it immediately against a wall or a stone. The whole secret of this consisted in having previously rubbed over the wall or stone with sulphur. But as the author, a few lines before, speaks of a mixture of sulphur and naphtha, there is reason to think that he alludes to the same here. Plutarch<sup>4</sup> relates how Alexander the Great was astonished and delighted with the secret effects of naphtha, which were exhibited to him at Ecbatana. The same author, as well as Pliny, Galen, and others, has already remarked, that the substance with which Medea destroyed Creusa, the daughter of Creon, was nothing else than this fine oil<sup>5</sup>. She sent to the unfortunate princess a dress besmeared with it, which burst into flames as soon as she approached the fire of the altar. The blood of Nessus, wherein the dress of Hercules, which took fire likewise, had been dipped, was undoubtedly naphtha also<sup>6</sup>; and this oil must have been always employed when offerings caught fire in an imperceptible manner<sup>7</sup>. In all periods of the world priests have acted as jugglers to simple and ignorant people.

In modern times, persons who could walk over burning coals or red-hot iron, or who could hold them in their hands and their teeth, have often excited wonder. In the end of

<sup>1</sup> Directions for performing this trick may be found in various works, such as Joh. Wallbergen's *Zauberkünste*, Stuttgard, 1754, 8vo, and *Natürliches Zauberbuch*, Nurnberg, 1740, 8vo.

<sup>2</sup> See Bayle's *Diction.* i. p. 450, art. Barchochebas.

<sup>3</sup> Philostorgii *Hist. Eccles.* vii. 7, p. 93.

<sup>4</sup> *Vita Alexandri*, p. 687. <sup>5</sup> Galen, *l. c.* <sup>6</sup> Ovid. *Met. lib. ix.* 160.

<sup>7</sup> Instances may be found collected in Huetii *Alnetanæ Quæstion. lib. ii.* and in Bayle's *Dictionary*, art. *Egnatia*.



the seventeenth century, an Englishman, named Richardson who, as we are assured, could chew burning coals, pour melted lead upon his tongue, swallow melted glass, &c., rendered himself very famous by these extraordinary feats<sup>1</sup>. Laying aside the deception<sup>2</sup> practised on the spectators, the whole of this secret consists in rendering the skin of the soles of the feet and hands so callous and insensible, that the nerves under them are secured from all hurt, in the same manner as by shoes and gloves. Such callosity will be produced if the skin is continually compressed, singed, pricked, or injured in any other manner. Thus do the fingers of the industrious sempstress become horny by being frequently pricked; and the case is the same with the hands of fire-workers, and the feet of those who walk bare-footed over scorching sand<sup>3</sup>.

<sup>1</sup> Journal des Sçavans, 1667, pp. 54, 222; and 1680, p. 292. Deslandes, Mémoires de Physique, ii. and Bremenscher Magazin, i. p. 665. See also Busbequii Omnia, Basil, 1740, 8vo, p. 314.

<sup>2</sup> [Deception might have been easily practised in this case. Fusible metal, as suggested by Sir David Brewster, Nat. Magic, p. 301, which consists of mercury, tin and bismuth, and which melts at a low temperature, might easily have been substituted in place of lead; and fluids, the boiling-point of which is lower than water, might easily have been substituted for that liquid.]

A solution of spermaceti in sulphuric æther, tinged with alkanet root, which solidifies at 50° F., and melts and boils with the heat of the hand, is supposed to be the substance which is used at Naples, when the dried blood of St. Januarius melts spontaneously and boils over the vessel which contains it.

The experiments of M. Tillet, Dr. Fordyce and Sir Charles Blagden, will show the great heat which may be endured by the human body. Some of these gentlemen remained in a room where the heat was one or two degrees above 260° F. for eight minutes; a beef-steak was cooked in the same atmosphere, and was overdone in thirty-three minutes; when the steak was blown upon with a pair of bellows, it was found to be pretty well done in thirteen minutes. But Sir F. Chantry exposed himself to a still greater heat in the furnace used for drying his moulds. When raised to its highest temperature, the thermometer indicated 350° F., and the iron floor was red-hot. The workmen often entered it at 340°. On one occasion Sir F., accompanied by five or six of his friends, entered the furnace, and after remaining two minutes, they brought out a thermometer which indicated 320°. Some of the party experienced sharp pains in the tips of their ears, and in the septum of the nose, whilst others felt a pain in their eyes.—Brewster, *l. c.*]

<sup>3</sup> [The peculiar property of minerals and various salts, as alum, in forming and protecting articles of dress, &c. from the effects of fire, has long been known. But the art of practically applying it, is due to the inge-



In the month of September, 1765, when I visited the copper-works at Awestad, one of the workmen, for a little drink-money, took some of the melted copper in his hand, and after showing it to us, threw it against a wall<sup>1</sup>. He then squeezed the fingers of his horny hand close to each other; put it a few minutes under his armpit, to make it sweat, as he said; and, taking it again out, drew it over a ladle filled with melted copper, some of which he skimmed off, and moved his hand backwards and forwards, very quickly, by way of ostentation. While I was viewing this performance, I remarked a smell like that of singed horn or leather, though his hand was not burnt. The workmen at the Swedish melting-houses showed the same thing to some travellers in the seventeenth century; for Regnard saw it in 1681, at the copper-works in Lapland. It is highly probable that the people who hold in their hands red-hot iron, or who walk upon it, as I saw done at Amsterdam, but at a distance, make their skin callous before, in the

nuity of the Chevalier Aldini of Milan. His dress consisted of a strong cloth covering which had been steeped in a solution of alum, for the body, arms and legs; whilst the head-dress was a large cap enveloping the whole head down to the neck, with holes for the nose, eyes and mouth; the covering for the feet was composed of asbestos, or amianthus cloth. The stockings and cap were single, but the gloves were double, to enable the fireman to take burning or red-hot bodies into his hands. A metallic dress was added to this, consisting of a cap, with a mask, leaving a space between it and the asbestos cap; a cuirass; a piece of armour for the trunk and thighs; a pair of boots of double wire-gauze; and an oval shield five feet long by two and a half wide, made by stretching the wire-gauze over a slender frame of iron. All these pieces were made of wire-gauze.

It was found, that when armed with this apparatus, a man could walk upon hot iron, in the midst of high flames, keep his head over a pan of flaming fire, &c. for several minutes, and this in some cases where the heat was so intense that bystanders were obliged to stand at the distance of eight or ten yards. This was remarkably shown in 1829, in the yard of the barracks of St. Jervais. Two towers were erected, two stories high, and were surrounded with heaps of inflamed faggots and straw. One of the firemen, with a child on his back, in a wicker basket covered with metallic gauze, and having a cap of amiantheric cloth, rushed into a narrow place, where the flames were raging eight yards high. The violence of the fire was so great that he could not be seen, while a thick black smoke spread around, throwing out a heat which was insupportable to the spectators. The man remained so long invisible that serious doubts were entertained of his safety. He at length, however, issued from the fiery gulf uninjured.]

<sup>1</sup> The same thing was performed by Schreber in 1760.



like manner. This may be accomplished by frequently moistening it with oil of vitriol; according to some the juice of certain plants will produce the same effect; and we are assured by others that the skin must be very frequently rubbed, for a long time, with oil, by which means, indeed, leather also will become horny.

Of this art, traces may be found also in the works of the ancients. A festival was held annually on Mount Soracte, in Etruria, at which the Hirpi, who lived not far from Rome, jumped through burning coals; and on this account they were indulged with peculiar privileges by the Roman senate<sup>1</sup>. Women also, we are told, were accustomed to walk over burning coals at Castabala in Cappadocia, near the temple dedicated to Diana<sup>2</sup>. Servius remarks, from a work of Varro now lost, that the Hirpi trusted not so much to their own sanctity as to the care which they had taken to prepare their feet for that operation.

I am not acquainted with everything that concerns the trial by ordeal, when persons accused were obliged to prove their innocence by holding in their hands red-hot iron; but I am almost convinced that this also was a juggling trick of the priests, which they employed as might best suit their views. It is well known that this mode of exculpation was allowed only to weak persons, who were unfit to wield arms, and particularly to monks and ecclesiastics, to whom, for the sake of their security, that by single combat was forbidden. The trial itself took place in the church entirely under the inspection of the clergy; mass was celebrated at the same time; the defendant and the iron were consecrated by being sprinkled with holy water; the clergy made the iron hot themselves; and they used all these preparatives, as jugglers do many motions, only to divert the attention of the spectators. It was necessary that the accused persons should remain at least three days and three nights under their immediate care, and continue as long after. They covered their hands both before and after the proof; sealed and unsealed the covering: the former, as they pretended, to prevent the hands from being prepared any how by art; and the latter to see if they were burnt.

<sup>1</sup> Plin. vii. 11.—Virg. *Æn.* xi.—Silius Ital. v.—Strabo, v.

<sup>2</sup> Strabo, xii.



Some artificial preparation was therefore known, else no precautions would have been necessary. It is highly probable that during the first three days the preventive was applied to those persons whom they wished to appear innocent; and that the three days after the trial were requisite to let the hands resume their natural state. The sacred sealing secured them from the examination of presumptuous unbelievers; for to determine whether the hands were burnt, the last three days were certainly not wanted. When the ordeal was abolished, and this art rendered useless, the clergy no longer kept it a secret. In the thirteenth century an account of it was published by Albertus Magnus, a Dominican monk<sup>1</sup>. If his receipt be genuine, it seems to have consisted rather in covering the hands with a kind of paste than in hardening them. The sap of the *Althæa* (marsh-mallow), the slimy seeds of the flea-bane, which is still used for stiffening by the hat-makers and silk-weavers, together with the white of an egg, were employed to make the paste adhere; and by these means the hands were as safe as if they had been secured by gloves. The use of this juggling trick is very old, and may be traced back to a pagan origin. In the *Antigone* of Sophocles, the guards placed over the body of Polynices, which had been carried away and buried contrary to the orders of Creon, offered, in order to prove their innocence, to submit to any trial: "We will," said they, "take up red-hot iron in our hands, or walk through fire<sup>2</sup>."

The exhibition of balls and cups, which is often mentioned in the works of the ancients as the most common art of jugglers, is also of great antiquity. It consists in conveying speedily and with great dexterity, while the performer endeavours by various motions and cant phrases to divert the attention of the simple spectators from observing his movements too narrowly, several light balls, according to the pleasure of any person in company, under one or more cups; removing them sometimes from the whole; and conveying them again back in an imperceptible manner. In general, three leaden cups are used, and as many balls of cork; and to prevent all discovery by their slipping from the thumbs of

<sup>1</sup> In his work *De Mirabilibus Mundi*, at the end of his book *De Secretis Mulierum*, Amstelod. 1702, 12mo, p. 100.

<sup>2</sup> *Antigone*, 270.



the juggler, or making a noise, as he must lay hold of them with much quickness, the table before which he sits is covered with a cloth.

These small balls were by the ancients called *calculi*; and the cups *acetabula*, or *paropsides*. Casaubon<sup>1</sup> has already quoted most of those passages in ancient authors which relate to this subject; and they have been repeated by Bulenger<sup>2</sup>; but neither of these writers makes mention of the fullest and clearest description given in the letters of Alciphron<sup>3</sup>. We have there an account of a countryman who came to town, and was conducted by a merchant to the theatre, where he saw with great astonishment the exhibition of cups and balls. "Such an animal," says he, "as the performer I would not wish to have near me in the country; for in his hands my property would soon disappear." The art of oratory, because it deceives the auditors, is frequently compared to that of balls and cups. From the Latin word *gabata*, mentioned by Martial, together with *paropsides*, the French have made *gobelets*; and hence their common expressions *jouer des gobelets*, and *joueur des gobelets*, which they use when speaking of jugglers.

In all ages of the world there have been men who excited great wonder by extraordinary strength. Instances of this have been already collected; but they do not belong to my present subject<sup>4</sup>. I can, however, prove that above fifteen hundred years ago there were people who, by applying a knowledge of the mechanical powers to their bodies, performed feats which astonished every ignorant spectator; though it is certain that any sound man of common strength could perform the same by employing the like means. Of these one may say with Celsus, "*Neque hercule scientiam præcipuam habent hi, sed audaciam usu ipso confirmatam.*"

About the beginning of the last century, such a strong man, or Samson, as he called himself, a native of Germany, travelled over almost all Europe; and his pretended art has

<sup>1</sup> Animad. in Athen. lib. i. 15.

<sup>2</sup> De Theatro, lib. i. 40, in Grævii Thes. Ant. Rom. ix.

<sup>3</sup> Lib. iii. epist. 20.—Seneca, Epist. 45. Compare Suidas, Pollux, and Athenæi Deipn. 4. It is probable that Quintilian alludes to this art in his Institut. x. 7, 11.

<sup>4</sup> Plin. vii. 20, p. 385.—Martial. v. 12.—Suidas, speaking of Theogenes Thasius.—Haller, Elem. Physiol. iv. p. 486.



been mentioned by so many writers, that we may conclude it had not been often exhibited before; and that it was then considered as new. His name was John Charles von Eckerberg; he was born at Harzgerode in Anhalt; and at that time was thirty-three years of age. When he fixed himself between a couple of posts, on any level place, two or more horses were not able to draw him from his position; he could break ropes asunder, and lift a man up on his knee while he lay extended on the ground. But what excited the greatest astonishment was, that he suffered large stones to be broke on his breast with a hammer, or a smith to forge iron on an anvil placed above it.

This last feat was exhibited even in the third century, by Firmus or Firmius, who, in the time of Aurelian, endeavoured to make himself emperor in Egypt. He was a native of Seleucia in Syria; espoused the cause of Zenobia, the celebrated queen of Palmyra; and was at length executed publicly by order of the emperor Aurelian. It is of this Firmus, and not of another, who a century after was overcome in Africa by the father of the emperor Theodosius, that Vopiscus speaks where he relates that he could suffer iron to be forged on an anvil placed on his breast. For this purpose he lay on his back; but he put himself in such a position, by resting with his feet and shoulders against some support, that his whole body formed an arch; so that he seemed rather to be suspended than to lie at full length<sup>1</sup>. This art, which is explained and illustrated by Desaguliers<sup>2</sup> and Professor Kuhn<sup>3</sup> of Dantzic, has now become so common that it is often exhibited without occasioning much surprise.

In the works of the ancients, rope-dancers are frequently mentioned. The passages where they occur have been col-

<sup>1</sup> Vopiscus, Vita Firmi. See the figure in Desaguliers, tab. xix. fig. 5. He describes the position thus:—The pretended Samson puts his shoulders (not his head, as he used to give out) upon one chair, and his heels upon another (the chairs being made fast), and supports one or two men standing on his belly, raising them up and down as he breathes, making with his backbone, thighs and legs, an arch whose abutments are the chairs.

<sup>2</sup> A course of Experimental Philosophy. Lond. 1745, 4to, i. p. 266. [A popular account of these extraordinary feats, with illustrations and explanations of the principles on which they depend, is given by Sir David Brewster in his interesting volume on Natural Magic, p. 246.]

<sup>3</sup> Versuche und Abhandl. der Naturforsch. Geselsch. in Danzig.



lected by various authors, though never completely ; and I am inclined to think that those who have seen many performers of this kind would be able to clear up some that are obscure. I have seen many myself ; but I have forgot the greater part of what I observed ; and there are other reasons also which prevent me from undertaking that task : I dread the reproach of “ *multum agendo nihil agis*.” That I may not, however, pass over this subject entirely, I shall present the reader with what follows<sup>1</sup>. We meet with various appellations given to rope-dancers, which do not, as some have imagined, point out different kinds, but allude only to new-invented arts, leaps, or dexterities, which, while recommended by novelty, were much wondered at, though they were afterwards imitated by all. To these belong the *schaenobatae*, *oribatae*, *neurobatae*, *petaminarii*, *funambuli*, &c. Some of the ancient rope-dancers seem to have used a balancing-pole, or at least to have had weights in their hands to preserve an equipoise<sup>2</sup>. It is certain also that rope-dancers were not wanting in the middle ages. In the year 1237 they were very common in Italy<sup>3</sup> ; and in 1393 there were some of them at Augsburg, who exhibited their dexterity on the rope, and received from each spectator three German halfpence<sup>4</sup>.

To place men upon the shoulders of each other in such a manner that every row consists of a man fewer, till they form a pyramid ending in a single person, upon whose head a boy often stands with his feet upwards, is likewise an ancient piece of dexterity. This exhibition is varied many ways ; and on that account it is difficult to form even conjectures respecting it, especially as the description given of it by a Roman poet is very unintelligible<sup>5</sup>.

<sup>1</sup> A great many of these passages of the ancients have been collected by Bulenger, in his work *De Theatro*, i. cap. 41. See also Des Camps in a dissertation contained in *Recherches Curieuses d'Antiquité*, par Spon. A Lyon 1683.—*Mercurialis De Arte Gymnast.* and *Fabricii Biblioth. Antiq.* p. 995.

<sup>2</sup> An epigram, ascribed to Petronius, at page 542 of the edition of Hadrianides, belongs to this subject.

<sup>3</sup> *Muratori Antiquit. Ital. Med. Ævi*, ii. p. 846.

<sup>4</sup> *Von Stetten, Kunstgeschichte von Augsburg*, ii. p. 177.

<sup>5</sup> *Claudian. de Mallii Consul.* 320. In Cilano's *Römischen Alterthümer*, ii. fig. 8, there is a representation like what I have often seen exhibited. But the most dangerous and the most curious is that of which an eu-



I am however still less acquainted with an art in which hoops and wheels were employed by the *petauristæ*, who excited great astonishment among the populace. The first part of the art may have consisted in nothing more than the varied contortions and tumbling which we still see practised by children trained for that purpose. Cilano explains a well-known passage of Manilius, as if the performers had darted through suspended iron hoops, made often red-hot. Of this I entertain less doubt than how we ought to understand the *corpora jactata petauro* of Juvenal<sup>1</sup>; and the *corpora valido excussa petauro* of Manilius<sup>2</sup>, which many have attempted to explain already. At any rate this wheel was different from that upon which a female dancer, as mentioned by Xenophon, wrote and read while it turned round with great velocity<sup>3</sup>.

The art of exhibiting various feats of horsemanship, which has been practised so much in modern times, seems to have come first from the East. At any rate, those performers in that way who, in the thirteenth century, were at the Byzantine court, and who travelled all over Europe, came from Egypt. A gravure is given in *Splendor Urbis Venetiarum*, to be found in Grævii *Thesaurus Antiquit. Italiæ*, v. 3. p. 374.

<sup>1</sup> Sat. xiv. 265.

<sup>2</sup> Lib. v. 433.

<sup>3</sup> Symposium, p. 655, edition of Basle, 1555. fol. Εἰσεφέρετο τῇ ὀρχηστρίδι: τροχὸς τῶν κεραμεικῶν ἐφ' οὗ ἔμελλε θαυμασιουργήσειν. In the old edition of J. Ribittus, this passage is thus translated: "Allata est saltatrici orbis saltatorius, in quo admiranda erat editura." The first question that arises is, what was τροχὸς τῶν κεραμεικῶν. The last word alluded to a place at Athens where wrestling was exhibited every year; and on that account Aristophanes uses the expression πληγαὶ κεραμεικαί. This however affords no explanation. Bulenger, who quotes the same passage, translates it in the following manner: "Illata est saltatrici figuræ rota, per quam se trajiceret, et miracula patraret." He means here therefore a potter's wheel, the invention of Anacharsis, but that was always called κεραμικὸς τροχός, and not τροχός τῶν κεραμεικῶν. But even allowing that a potter's wheel is meant, it is wrong to add *per quam se trajiceret*; for the potter's wheel is not like a hoop, but like a plate or dish; and when turned round revolves not vertically, but horizontally. Besides, how the performer could write or read on a wheel that she jumped through, he has not thought proper to explain. "Scribere et legere in rota dum versatur, mirabile quiddam est." If a potter's wheel be meant, I consider it as certainly possible for a person to stand upon it whilst it revolves with the greatest velocity, and even to read or write but it would be necessary to lift up the legs, in turn, with the utmost quickness.



They could stand on the horses when at a gallop; mount and dismount while on full speed at the chase; tumble on horse-back, and do many other things equally extraordinary<sup>1</sup>. At the end of the sixteenth century, an Italian, who had learned this art while a slave in Turkey, went about exhibiting his dexterity in various parts of Europe. Montagne saw him at Rome in 1581<sup>2</sup>; and the year following he was at Paris<sup>3</sup>. Some of these feats were performed by the ancient *desultores*.

Whether the ancients taught horses, dogs, birds, and other animals, to perform various tricks which are frequently exhibited at present for money, I do not know; but it is certain that what they made the elephant, which undoubtedly is the most sagacious and tractable of all animals, perform, exceeds everything yet known of the kind. Without repeating what has been so often related, I shall only mention the elephant which walked upon a rope backwards and forwards, as well as up and down; and which Galba first caused to be shown to the Roman people. After this, so much confidence was placed in the dexterity of the animal, that a person sat on an elephant's back while he walked across the theatre upon a rope extended from the one side to the other. Lipsius, who has collected the testimonies, thinks they are so strong that they cannot be doubted<sup>4</sup>.

The training of horses to obey a private signal, imperceptible to the most attentive spectator, and to perform actions

<sup>1</sup> Nicephorus Gregor. viii. 10. p. 215. This company of rope-dancers came from Egypt. They travelled through the greater part of Asia, and all Europe, as far as the extremity of Spain. At Constantinople they extended the ropes, on which they first exhibited their art, between the masts of ships. One is almost induced to believe that stupid superstition did not then prevail so much in Europe as at the beginning of the last century. The historian says that the company at first consisted of forty persons; but that the half of them were cast away on their passage to Constantinople. He does not, however, tell us that they or their horses were anywhere burnt as conjurors, or possessed with the devil.

<sup>2</sup> See the German translation of his Travels, ii. p. 238.

<sup>3</sup> Journal du Règne de Henri III. p. 57.—Recueil de Pièces servant à l'Hist. de Henri III. Cologne, 1666, 12mo.

<sup>4</sup> Epistolarum Selectarum Centuria. Antverpiæ, 1605, 4to, i. epist. 50. p. 59.—Plin. viii. 1 and 3.—Seneca, epist. 86.—Suetonii Vit. Galbæ.—Dio Cassius. A great many also may be found collected in Hartenfels Elephantographia, Erfordiæ, 1715, 4to. It appears that in the thirteenth century some ventured to ride a horse upon a rope. See the Chronicle Alberichi Monachi Trium-Fontium, inserted by Leibnitz in Accessiones



which appear, to those unacquainted with the art, to display rational faculties, I have never found mentioned in the works of the ancients. That the Sybarites however taught their horses to dance to the sound of music, is asserted by a variety of authors<sup>1</sup>. In the sixteenth century, dogs trained in the like manner excited great wonder<sup>2</sup>.

In the year 1766, an Englishman, named Wildman, made himself much known by taming or training bees, in such a manner that they not only followed him wherever he went, but settled even on his face and hands without stinging him, and seemed as if obedient to his orders<sup>3</sup>. Some years after, a person who practised the like art, travelled about through Germany, and gave himself out to be Wildman; but M. Riem proved that he was not Wildman, and published the secret by which he acquired so much power over these insects<sup>4</sup>. I cannot say whether the ancients were acquainted with this art; but I shall here remark, that it was known in the kingdom of Galam, at Senegal, a hundred years before Wildman; for when Brue, a Frenchman, was there in 1698, he was visited by a man who called himself the king of the bees<sup>5</sup>. "Let his secret," says that traveller, "consist in what it may, this much is certain; that they followed him wherever he went, as sheep do their shepherd. His whole body, and particularly his cap, was so covered with them that they appeared like a swarm just settled. When he departed they went along with him; for besides those on his body, he was surrounded by thousands which always attended him<sup>6</sup>."

*Historicæ*, vol. ii., where a description is given of the solemnities at the wedding of Robert, brother to the king of France, in the year 1237.

Several instances of the dexterity of the elephant may be found in *Lipsii Laus Elephantis*, inserted in *Dissertat. Ludicrarum et Amœnitatum Scriptores varii*, Lugd. Bat. 1638.—TRANS.

<sup>1</sup> *Æliani Hist. An.* xvi. 23. vi. 10.—*Athenæus*, lib. xii.—*Plinius*.

<sup>2</sup> One instance may be found in *Theophanis Chronographia*, which was printed at Paris 1655, fol. It occurred in the seventeenth year of the reign of Justinian, or 543. <sup>3</sup> *Universal Magazine*, 1766, October, p. 217.

<sup>4</sup> *Der entlarvte Wildman, Betrüger grosser Höfe*. Berlin, 1774, 8vo. See also *Göttingische Gelehrte Anzeig.* 1775, p. 816. The name of *impostor* given to Wildman was, however, too harsh; for I do not think that he who performs anything extraordinary, never done by any one before, becomes an impostor when another discovers his art.

<sup>5</sup> The voyage of Brue is in *Labat's Afrique Occidentale*, iv.

<sup>6</sup> [A curious exhibition of this kind has been made public for several years in the Strand, viz. the "industrious fleas." These noxious animals



In modern times, persons destitute of arms and hands, or who have these limbs formed very imperfectly, but who possess the art of supplying that want by the use of their feet and toes, show themselves sometimes for money ; and as they entertain the spectators by exciting their wonder, they deserve from them that support which they are not able to obtain in any other manner. Instances of such people who had acquired this art, have been very common within the last two centuries<sup>1</sup>; but in the works of the ancients I have found only one. An Indian king, named Porus, sent to the emperor Augustus an embassy with presents, among which were some rare animals, and a man without arms, who with his feet, however, could bend a bow ; discharge arrows ; and put a trumpet to his mouth and blow it. Dio Cassius confesses that he did not know how this was possible ; but Strabo refers for his authority to Nicolaus of Damascus, who saw all the presents as they passed through Antioch<sup>2</sup>. Had this deformed person, whom Strabo compares to a Hermes, travelled about, according to the modern practice, as a show, he would have been better known, and in all probability his example would have induced others to imitate his art<sup>3</sup>. Manilius says, however, that there were people, who, in playing at ball, could use their feet with as much dexterity as their hands, who could catch the ball with them, and again throw it back ; but the poet, perhaps, did not allude to the small hand-ball, but to the large one which is struck with the fist, and which may be stopped also by the foot. Besides, the passage is read and explained different ways<sup>4</sup>.

are here seen to draw and drive a coach and four ; fire off a small cannon ; and various other performances of a similar kind.]

<sup>1</sup> Several instances of the like kind may be found also in *Monstrorum Historia Memorabilis* a J. G. Schenkio a Grafenberg filio, Francof. 1609, 4to, p. 28 *et seq.* One of the most curious is that of Thomas Schweicker, born at Halle in Prussian Saxony, in the year 1586. Camerarius saw him not only write, but even make a pen with his feet.—TRANS.

<sup>2</sup> Strabo, lib. xv. p. 1048. ed. Almel.—Dio Cassius, lib. liv. p. 739. Suetonius, Eutropius, Eusebius and Orosius, speak of this embassy, but make no mention of the presents.

<sup>3</sup> [In modern times the idle portion of the public has been gratified by the exhibition of the Siamese twins ; the diminutive monster Tom Thumb ; and quite recently a child with three legs. The birth of such monsters is equivalent to a legacy or fortune to the parents, who by their exhibitions realise large sums : the morbid taste of the public, especially the weaker portion, for such sights is truly deplorable.] <sup>4</sup> Man. Astron. lib. v. 165.



Figures or puppets, which appear to move of themselves, were employed formerly to work miracles; but they could hardly be used for that purpose at present in any catholic country of Europe, though they still serve to amuse the vulgar. Among these are the *marionettes*<sup>1</sup>, as they are called, the different parts of which are put in motion imperceptibly by a thread. Of a still more ingenious construction are those which are moved by the turning of a cylinder, as is the case in the machines with which some of the old miners in Germany earn a livelihood; but the most ingenious of all are those which are kept in continual movement for a certain time, by the help of wheels with a weight or spring. The latter are called *automata*; and, when they represent human figures, *androides*. Under the former general name are comprehended our watches, the most useful of all, and also jacks<sup>2</sup>, with many others. The latter appellation is given to small puppets, which, when their inner works have been wound up, run upon the table or pavement, and as they advance move their head, eyes, and hands. They have been exhibited sometimes under the name of *courrante Margarethe*, which gave rise perhaps to the word *marionette*.

The proper *marionettes* are very old. They were common among the Greeks, and from them they were brought to the Romans. They were known by the name of *neurospasta*, and were much used at their shows. Aristotle speaks of some

<sup>1</sup> Frisch derives this word from *morio*, a fool or buffoon.

<sup>2</sup> This piece of kitchen furniture was known in the middle of the sixteenth century. Montagne saw one at Brixen, in Tyrol, in the year 1580, and wrote a description of it in his Journal, as a new invention. He says it consisted entirely of wheels; that it was kept in motion by a heavy piece of iron, as clocks are by a weight, and that when wound up in the like manner, it turned the meat for a whole hour. He had before seen, in some other place, another driven by smoke.—Reise, i. pp. 155, 249. The latter kind seem to be somewhat older. Scappi, cook to pope Pius V., gave a figure of one in his book *Opera di M. Bartolomeo Scappi*, printed at Venice 1570, which is exceedingly scarce. I lately saw a copy, which, instead of eighteen, had twenty-four engravings. It was printed twice afterwards at the same place, viz. in 1571 and 1605, in quarto. The third edition says, “con due aggiunte, cio é il Trinciante et il Maestro di casa.” Bayle seems to confound this book with that of Platina *De Honesta Voluptate*, or to think that the latter was the real author of it. This however cannot be, as there were more than a hundred years between the periods when Scappi and Platina lived. Platina died in 1481, and not in 1581, as we read in Bayle.



which moved their head, eyes, hands and limbs in a very natural manner<sup>1</sup>. They are mentioned with equal precision by Galen, Xenophon, Antoninus, Horace, Gellius, and others. To these belong the *phalli*, which were carried round during the festivals of Osiris and Bacchus, and of which one member only, that properly meant by the name, and which was almost as large as the whole body, moved upon certain threads being pulled<sup>2</sup>. Count Caylus has given an engraving of the body of a small puppet, made of ivory or bone; but he requires too much when he desires us to consider that fragment, merely on his word, as a piece of Greek or Roman antiquity. He at least ought to have informed us where it was found, and by what means he procured it. In regard to such articles, it is as easy to deceive as to be led into an error; and objects of bone are certainly of no great duration<sup>3</sup>.

The question concerning the antiquity of automata, properly so called, which are moved by wheels, weights and springs, I shall leave to those who have read the works of the ancient mathematicians, and who may be desirous of writing on the history of mechanics. As far as I know, the ancients were not acquainted with the art of making them, unless some propositions of Ctesibius, mentioned by Vitruvius, allude to that subject. When clocks were brought to perfection, some artists added to them figures, which at the time of striking performed various movements; and as they succeeded in these, some attempted to make, detached from clocks, single figures, which either moved certain limbs, or advanced forward and ran. In the middle of the sixteenth century, when Hans Bullmann<sup>4</sup>, a padlock-maker at Nuremberg, constructed figures of men and women which moved backwards and forwards by clock-work, beat a drum, and played on the lute according to musical time, they excited universal astonishment as a new invention. It was about the same period that watches came into use. The accounts however which speak of much older automata deserve to be examined with more attention.

The most ancient of all are undoubtedly the tripods con-

<sup>1</sup> De Mundo. cap. vi.

<sup>2</sup> Herodot. ii. 48. p. 127.—Lucian. de Syria Dea, 16, ed. Bipont. ix. p. 99.   <sup>3</sup> Recueil des Antiquit. iv. p. 259.   <sup>4</sup> Doppelmayr, p. 285.



structed by Vulcan<sup>1</sup>, which being furnished with wheels, advanced forwards to be used, and again returned to their places. But what was impossible to the gods of Homer? An unbeliever might conjecture that these tripods, which are mentioned also by Aristotle<sup>2</sup>, and which perhaps were only a kind of small tables or dumb-waiters, had wheels so contrived that they could be put in motion and driven to a distance on the smallest impulse, like the fire-pans in our country beer-houses, at which the boors light their pipes.

That Dædalus made statues which could not only walk, but which it was necessary to tie, in order that they might not move, is related by Plato<sup>3</sup>, Aristotle, and others. The latter speaks of a wooden Venus, and remarks that the secret of its motion consisted in quicksilver having been poured into it. What the author here means I cannot comprehend; but I do not imagine that this Venus threw itself topsy-turvy backwards, like the Chinese puppets. However this may be, it is astonishing that the Chinese should have fallen upon the invention of giving motion to puppets by means of quicksilver, and in so ingenious a manner, that Muschenbroek<sup>4</sup> thought it worth his while to describe their whole construction, and to illustrate it by figures. But before this method was known in Europe, Kircher had an idea of putting a small waggon in motion by adding to it a pipe filled with quicksilver, and heating it with a candle placed below it<sup>5</sup>. The account of Aristotle is more mysterious, for he does not inform us how the quicksilver acted.

Callistratus, another writer, who was the tutor of Demosthenes, gives us to understand that the statues of Dædalus were made to move by the mechanical powers<sup>6</sup>. But what has been asserted by Palæphatus, and by Gedoyn<sup>7</sup>, Banier, Goguet, and others among the moderns, is most probable. The first statues of the Greeks were imitations of those of the Egyptians, for the most part clumsy figures, with their eyes

<sup>1</sup> Iliad. xviii. 373. It deserves to be remarked, that there were also such *τρίποδες αὐτόματοι* at the banquet of Iarchas. See Philostrat. Opera, ed. Olearii, pp. 117, 240.

<sup>2</sup> Polit. i. 3.

<sup>3</sup> In his Menou, p. 426.—Euthyphron, pp. 8, 11.

<sup>4</sup> Introd. in Philos. Nat. i. p. 143. <sup>5</sup> Physiologia Kircheriana, fol. p. 69.

<sup>6</sup> In Philostrati Opera, ed. Olearii, p. 899.

<sup>7</sup> In Mém. de l'Acad. des Inscr. xiii. p. 274.



shut, their arms hanging down close to the body on each side, and their feet joined together. Those made by Dædalus had their eyes open, as well as their feet and hands free; and the artist gave them such a posture, that they seemed either reclining, or appeared as if ready to walk or to run. As Anacreon<sup>1</sup>, struck with wonder, exclaimed when he saw a waxen image of his favourite object, "Begone, wax, thou wilt soon speak!" the astonished Greeks in like manner cried out, when they beheld the statues of Dædalus, "They will soon walk." The next generation affirmed that they really walked; and their posterity, adding still to what was told them, asserted that they would have run had they not been bound.

Equally imperfect is the account given of the wooden pigeon constructed by Archytas of Tarentum. We are informed that it flew; but when it had once settled, it could not again take flight. The latter is not incredible; but even if we allow that aërostatic machines were then known, it is impossible to believe the former. At present one cannot determine with any probability, what piece of mechanism gave rise to this relation<sup>2</sup>. The head of Albertus Magnus, which is said not only to have moved, but to have spoken, is too little known for any opinion to be formed concerning it. The construction of it must have been very ingenious and complex, if it be true that he was employed upon it thirty years<sup>3</sup>.

In the fourteenth and following centuries, automata, as I have said, were frequently made. Among these was the iron fly of John Müller or Molitor, or, as he is sometimes called, Regiomontanus, which is said to have flown about; and his artificial eagle, which flew to meet the Emperor Maximilian on his arrival at Nuremberg, June the 7th, 1470. None of the contemporary writers, however, though they often speak of this very learned man, make the least mention of these pieces of mechanism; and it is probable that the whole tale originated with Peter Ramus<sup>4</sup>, who never was at Nuremberg till the year 1571. J. W. Baier<sup>5</sup> endeavours to prove that the

<sup>1</sup> Ode xxvii.

<sup>2</sup> Aulus Gellius, x. 12.

<sup>3</sup> See Naudé's Apology, Bayle's Dictionary, &c. Thomas Aquinas is said to have been so frightened when he saw this head, that he broke it to pieces, and Albertus thereupon exclaimed, "Periit opus triginta annorum!"

<sup>4</sup> Schol. Mathemat. lib. ii. p. 65.

<sup>5</sup> Dissertat. de Regiomontani Aquila et Musca Ferrea. Altorfi, 1709.—



above-mentioned fly, moved by wheel-work, leaped about upon a table; and that the eagle perched upon the town-gate, stretched out its wings on the emperor's approach, and saluted him by an inclination of its body. We know that Charles V., after his abdication, amused himself during the latter period of his life with automata of various kinds<sup>1</sup>.

The most ingenious, or at least the most celebrated automata, were those made by Vaucanson, which he exhibited publicly at Paris, for the first time, in 1738. One of them, which represented a flute-player sitting, performed twelve tunes, and, as we are assured, by wind issuing from its mouth into a German-flute, the holes of which it opened and shut with its fingers. The second was a standing figure, which in the like manner played on the Provençal shepherd's pipe, held in its left hand, and with the right beat upon a drum or *tambour de Basque*. The third was a duck, of the natural size, which moved its wings, exhibited all the gestures of that animal, quacked like a duck, drank water, ate corn, and then after a little time let drop behind it something that resembled the excrement of a duck<sup>2</sup>. These pieces must have been often imitated. I saw some of the like kind in the year 1764, at the palace of Zarsko-Selo, near Petersburg, and was told that they had been purchased from Vaucanson<sup>3</sup>. As far as I can remember, the tambourin was damaged. I saw there also a regiment of soldiers, which went through their exercise, moved by wheel-work<sup>4</sup>.

See Mémoires de Trevoux, 1710, Juillet, p. 1283.—Doppelmayer, p. 23.—Fabricii Bibl. Med. Ætat. iv. p. 355.—Heilbronner Hist. Math. p. 504.

<sup>1</sup> Strada De Bello Belgico. Mogunt. 1651, 4to, p. 8. He calls the artist Jannellus Turrianus Cremonensis.

<sup>2</sup> In the year 1738, *Le Mécanisme du Fluteur Automate*, par Vaucanson, was printed at Paris, in a thin 4to. It contains only a short description of the flute-player, which is copied into the *Encyclopédie*, i. p. 448, under the article *Androïde*. The duck, as far as I know, has been nowhere described.

<sup>3</sup> Vaucanson died at Paris in 1782.

<sup>4</sup> [The publisher is in possession of an elegantly formed mechanical bird-cage, in which two artificial bullfinches wheel about on a perch, flutter their wings, and move their beaks, while emitting musical sounds in imitation of their natural note. A fountain constructed of spiral glass plays in the centre. Beneath the cage is a clock which sets the whole in motion hourly, for three or four minutes; but it may be set going independently, like a musical snuff-box. It is presumed to have been made by Vaucanson



In the year 1752, one Du Moulin, a silversmith, travelled about through Germany with automata like those of Vaucanson. In 1754, he wished to dispose of them to the margrave of Bayreuth; but he was obliged to pawn them in Nuremberg, at the house of Pfluger, who offered to sell them for 3000 florins, the sum lent upon them. They were afterwards purchased by counsellor Beireis, at Helmstadt, who kindly showed them to me. It is much to be regretted that the machinery of them is greatly deranged; the flute-player emits only some very faint tones; but the duck eats, drinks, and moves still. The ribs, which are of wire, had been covered with duck's feathers, so as to imitate nature; and as these are now lost, one can see better the interior construction; respecting which I shall only observe, that the motion is communicated by means of a cylinder and fine chains, like that of a watch, all proceeding through the feet of the duck, which are of the usual size. Nicolai<sup>1</sup> says that Du Moulin came to Petersburg in 1755, and died at Moscow in 1765. It is probable that he made the automata which I saw in Russia. Those which he left behind him at Nuremberg seem either not to have been completed, or to have been designedly spoiled by him; for they appeared to have defects which could not be ascribed to any accident. M. Beireis however has begun to cause them to be repaired.

Of all these automata, the duck I confess appeared to me the most ingenious; but I can prove that like pieces of mechanism were made before the time of Vaucanson. We are told by Labat<sup>2</sup>, that the French general De Gennes, who, about the year 1688, defended the colony of St. Christopher against the English, constructed a peacock which could walk about, pick up from the ground corn thrown before it, digest it, according to appearance, and afterwards drop something that resembled excrement. This man was of an ancient noble family in Brittany, which had however been so reduced, that the father carried on a handicraft. The son became acquainted with the marquis de Vivonne, who, on account of

about a hundred years ago, and was at one time a principal attraction at Weeks's celebrated Museum, where that singular piece of mechanism the Tarantula spider was first exhibited.]

<sup>1</sup> Nicolai, Reise, i. p. 287.

<sup>2</sup> Nouveau Voyage aux Iles de l'Amerique. A la Haye 1724, 2 vols. 4to. ii. pp. 298, 384. From his county he was called Count de Gennes.



his promising talents, bred him to the sea. He rose to be commander of a vessel, conducted a squadron to the Straits of Magellan, where it was intended to form a colony, and obtained in Cayenne a tract of land, which he got erected into a county, under the name of Oyac. He invented machines of various kinds useful in navigation and gunnery, and, as we are told, constructed clocks that moved without weights or springs.

The flute-player also of Vaucanson was not the first of its kind. In the beginning of the sixteenth century, the anonymous author of that well-known poem *Zodiacus Vitæ*, saw at Rome a figure made in the like manner by a potter. It is much to be regretted that no account is given of its construction.

Vidi ego dum Romæ, decimo regnante Leone,  
Essem, opus a figulo factum, juvenisque figuram,  
Efflantem angusto validum ventum oris hiatu<sup>1</sup>.

I shall here beg leave to say a few words respecting an object of juggling, which, however old it may be, still excites astonishment, and has often imposed upon the credulity of men of learning<sup>2</sup>: I mean those speaking machines, which, according to appearance, answer various questions proposed to them, sometimes in different languages, sing, and even blow a huntsman's horn. The figure, or only a head, is often placed upon a box, the forepart of which, for the better deception, is filled with a pair of bellows, a sounding-board, cylinder, and pipes, supposed to represent the organs of

<sup>1</sup> *Zodiacus Vitæ*, xi. 846.

<sup>2</sup> See a small treatise Ueber H. D. Muller's Redende Maschine, und über redende Maschinen überhaupt. Nurnberg, 1788, 8vo.—*Algem. Teutsches Biblioth.* vol. lxxxvii. p. 473. The Speaking Figure and the Automaton Chess-player exposed and detected. London, 1784, 8vo.—[This celebrated chess-playing automaton, invented by M. Vankempelin, was repaired and exhibited in London in 1820, by the ingenious mechanician Maelzel, with considerable success. The figure and machinery were always submitted to the inspection of the visitors, and shifted along the floor in various directions before the game commenced, and the deception was so adroitly managed as to escape the detection of the most scrutinizing. The proprietor always took care to secure the best chess-player in the town before he commenced operations, the wonder therefore was greatly increased by the superiority of the automaton's play. Mr. Lewis directed it in London. It is now generally admitted that a boy was concealed inside.]



speech. At other times the machine is only like a peruke-maker's block, hung round with a Turkish dress, furnished with a pair of arms, and placed before a table, and sometimes the puppet stands upon the table, or against a wall. The sounds are heard through a speaking-trumpet, which the figure holds in its mouth.

Many jugglers are so impudent as to assert that the voice does not proceed from a man, but is produced by machinery, in the same manner as the music of an organ. Some, like the last whom I saw, are more modest or timorous, and give evasive answers to the questions asked them respecting the cause of the voice, with as much art as those who exhibit with balls and cups. Concerning these speaking machines, however, different opinions are entertained. Some affirm that the voice issues from the machine; others, that the juggler answers himself, by speaking as ventriloquists do, or by having the power to alter his voice; and some believe that the answers are given by a man somewhere concealed. The violence with which these opinions are maintained exposes the juggler often to the danger of losing his life; for, when the illusion is detected, the populace, who in part suffer themselves willingly to be deceived, and who even pay the juggler for his deception, imagine that they have a right to avenge themselves for being imposed on. The machines are sometimes broken; and the owners of them are harshly treated as impostors. For my part, I do not see why a juggler, with a speaking machine, is a more culpable impostor than he who pretends to breathe out flames and to swallow boiling oil, or to make puppets speak, as in the Chinese shadows. The spectators pay for the pleasure which they receive from a well-concealed deception, and with greater satisfaction the more difficult it is for them to discover it. But the person who speaks or sings through a puppet, is so well hid, that people of considerable penetration have imagined that such concealment was impossible. At present this art is well known.

Either a child or a woman is concealed in the juggler's box; or some person, placed in a neighbouring apartment, speaks into the end of a pipe which proceeds through the wall to the puppet, and which conveys the answers to the spectators. The juggler gives every necessary assistance



to the person by signs previously agreed on. I was once shown, in company with M. Stock, upon promising secrecy, the assistant in another apartment, standing before the pipe, with a card in his hand on which the signs were marked; and he had been brought into the house so privately that the landlady was ignorant of the circumstance. The juggler, however, acknowledged that he did not exhibit without fear; and that he would not venture to stay long at a place like Göttingen, or to return with his Turks, though the populace were so civil as to permit him to depart peaceably with what he had gained.

The invention of causing statues to speak by this method seems so simple, that one can scarcely help conjecturing that it was employed in the earliest periods to support superstition; and many have imagined that the greater part of the oracles spoke in the same manner<sup>1</sup>. This, however, is false, as has been proved by the Jesuit Baltus, and the anonymous author of a Reply to Fontenelle's History of Oracles<sup>2</sup>. It appears that the pagan priests, like our jugglers, were afraid that their deceptions, if long practised, might be discovered. They considered it therefore as more secure to deliver the answers themselves; or cause them to be delivered by women instructed for that purpose, or by writing, or by any other means. We read, nevertheless, that idols<sup>3</sup> and the images of saints once spoke; for at present the latter will not venture to open their mouths. If their votaries ever really heard a voice proceed from the statue, it may have been produced in the before-mentioned manner.

Whether the head of Orpheus spoke in the island of Lesbos, or, what is more probable, the answers were conveyed to it by the priests, as was the case with the tripod at Delphi, cannot with certainty be determined. That the impostor Alexander, however, caused his Æsculapius to speak in this manner, is expressly related by Lucian<sup>4</sup>. He took, says that author, instead of a pipe, the gullet of a crane, and transmitted the voice through it to the mouth of the statue.

<sup>1</sup> Van Dale De Oraculis. Amstelod. 1700, 4to. i. 10, p. 222.

<sup>2</sup> Réponse à l'Histoire des Oracles de M. de Fontenelle.

<sup>3</sup> A few instances are related by Livy, Valerius Maximus, and Plutarch. Among the fables of the Christian church they are more numerous.

<sup>4</sup> Vol. v. p. 90. editio Bipont.



In the fourth century, when bishop Theophilus broke to pieces the statues at Alexandria, he found some which were hollow, and placed in such a manner against a wall that a priest could slip unperceived behind them, and speak to the ignorant populace through their mouths<sup>1</sup>. I am acquainted with a passage which seems to imply that Cassiodorus, who, it is well known, constructed various pieces of mechanism, made also speaking machines; but I must confess that I do not think I understand the words perfectly<sup>2</sup>.

That people ventured more than a hundred years ago to exhibit speaking machines for money, has been proved by Reitz in his annotations to Lucian, where he produces the instance of one Thomas Irson, an Englishman, whom he himself knew, and whose art excited much wonder in king Charles II. and his whole court. When the astonishment, however, became general, one of the pages discovered, in the adjoining chamber, a popish priest who answered in the same language, through a pipe, the questions proposed to the wooden head by whispering into its ear. This deception Irson often related himself<sup>3</sup>.

I shall now add only a few observations respecting the Chinese shadows, which I have occasionally mentioned before. This ingenious amusement consists in moving, by pegs fastened to them, small figures cut out of pasteboard, the joints of which are all pliable, behind a piece of fine painted gauze placed before an opening in a curtain, in such a man-

<sup>1</sup> Theodoret Hist. Eccles. v. 22.

<sup>2</sup> Cassiodori Variar. i. ep. 45.

<sup>3</sup> [*Speaking Automaton*.—There is a piece of mechanism now exhibiting to the public at the Egyptian Hall—the work of Professor Faber, of Vienna, and the result, as he states, of twenty-five years of labour and preparation. The name which he has given to this product of his ingenuity is the Euphonia; and the work, as that name implies, is another of those many combinations which have attempted, by the anatomical and physiological study of the structures that contribute to the human voice, to attain to an imitation of that organ as regards both sound and articulation. As an example of inductive and mechanical skill this exhibition is well deserving of attention. The professor himself, by an arrangement of bellows-pipes, pedal and keys, which he plays somewhat like the keys of a piano, prompts the discourse of his automaton; which certainly does enunciate both sounds and words. When we entered the room we found it singing to a select society. It requires all our sense of the ingenuity and perseverance which have been bestowed on the work to induce our assent to the proposition which calls the voice human; but undoubtedly it is a remarkable result of contriving skill and scientific patience.—*Athæneum*.]



ner as to exhibit various scenes, according to pleasure ; while the opening covered with gauze is illuminated, towards the apartment where the spectators sit, by means of light reflected back from a mirror ; so that the shadows of the pegs are concealed. When it is requisite to cause a figure to perform a variety of movements, it is necessary to have several persons, who must be exceedingly expert. When a snake is to be represented gliding, the figure, which consists of delicate rings, must be directed at least by three assistants.

This amusement, which one can hardly see the first time without pleasure, is really a Chinese invention. Many years ago, I have seen Chinese boxes on which such moveable figures were apparent only when the box was held against the light. In China, these shadows are used at the well-known feast of lanterns ; and a description of them may be found in the works of some travellers. That they were common also in Egypt, we are informed by Prosper Alpinus<sup>1</sup>, who admired them much ; but he was not able to discover the method by which they were produced, as it was kept a secret. I was told by an Italian, who exhibited them at Göttingen some years ago, that they were first imitated, from the Chinese, at Bologna.

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