JOURNAL OF
THE
MUSICAL BOX
SOCIETY OF
GREAT BRITAIN

THE MUSIC BOX

a magazine of mechanical music

Vol. 4 No. 3

Keith Harding

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THE MUSIC BOX

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Hon. Editor : Arthur W.J.G. Ord-Hume.

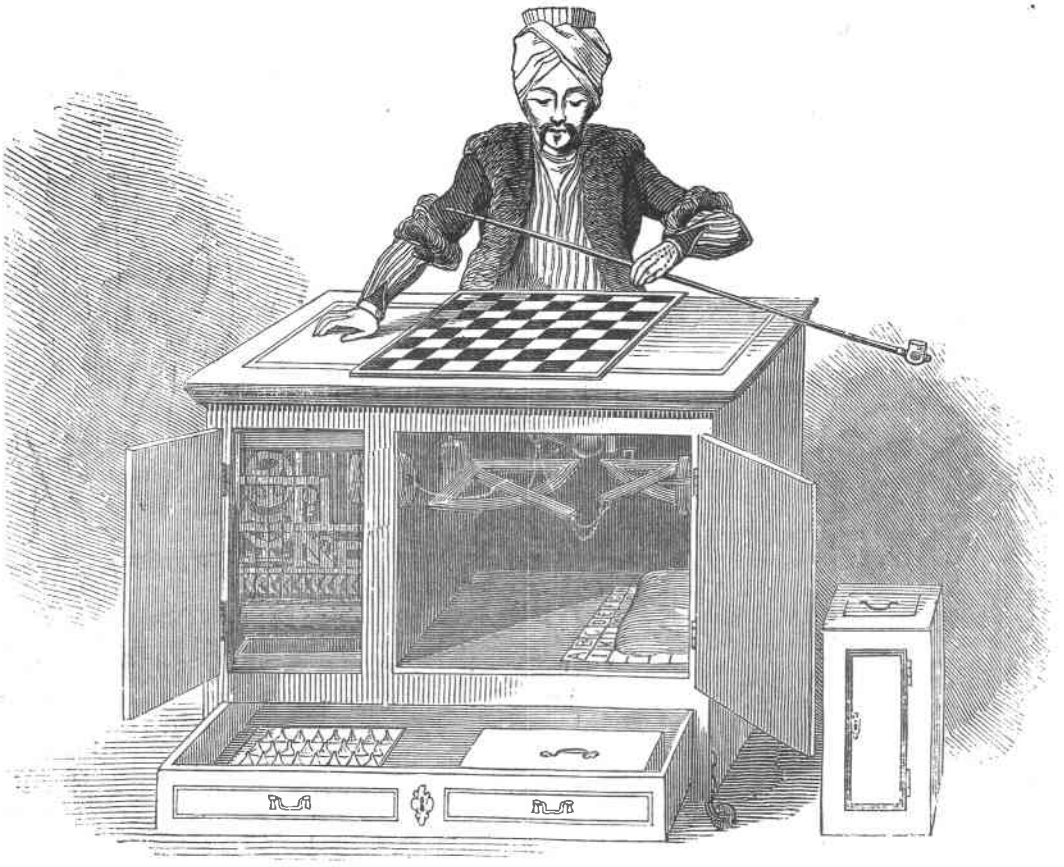
The Editor writes:

IT IS GETTING on for four years since the passing of John Clark, our first President. Those of us who were fortunate in knowing him will certainly still recall his guidance and enthusiasm during the burgeoning days of our Society. As with every other sphere of knowledge, we all had to start somewhere and that somewhere inevitably meant "Clarkey". He was probably the last of the breed of men who actually served their time with musical box makers. He was in towards the tail end of their era and later emerged as a sole surviving figure as the industry crumbled about him in the face of war, progress and obsolescence.

How amazed, I am sure, would he be today if he could see the way in which we, his "apprentices", were carrying on with the musical box! Collectively as a Society we have researched more history than Clarkey could ever know. We have talents which he would salute with that deep chuckle of his. Why, we are already making new major assemblies for mechanical musical instruments, new cases - even new music. Inspired by our joint efforts, Members are perfecting and cultivating techniques which are of immense value and interest. Some are engaged in research into history and are uncovering fascinating material. One of our Founder Members has, for example, just completed a detailed investigation into the ramifications of Nicole Freres and their associates which is astonishing in its revelations. A detailed article on this is expected to be featured in our Christmas issue.

My dictionary says that a Society is an association of persons united by a common aim or interest or principle. So long as we remember this and so long as we sustain our interest, the mechanical musical instrument will continue to flourish in the light of better knowledge and understanding - a living link with an age which many of us may aver to have been filled with at least the same amount of wonderment as the space-age.

ARTHUR W.J.G. ORD-HUME



THE AUTOMATON CHESS PLAYER.

OBSERVATIONS

ON THE

Automaton

CHESS PLAYER.

NOW EXHIBITED IN LONDON.

AT

4, SPRING GARDENS.

BY AN OXFORD GRADUATE.

——ut speciosa dehinc miracula promat.—Hor.

London:

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1819.

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PREFACE.

THE science of mechanics is one of those in which the ingenuity of modern artists appears with superior advantage. The ancients, with the single exception of Archimedes, had but an imperfect knowledge of the mysteries of this science, as their attempts in the construction of instruments for marking time; and of the organ, sufficiently prove. This inferiority may be accounted for upon the principle, that the highest discoveries in mechanics do not depend upon the capacity, however en-

larged, of any individual, but upon the successive discoveries of many individuals, during ages, combined at length, by some powerful genius, and directed to the completion of one great object. Hence it was reserved to modern times, to witness the invention of those exquisite and grand combinations of mechanism, which are displayed in the numerous kinds of watch and clock work, and in the higher order of wind instruments, in their several varieties: and hence the present age has produced the most finished pieces of mechanical science, in the Flute-player of Monsieur de Vaucanson, the Trumpeter of Maelzel *, the Panharmonicon of Mr.

* This piece of mechanism is shown, together with the Automaton Chess Player, at 4, Spring Gardens.

Gurk, and the Apollonicon of our celebrated native mechanicians, Messrs. Flight and Robson*. Notwithstanding, however, the superior ingenuity of modern artists, in mechanics, which these scientific inventions discover, it seems to be a thing absolutely impossible, that any piece of mechanism should be invented, which, possessing perfect mechanical motion, should appear to exert the intelligence of a reasoning agent. This seeming impossibility is surmounted in the construction of the Automaton Chess Player. The stretch of invention shown in this unparalleled instance of mechanical skill, will

* This grand instrument, which performs by mechanical action, or may be played upon by five professors at once, is shown at the rooms, No. 101, St. Martin's Lane.

be fully appreciated only by those who can form an estimate of the variety of combinations amongst the pieces which a game of Chess presents: the constant exercise of acute judgment required in anticipating the designs of an antagonist, or in frustrating those which cannot be foreseen; and the experience in the game, which must be attained by any individual, before he can become qualified to be a skilful Chess Player. Some accurate notion, however, of the surprising powers which the inventor of this singular piece of mechanism has displayed, even they who are unacquainted, or but slightly acquainted, with the game of Chess, may derive from a faithful description of it, with respect to its construction, so far as that can be explained, and its general manner of work-

ing. Such a description, likewise, may be acceptable to those who are adepts in the game, to call to their recollection, any interesting circumstance relating to the Automaton, which they may have forgotten; and to be a slight memorial of a masterpiece of human ingenuity which excited their liveliest curiosity and admiration.

" Indocti discant, ament meminisse periti."

OBSERVATIONS,

&c.

THE celebrated piece of mechanism, called the Automaton Chess Player, was the invention of Wolffgang de Kempelen, a Hungarian gentleman, Aulic Counsellor to the Royal Chamber of the domains of the Emperor in Hungary. His genius for mechanics appeared in early life; and when matured by study, and experimental observation to which the leisure that his employment afforded him, was chiefly devoted, displayed itself in various inven-

tions and improvements of great public utility.

Being at Vienna, in the year 1769, upon business of office, he was invited, by order of the Empress Maria Theresa, to be present at certain experiments of magnetism, which were to be exhibited before herself and the Imperial court, by a Frenchman, of the name of Pelletier. During the exhibition, M. de Kempelen, who was honoured with the familiar conversation of the Empress, dropped a hint that he thought himself competent to construct a piece of mechanism, which should produce effects far more surprising and unaccountable than those which she then witnessed. The curiosity of the Empress being strongly raised, she expressed a lively desire to see his idea carried into execution, and drew from him a promise that he would gratify her wishes

without delay. M. de Kempelen kept his word; and within the space of six months completed his Automaton Chess Player.

At Vienna, where it was first produced, it excited the highest astonishment and admiration of the Empress and her court, and of many illustrious and scientific persons, who examined its extraordinary powers. The report of them quickly spread; and the newspapers of the time speak of them in unmeasured terms of approbation. The inventor, however, with that indifference to popular favour which characterizes true genius, not only declined making a public exhibition of his Automaton, and refused considerable pecuniary offers from persons desirous of purchasing it; but in his ardour for prosecuting some new mechanical pursuit, actually laid it aside, and even proceeded in part to take it to pieces.

In this disordered state it remained during many years, when, on the occasion of a visit made by the Grand Duke Paul, of Russia, with his consort, to the court of Vienna, the Emperor Joseph II. recollecting the invention of M. de Kempelen, signified a wish that he should exhibit it for the gratification of these august personages. In the course of five weeks, the numerous repairs which it required, were completed by the indefatigable genius of its inventor; and on being produced before the Imperial visiters, it excited no less astonishment and admiration than at its first appearance. Upon this occasion, M. de Kempelen was urged and prevailed upon to satisfy general curiosity by exhibiting it publicly in Germany and in other countries. Accordingly, the Emperor having granted him permission to absent himself from the duties of his employment during two years, he travelled with his Automa-

ton, into various parts of Germany and to Paris; and in the year 1785, he visited England. At his death, which took place about the year 1803, the Automaton came into possession of his son, who sold it to the present exhibiter, a man, apparently of great ability in the science of mechanics, and inferior only to M. de Kempelen himself.

This short historical notice, touching the inventor of the Automaton Chess Player, and the circumstances which led to its invention and first exhibition, naturally precedes a description of the Automaton itself.

The room where it is at present exhibited, has an inner apartment, within which appears the figure of a Turk, as large as life, dressed after the Turkish fashion, sitting behind a chest of three feet and a half in length, two feet in breadth,

and two feet and a half in height, to which it is attached by the wooden seat on which it sits. The chest is placed upon four casters, and together with the figure, may be easily moved to any part of the room. On the plain surface formed by the top of the chest, in the centre, is a raised immoveable chess-board of handsome dimensions, upon which the figure has its eyes fixed; its right arm and hand being extended on the chest, and its left arm somewhat raised, as if in the attitude of holding a Turkish pipe, which originally was placed in its hand.

The exhibiter begins by wheeling the chest to the entrance of the apartment within which it stands, and in face of the spectators. He then opens certain doors contrived in the chest, two in front, and two at the back, at the same time pulling out a long shallow drawer at the bottom of the

chest made to contain the chess men, a cushion for the arm of the figure to rest upon, and some counters. Two lesser doors, and a green cloth screen, contrived in the body of the figure, and in its lower parts, are likewise opened, and the Turkish robe which covers them is raised; so that the construction both of the figure and chest internally is displayed. In this state the Automaton is moved round for the examination of the spectators; and to banish all suspicion from the most sceptical mind, that any living subject is concealed within any part of it, the exhibiter introduces a lighted candle into the body of the chest and figure, by which the interior of each is, in a great measure, rendered transparent, and the most secret corner is shown. Here it may be observed, that the same precaution to remove suspicion is used, if requested, at the close as at

the commencement of a game of Chess with the Automaton.

The chest is divided, by a partition, into two unequal chambers. That to the right of the figure is the narrowest, and occupies scarcely one third of the body of the chest. It is filled with little wheels, levers, cylinders, and other machinery used in clock-work. That to the left contains a few wheels, some small barrels with springs, and two quarters of a circle placed horizontally. The body and lower parts of the figure contain certain tubes which seem to be conductors to the machinery. After a sufficient time, during which each spectator may satisfy his scruples and his curiosity, the exhibiter recloses the doors of the chest and figure, and the drawer at bottom; makes some arrangements in the body of the figure, winds up the works with a key inserted into a small

opening on the side of the chest, places a cushion under the left arm of the figure, which now rests upon it, and invites any individual present to play a game of Chess.

At one and three o'clock in the afternoon, the Automaton plays only ends of games, with any person who may be present. On these occasions the pieces are placed on the board, according to a preconcerted arrangement; and the Automaton invariably wins the game. But at eight o'clock every evening, it plays an entire game against any antagonist who may offer himself, and generally is the winner, although the inventor had not this issue in view as a necessary event.

In playing a game, the Automaton makes choice of the white pieces, and always has the first move. These are sm[illegible]

advantages towards winning the game which are cheerfully conceded. It plays with the left hand, the right arm and hand being constantly extended on the chest, behind which it is seated. This slight incongruity proceeded from absence of mind in the inventor, who did not perceive his mistake till the machinery of the Automaton was too far completed to admit of the mistake being rectified. At the commencement of a game, the Automaton moves its head, as if taking a view of the board; the same motion occurs at the close of a game. In making a move, it slowly raises its left arm from the cushion placed under it, and directs it towards the square of the piece to be moved. Its hand and fingers open on touching the piece, which it takes up, and conveys to any proposed square. The arm, then, returns with a natural motion to the cushion upon which it usually rests. In taking a

piece, the Automaton makes the same motions of the arm and hand to lay hold of the piece, which it conveys from the board; and then returning to its own piece, it takes it up, and places it on the vacant square. These motions are performed with perfect correctness; and the dexterity with which the arm acts, especially in the delicate operation of castling, seems to be the result of spontaneous feeling, bending at the shoulder, elbow, and knuckles, and cautiously avoiding to touch any other piece than that which is to be moved, nor ever making a false move.

After a move made by its antagonist, the Automaton remains for a few moments only inactive, as if meditating its next move; upon which the motions of the left arm and hand follow. On giving check to the King, it moves its head as a signal. When a false move is made by its antago-

nist, which frequently occurs, through curiosity to observe in what manner the Automaton will act: as, for instance, if a Knight be made to move like a Castle, the Automaton taps impatiently on the chest, with its right hand, replaces the Knight on its former square, and not permitting its antagonist to recover his move, proceeds immediately to move one of its own pieces: thus appearing to punish him for his inattention. The little advantage in play which is hereby gained, makes the Automaton more a match for its antagonist, and seems to have been contemplated by the inventor as an additional resource towards winning the game.

It is of importance that the person matched against the Automaton, should be attentive, in moving a piece, to place it precisely in the centre of its square; otherwise the figure, in attempting to lay

hold of the piece, may miss its hold, or even sustain some injury in the delicate mechanism of the fingers. When the person has made a move, no alteration in it can take place: and if a piece be touched, it must be played somewhere. This rule is strictly observed by the Automaton. If its antagonist hesitates to move for a considerable time, it taps smartly on the top of the chest with the right hand, which is constantly extended upon it, as if testifying impatience at his delay.

During the time that the Automaton is in motion, a low sound of clock-work running down is heard, which ceases soon after its arm returns to the cushion; and then its antagonist may make his move. The works are wound up at intervals, after ten or twelve moves, by the exhibiter, who is usually employed in walking up and down the apartment in which the Auto-

maton is shown, approaching, however, the chest from time to time, especially on its right side.

At the conclusion of the exhibition of the Automaton, on the removal of the chess men from the board, one of the spectators indiscriminately is requested to place a Knight upon any square of the board at pleasure. The Automaton immediately takes up the Knight, and beginning from that square, it moves the piece, according to its proper motion, so as to touch each of the sixty-three squares of the chess board in turn, without missing one, or returning to the same square. The square from which the Knight proceeds is marked by a white counter; and the squares successively touched, by red counters, which at length occupy all the other squares of the board.

The description now given of the Automaton Chess Player, with respect to its construction, so far as that can be explained, and its general manner of working, naturally suggests an interesting inquiry: What are the immediate causes by which its unparalleled phenomena are produced?

To this inquiry no satisfactory answer has yet been made. It is allowable, therefore, to hazard some observations in reply to it. The causes sought for appear to be two, which are distinct from each other —a moving force from which the left arm and hand of the Automaton derive the action peculiar to those parts of the body; and a directing force, by which the same arm and hand, when raised and prepared to act, are guided on this side or that, according to circumstances, many of which cannot possibly be anticipated, and each of which requires the exertion of the rea-

soning faculty, sometimes in a high degree. To explain the nature of the moving force, which is employed, is the province of the professed mechanician, who can account for it upon fixed mechanical principles. The operation of that force at a certain time after each move of an antagonist, seems to depend upon the momentary interference of the exhibiter, who though usually employed in walking up and down, approaches the chest when theAutomaton is about to make a move (p. 20), and appears to touch some spring, near to the arm of the figure, on the right side, which spring may set in motion the works by which the arm and hand of the Automaton are raised from the cushion, are made to bend at their several joints, so as to grasp the piece to which they may be guided by the directing force, and to retain it for a given moment of time, after which, on disposing of the piece, the arm and hand become relaxed, and are

brought back to their usual position. In case a piece is to be taken, or a false move is made by an antagonist, or the Automaton castles (p. 21), by a peculiar manner of touching the spring, these mechanical motions of the arm and hand might be repeated de suite; with a variation only in the return of the arm, which would not take place until the end of the repetition. But the mystery in the action of the Automaton—a mystery not less hard to be solved by professed mechanicians, than by persons unacquainted with the science of mechanics, arises from the nature and operation of the directing force by which the arm and hand of the Automaton, when raised and prepared to act by the moving force, are guided with a precision and judgment that baffles the skill even of experienced chess players. Various conjectures have been made upon this subject. It was supposed, for a time, that the di-

recting force was some concealed loadstone, until the inventor of the Automaton showed the groundless nature of such a supposition, by permitting any person to place the most powerful loadstone in contact with the figure, or upon any part of the chest to which it is attached.

The most obvious solution of the nature and operation of the directing force may be drawn from the hypothesis, that a living subject is enclosed within the left or larger chamber of the chest, who guides the arm and hand of the Automaton when raised, either in this or that direction, according to the ever varying appearance of the game, which might be discerned through a transparent chess-board. It is sufficient, however, in order to refute this hypothesis, to repeat what has been already mentioned in page 17, that both before and after the exhibition of the Auto-

maton, the exhibiter is willing to lay open for the examination of every spectator its entire construction internally, so as to satisfy the most incredulous person, that no concealment whatsoever of a living subject can take place.

With more semblance of reason, it has been conjectured that there is a communication between the left arm and hand of the Automaton, and a person placed in an adjoining room, who, though unseen, himself, is a spectator of the game; and that by means of this communication, the directing force required may be conveyed at the time when the arm and hand are raised. This conjecture, however plausible, may be answered by the statement of a plain fact, referred to before, that M. de Kempelen exhibited his Automaton, on two different occasions, at the Imperial palace of Vienna; and it is absolutely chimerical to suppose, that upon those occa-

sions, any communication could be opened with an adjoining apartment in the palace to that in which the Automaton was exhibited. Still the question returns, What is the nature and operation of the directing force, by which the left arm and hand of the Automaton when raised, and prepared to act, are guided?

With respect to the nature of this directing force, there can be only one reasonable opinion, that it must proceed from the immediate direction of some human agent; and since there is no communication with such an agent concealed within the chest, or in a room adjoining, it must proceed from the immediate direction of the exhibiter himself.

Nevertheless the operation of this directing force, or in what secret manner the exhibiter directs the arm and hand of the Automaton when raised, yet remains to

be explained. M. de Kempelen once threw out a hint, that the chief merit of his invention lay in the successful manner in which he deceived the spectators; by which hint he seemed to imply not only that the exhibiter does interfere in an unperceived manner in directing the arm and hand of the Automaton when raised, according to the varying circumstances of a game of Chess; but that the mode of such interference is very simple. In fact, when the arm and hand are raised and prepared to act by the operation of the moving force already explained, the action of a wire or piece of catgut, not much thicker than a hair, would be sufficient to guide them in any direction; which action, from the delicacy of the medium used, might be communicated in a manner wholly unperceived by the spectators*.

* There can be little doubt that the peculiar action of the Automaton (p. 24), by which the Knight is

Probably the precise time and instrument of communicating this action, which are circumstances systematically kept secret, will never be discovered; and the conception of them, reflects the highest honour upon the ingenuity of the inventor. To construct an arm and hand capable of performing the ordinary functions of those parts, would be of itself sufficient to secure the reputation of an artist; but to make the same arm and hand almost counterparts of living members in a reasoning agent, displays a power of invention as bold and original, as any that has ever been exhibited to the world.

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made to touch each of the 63 squares of the chess-board in turn, depends upon the action of machinery alone, without any interference of the exhibiter, except in previously winding up the works. The motions of the head of the figure, and its tapping on the chest (pp. 20—23), are a kind of hors d'œuvre.

THE END.

S. Gosnell, Printer, Little Queen Street, London.

AN ACCOUNT OF THE MECHANISM OF AN AUTOMATON, OR IMAGE playing on the *German-Flute*:

As it was preſented in a *Memoire*, to the Gentlemen of the ROYAL-ACADEMY of SCIENCES at *PARIS*.

By M. VAUCANSON, *Inventor and Maker of the ſaid* MACHINE.

TOGETHER WITH

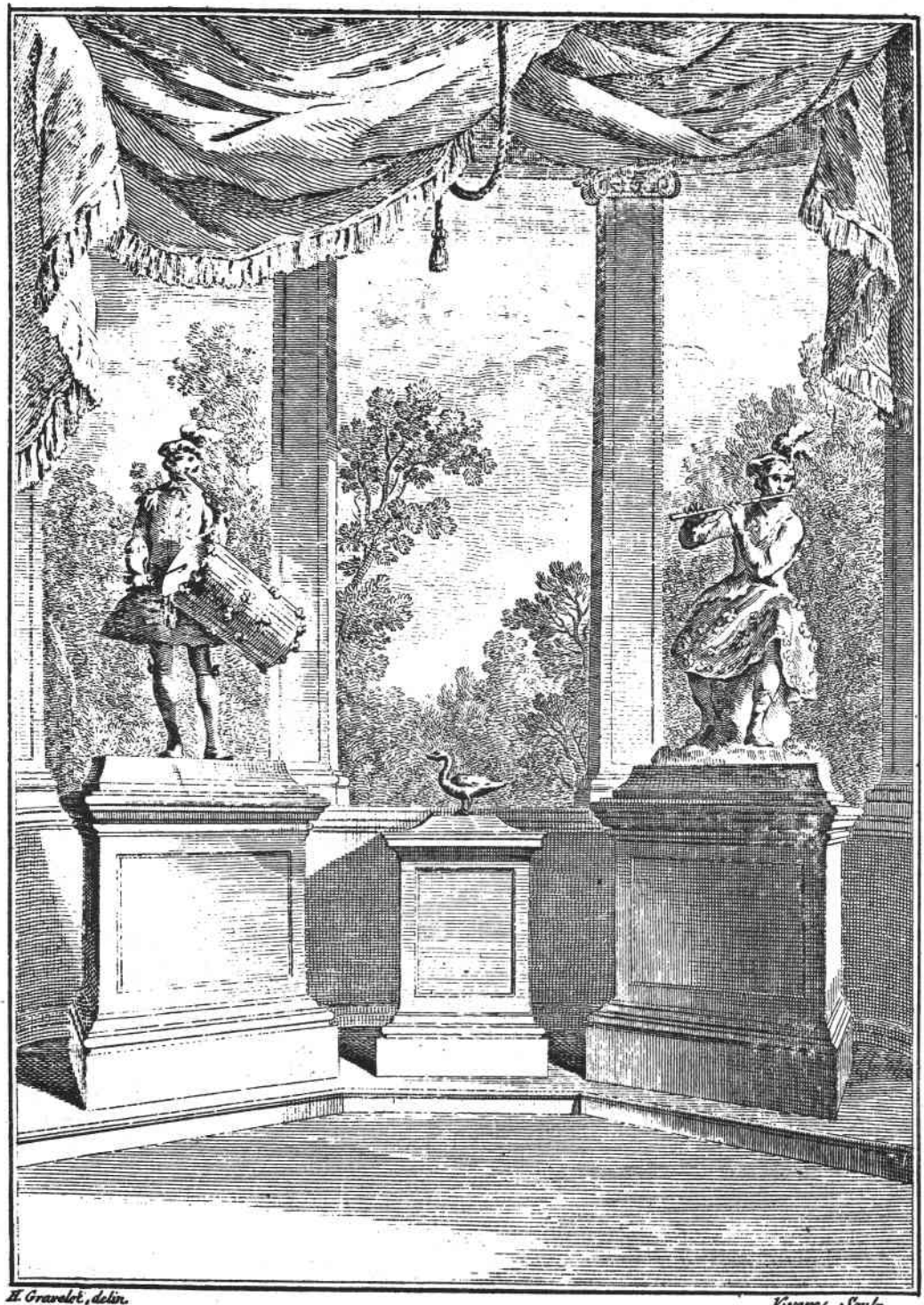
A DESCRIPTION of an artificial DUCK, eating, drinking, macerating the Food, and voiding Excrements, pluming her Wings, picking her Feathers, and performing ſeveral Operations in Imitation of a living Duck: Contrived by the ſame Perſon.

AS ALSO

That of another Image, no leſs wonderful than the firſt, playing on the Tabor and Pipe; as he has given an Account of them ſince the *Memoire* was written.

Tranſlated out of the French *Original, by* J. T. DESAGULIERS, L. L. D. F. R. S. *Chaplain to his Royal Highneſs the* PRINCE *of* Wales.

LONDON: Printed by T. PARKER, and ſold by Mr. STEPHEN VARILLON at the *Long Room*, at the *Opera Houſe* in the *Hay-market*, where theſe Mechanical Figures are to be ſeen at 1, 2, 5, and 7, *o' Clock* in the Afternoon. 1742.



H. Gravelot, delin. Vivares Sculp.

AN

ACCOUNT

OF THE

MECHANISM of an IMAGE

Playing on the *GERMAN FLUTE*, &c.

Preſented to the Gentlemen of the *Royal Academy* of Sciences,

By Mr. *VAUCANSON*, the Inventor of it.

GENTLEMEN,

LESS ſenſible of the Applauſe of the Publick, than deſirous of theHappineſs of deſerving yours, I come to diſcover to you, that it is only in following your Steps that I have been able to go on with ſome Succeſs in the Track I have purſued, for the Execution of my Undertaking. You will know your Leſſons in my Work. It is only raiſed on the ſolid Principles of Mechanicks, which I have taken from you.

To You I owe the Reflections I have made on the Sound of Inſtruments, on Mechanicks, and on the different Motion of the Parts wherewith Machines work. My Thoughts on the *German-Flute* will make the firſt Part of this *Memoire*: And in the Second, I ſhall do my ſelf the Honour to give a Detail of the Pieces contain'd in my Work, their ſeveral Motions, and their Effect.

FIRST PART.

My firſt Care has been to examine the Mouth of Wind-Inſtruments, to know well how to get Sound out of them, what Parts contribute to produce it, and how it may be modified.

You know, Gentlemen, that the Mouth of a *German Flute* differs from that of the other Wind-Inſtruments, ſuch as the common Flute, the Flageolet, and the Organ-Pipe; becauſe in theſe laſt the Wind introduced at a narrow Hole, but which is determined, ſtrikes the Parts of the Body of the Inſtrument which are immediately under it, as the Bezel; and by the Quickneſs of its Return, and its Re-action upon the ſmall Parts round about it, it ſuffers a violent Colliſion: Thus communicating its Vibrations to all the Parts of the Wood of the Flute, which in their Turn communicate them to the external Air round about them, it produces in us the Senſation of Sound.

But in the *German-Flute* the Mouth is undetermined, becauſe in that Inſtrument the Wind paſſes through a greater or ſmaller Iſſue, made by the greater or leſs Opening of the Lips, as they approach towards, or recede from each other; as they come nearer to, or are further from the Hole of the Flute; or as they advance more or leſs over the ſaid Hole.

All theſe Differences, which I reduce to four in the Mouth of the *German-Flute*, make it, in playing upon it, capable of a very great Number of Perfections, which are wanting in other Wind-Inſtruments, whoſe Mouth is determin'd; which I ſhall ſhew in explaining thoſe Motions.

The Sound being firſt produced by the Vibration of the Air, and the ſmall Parts of the Body of the Flute, is

is only determined by the Quickneſs or Slowneſs of thoſe Vibrations. If in an equal Time they are to be continued in a greater Number of the Parts of the Body ſtruck, they will loſe more of their Motion, and conſequently of their Swiftneſs; and thus, becoming ſlower in the ſame Time, they produce a leſs lively Sound; and this makes the deep or low Tones.

This happens when all the Holes of the Flute are ſtop'd. The Vibrations, which begin exactly at the Hole of the Mouth, muſt be communicated to all the Parts of the Wood at the ſame Time; therefore they are ſuddenly weaken'd, becauſe their Force is divided among a great Number of Particles; which will make the Flute give the loweſt Sound.

If you open the firſt Hole next the Bottom of the Flute, the Vibrations find an Iſſue ſooner, which interrupts their Continuation in the reſt of the Parts of the Body of the Flute: They have fewer Particles to ſtrike, (the Pipe being ſhortned by opening the ſaid Hole) thus, loſing a little leſs of their Force, becauſe there are now fewer Particles among which they muſt be divided, they will have a little more Swiftneſs; and being quicker in the ſame Time, they will produce a leſs deep Sound, and that will be a Tone higher. The other Tones will riſe gradually, as the upper Holes are unſtopp'd.

When you come to unſtop the Hole which is neareſt to the Mouth, that Hole dividing the inward Space of the Flute into two equal Parts, the Vibrations will find an Iſſue in the Middle of the Way that they are to run, to continue to the End of the Pipe; therefore they will go out with as much more Force and Velocity, having only half the Particles, among which they muſt divide themſelves; and conſequently will produce a Sound as high

high again, which will be the Octave. But as a Part of thoſe Vibrations is always communicated to the other half of the Body of the Flute, the Wind muſt be forc'd a little, to produce in thoſe Vibrations Accelerations, which by the Increaſe of their Motion will ſupply the Want of thoſe that are loſt in the other half of the Flute; then you will have a full Octave. That Note is alſo produc'd by ſtopping all the Holes of the Flute, as in that of the firſt Octave: But then you muſt double the Force of the Wind, to produce double Vibrations in the whole Body of the Flute, which amounts to the ſame Thing.

This is what is practiſed in the Tones of the ſecond Octave, where the Poſition of the Fingers and Opening of the Holes is the ſame as in the Firſt. You muſt blow with a double Force to produce double the Number of Vibrations in the ſame Time; which makes the ſecond Octave: Becauſe the more or leſs acute Sound conſiſts in the greater or leſs Number of Vibrations in the ſame Time.

Again, the Wind muſt be given with a triple Force to produce the third Octave; but Vibrations, ſo ſuddenly redoubled, not finding ſufficient Iſſue in the firſt Hole to hinder their going on in the reſt of the Body of the Flute, becauſe of their extreme Swiftneſs, we muſt be forced to open ſeveral Holes in the lower Part of the Flute; thus the Pipe being more open, the Vibrations will have a greater Iſſue and a full and open Sound will be form'd, without being oblig'd to give the Wind quite a triple Force.

By this changing of Openings, different from what is required in natural Sounds, an Iſſue may be given ſooner or later, and greater or leſs, to produce Semi-Tones; which muſt alſo be done in the laſt high Sounds, where a quicker and greater Iſſue muſt be given, that the Vibrations

Vibrations may not loſe their Velocity in communicating with too many Parts of the Body of the Flute.

What remains is to ſhew how the Wind is modified, and what are the Parts in a living Perſon which contribute to give it more or leſs Force.

The Preſſure of Pectoral Muſcles upon the Lungs drives the Air out of the Veſicles that contain it: When this come up to the Mouth thro' the *Trachea Arteria*, (or Wind-pipe) it goes out of it by the Opening which the Lips form as they are applied to the Hole of the Flute. The greater or leſs Force of the Wind depends, firſt, upon the greater or leſs Preſſure of the Muſcles of the Breaſt, which drive it out of its Receptacle; ſecondly, upon the greater or leſs Opening of the Lips at its going out: So that when you wou'd blow weakly, the Muſcles then muſt act weakly, and the Lips making a large Opening, the Wind is driven ſlowly; and conſequently its Return producing Vibrations equally ſlow, and ſtill farther ſlacken'd by their Communication with all the Parts of the Wood of the Flute, low Sounds will be form'd.

But when you wou'd riſe to the Octave, that is, produce Sounds as high again, the Muſcles muſt act with a little more Force; and the Lips, coming nearer together, muſt a little diminiſh their Opening; then the Wind being more ſtrongly compreſs'd, and having a ſmaller Iſſue, will double its Swiftneſs, and produce double Vibrations, and thereby give Notes as high again, that is, the Octave. As you riſe gradually to the high Sounds, the Muſcles will act with more Force, and the Opening of the Lips will be proportionably contracted, that the Wind, driven in a more lively Manner, and forced to go out at the ſame Time by a ſmaller Iſſue, may conſiderably increaſe its Swiftneſs, and conſequently produce accelerated Vibrations, which make acute Sounds.

But

But the *German-Flute* (as I have already ſaid) having this Difference from other Wind-Inſtruments, that its Mouth is undetermined, the Advantages that ariſe from it, are that the Wind may be modulated by the greater or leſs Opening of the Lips, and by their different Poſition upon the Hole of the Flute, and by the Performer's being able to turn the Flute inwards or outwards. By this Means the Sounds may be ſwell'd and diminiſh'd, ſoften'd, and ſtrengthen'd, produce Echoes, and give Grace and Expreſſion to the Tunes that are play'd; which Advantages are not to be found in thoſe Inſtruments whoſe Mouth is determin'd: which I ſhall ſhew in explaining the Mechaniſm of the different Operations perform'd on the *German-Flute*

Sound conſiſting in the Vibrations of the Air produced by its Entrance into the Flute, and its Return upon that which ſucceeds it; if, by a particular Poſition of the Lips, it enters into the whole Bigneſs of the Hole of the Flute, that is, goes thro' the longeſt Chord of the Hole, or the true Diameter of it, (which is done by turning the Flute outwards) then it ſtrikes a greater Number of the Particles of the Wood, and at its Return finding an Iſſue equally large, it communicates with a greater Quantity of external Air; and this produces the louder Sounds.

But when the Flute is turn'd inwards, the Lips cover more than half the Hole, the Wind going in thro' a ſmaller Opening, and being able to return only thro' the ſame, in order to communicate with the external Air, it can ſtrike only a leſs Quantity of it, which makes the Sound ſoft. Theſe two Differences may have ſeveral Degrees, which depend upon placing the Lips over a greater or leſs Chord of the Hole of the Flute, by turning it more inwards or outwards.

Therefore

Therefore when there is Occaſion to ſwell a Note, firſt you turn the Flute inwards, that the Lips coming over the Edge of the Hole may ſuffer but a ſmall Quantity of Wind to go in or out, which then is driven weakly to produce a weak Sound; then inſenſibly turning the Flute outwards, the Lips allow of a greater Paſſage and Return to the Wind, which at that Time is driven with greater Force, that it may be communicated to a greater Quantity of Air, and there y increaſe the Sound; or diminiſh it anew, by inſenſibly turning the Flute inwards, as in the firſt Operation.

All theſe Variations of the Mouth may be perform'd in any one Sound whatſoever, whether it be an high or a low one; becauſe the Wind, tho' driven with different Degrees of Velocity during the Note that you wou'd ſwell to ſoften, muſt always be ſo regulated as to produce the Vibrations which determi ne that Note: In the Beginning, when the Sound will be weak, becauſe it will ſtrike a leſs Quantity of external Air, yet it will have Vibrations equal to thoſe that are produc'd in the Middle of the Note where the Sound encreaſes in Force, becauſe it will be communicated to a greater Quantity of Air; the Vibrations not being ſtronger or weaker on Account of their Velocity, but on Account of the Quantity of the Parts that they act upon, and which they put in Motion.

Wou'd you produce a ſoft Sound to repreſent an Echo? Place the Lips over the Hole quite to its Edge, by turning the Flute much inwards: then the Sound being able to be communicated but to a ſmall Quantity of external Air, thro' ſo ſmall an Hole, makes us hear a Sound that ſeems to be afar off, by its ſtriking our Organs weakly.

Theſe are Conveniences which cannot be found in Inſtruments whoſe Mouth is determined and invariable.

What remains to explain is that ſtroke of the Tongue, which is abſolutely neceſſary for playing on all Wind-Inſtruments.

The tonguing an Inſtrument is nothing elſe than a ſhort Interruption of the Wind, by the Interpoſition of the End of the Tongue in the Paſſage of the Lips.

Theſe, GENTLEMEN, have been my Thoughts upon the Sound of Wind-Inſtruments, and the Manner of modifying it. Upon theſe Phyſical Cauſes I have endeavour'd to found my Enquiries; by imitating the ſame Mechaniſm in an *Automaton*, which I endeavour'd to enable to produce the ſame Effect in making it play on the German Flute. The Parts which compound it, their Situation, their Connection, and their Effects, will be the Subject of the ſecond Part of this *Memoire*, as I firſt propoſed.

SECOND PART.

The Figure is about ſix Foot and an half high, ſiting upon a Piece of a Rock, placed on a ſquare Pedeſtal, four Foot and an half high, and three Foot and an half wide.

In the forepart of the Pedeſtal (the Pannel being open'd) on the right Hand there is a Movement, which by Means of ſeveral Wheels mov'd by a Weight, carries round underneath a ſteel Axel or Arbor, two Foot and a half long, with ſix Cranks in its Length at equal Diſtances, but looking different Ways. To each Crank are faſten'd Strings which terminate at the End of the upper Boards of ſix Pair of Bellows, two Foot and an half long, and ſix Inches wide each, placed at the Bottom of the Pedeſtal, where their lower Boards are made faſt, ſo that as the Arbor turns, the ſix Pair of Bellows riſe and fall ſucceſſively one after another.

In

In the hind Part of the Pedeſtal, above each Bellows, there is a double Pulley, whoſe Diameters are unequal, namely, one of three Inches and the other of an Inch and an half; which is done to give the Bellows a greater Riſe, becauſe the Strings joyn'd to them go round the great Diameter of the Pulley, and thoſe that are faſten'd to the Arbor which draws them, wind round the ſmall Diameter.

On the great Diameter of three of theſe Pullies on the right Hand, there are alſo wound three Strings, which, by Means of ſeveral little Pullies, terminate at the upper Boards of three Pair of Bellows placed in the upper Part of the Pedeſtal, before and at the Top.

Each String, as it ſtretches, when it begins to draw the Board of the Bellows, to which it is fix'd, moves a Lever placed above, between the Axis and the double Pullies in the middle Part of the loweſt Space of the Pedeſtal. That Lever, by Means of different leading Pieces terminates at the Valve of the lower Board of each Bellows, and keeps it raiſed, that the Air may go thro' without any Reſiſtance, whilſt the upper Board, as it riſes, encreaſes the Cavity of the Bellows. By that Means, beſides gaining Force, we avoid the Noiſe which that Valve commonly makes, as the Air cauſes it to tremble when it comes into the Bellows. Thus the nine Bellows are moved without any Shake, or Noiſe, and with but a ſmall Force.

Theſe nine Bellows communicate their Wind, in three different and ſeparate Pipes. Each Pipe receives that of three Pair of Bellows: The three which are in the lower Part of the Pedeſtal on the right Hand forwards communicate their Wind to a Pipe which runs up along the upright Piece of the Pedeſtal on the ſame Side; and theſe three Bellows are loaded with a Weight of four Pounds each: The three which are on the left Hand in the ſame

Row, give their Wind thro' a Pipe like the former, which riſes along the upright Piece on the ſame Side; and thoſe below are only loaded with two Pounds each: The three Pair of Bellows, which are in the upper Part of the Pedeſtal, give their Wind thro' a Pipe which runs horizontally under them, and are loaded only with the Weight of their upper Boards.

Theſe three Pipes, by different Elbows, end in three ſmall Receptacles in the Breaſt of the Figure. There they re-unite into one, which goes up thro' the Throat, or Wind-Pipe, and widening makes a Cavity in the Mouth terminated by two Lips which bear upon the Hole of the Flute: Theſe Lips give the Wind a greater or leſs Iſſue, as they are more or leſs open; for the Performance of which, as well as that of coming forward or being drawn back, there is a particular Piece of Mechaniſm.

Within the forementioned Cavity there is a little moveable Tongue, which by its play can open or ſhut the Paſſage of the Wind that goes thro' the Lips of the Figure.

By this Mechaniſm has the Wind been conducted to the Flute; and by the following Contrivances it has been modified.

In the anterior Face of the Pedeſtal on the Left, there is another Movement, which by is Wheel-work, turns a Cylinder two Foot and an half long, and ſixty four Inches in Circumference: This Cylinder or Barrel is divided into fifteen equal Parts, of an Inch and an half each.

In the poſterior Face of the Pedeſtal in the upper Part of it, there is a Key-Frame, drawing or bearing on the Barrel, made of fifteen very moveable Levers, whoſe Ends on the Inſide have a little Nib or lifting Piece of Steel, which anſwers to each Diviſion of the Barrel.

At the other of theſe Levers are faſten'd Wires and Chains of Steel, which lead to the different Receptacles of Wind, to the Fingers, to the Lips, and to the Tongue of the Figure.

Thoſe

Thoſe which anſwer to the different Receptacles of Wind, are three in Number, and their Chains riſe perpendicularly behind the Back of the Figure, quite up to the Breaſt, where they end, being each fix'd to the Valve of one of the Receptacles: And this Valve being open, ſuffers the Wind to paſs into the Pipe of Communication, which riſes, as I have already ſaid, thro' the Wind-pipe into the Mouth.

The Levers which anſwer to the Fingers, are ſeven in Number, and their Chains alſo riſe perpendicularly quite up to the Shoulders; and there they make an Angle or Bend, to go thro' the upper Part of the Arm to the Elbow, where they bend again to run along the Arm as far as the Wriſt, where each of them ends in a Joynt fix'd to a Tenon made by the End of the Lever contain'd in the Hand, imitating the Bone which the Anatomiſts call *Metacarpos*, which, in the ſame Manner, makes a Joynt with the Bone of the firſt *Phalanx*: So that the Chain being drawn, the Finger may riſe.

Four of theſe Chains are inſerted in the right Arm to move the four Fingers of that Hand; and three in the left Arm for three Fingers, there being only three Holes which anſwer to that Hand.

The end of each Finger is arm'd with a Skin or Leather, to imitate the Softneſs of the natural Finger, that the Holes may be exactly ſtopt.

The Levers of the Key-Frame, which anſwer to the Motion of the Mouth, are four in Number: The Steel Wires which are faſten'd to them make Leaders to go to the Middle of a Ratchet within; and there are faſten'd to Chains, which riſe perpendicularly parallel to the Back-Bone in the Body of the Figure, whence paſſing thro' the Neck, they come into the Mouth, where they are faſten'd to thoſe Pieces, which being fix'd

ſix'd to the Lips within, give them four different Motions: The one opens them to give the Wind a greater Iſſue; the next contracts the Paſſage in bringing them nearer together; the third draws them back; and the fourth makes them advance over the Edge of the Hole.

There is but one Lever more upon the Key-Frame, to which is likewiſe faſten'd a Chain which riſes like the reſt, and ends in the Tongue, which is in the Cavity of the Mouth, behind the Lips, to ſtop the Hole, occaſionally, as I ſaid before.

Theſe fifteen Levers anſwer to the fifteen Diviſions of the Barrel, by their Ends which have the Steel Elbows or lifting Pieces, at an Inch and an half Diſtance from each other: When the Barrel turns, the Bars of Braſs fix'd upon its divided Lines meet with the lifting Pieces, and keep them raiſed a longer or a ſhorter Time, according as thoſe Bars are longer or ſhorter: And as the Ends of all thoſe lifting Pieces, make one right Line, parallel to the Axis of the Barrel, cutting all the Lines of Diviſion at right Angles; every Time that a Bar is fix'd at each Line, and that all the Ends of thoſe Bars make amongſt them alſo a right Line, and parallel to that which is form'd by the lifting Pieces of the Levers, each End of a Bar (as the Barrel turns) will touch and raiſe at the ſame Time the End of a Lever; and the other Ends of the Bars likewiſe forming a right Line parallel to the firſt, will, by the Equality of the Length of the Bars, each let fall its Lever at the ſame Time. One may eaſily ſee by this, how all the Levers may act, and at the ſame Time concur to the ſame Operation, if it be neceſſary.

When there is only Occaſion for ſome of the Levers to act, you place Bars only at thoſe Diviſions which anſwer to thoſe Levers which you wou'd have to move: You

You may even determine the Time, by placing them nearer to or farther from the Line form'd by the lifting Pieces ; and their Action may end ſooner or later, according to the different Length of the Bars.

The End of the Axis of the Barrel on the right Hand is terminated by an endleſs Screw with ſingle Threads, diſtant from one another a * Line and an half, containing twelve Threads, which make an Inch and an half in Length, equal to the Diviſions of the Barrel.

Above this Screw a Piece of Braſs is fix'd to the Pedeſtal Frame, which holds a Pivot of Steel of about one Line Diameter, that falls in between the Threads of the Screw, and ſerves inſtead of a Nut to it; ſo that the Barrel in turning is obliged to follow the ſame Direction as the Threads of the Screw, being guided by the Steel Pivot which is fix'd: Thus as the Barrel turns round, each Point of it will deſcribe a Spiral Line, and conſequently make a progreſſive Motionfrom Left to Right.

By this Means each Diviſion of the Barrel, determined at firſt under each End of a Lever, will change its Point at every Revolution, becauſe it will recede from it a *Line* and an half, which is the ſame Diſtance as the Threads of the Screw.

Therefore the End of the Levers faſten'd to the Key-Frame remaining unmoveable, and thoſe Points of the Barrel, to which they anſwered at firſt, moving away each Moment from the Perpendicular, by forming a ſpiral Line, (which by the progreſſive Motion of the Barrel, is always directed to the ſame Point, that is to the End of each Lever) it follows that the End of each Lever meets every Moment new Points upon the Barrs of the Barrel; which are never repeated, becauſe they form Spirals between them, which make twelve Turns upon the

* A Line is the twelfth Part of an Inch.

the Barrel, before the firſt Point of the Diviſion can come under another Lever than that under which it was firſt determin'd.

It is in this Space of an Inch and an half that all the Bars are placed, which Bars themſelves alſo form ſpiral Lines, that the Lever (under which each of them muſt paſs during the twelve Turns of the Barrel) may act.

As one Line changes in Reſpect of its Lever, all the other Lines change in Reſpect of theirs; thus each Lever has twelve Lines of Bars of ſixty four Inches in Length, which all go under it, and which all together make a Line of ſeven Hundred and ſixty-eight Inches long. Upon this Line are fix'd all the Bars ſufficient for the Action of the Lever during the whole Play.

What remains is to ſhew, how theſe different Motions have contributed to produce the Effect which I propoſed in this *Automaton*, comparing them with thoſe of a living Perſon.

To make it produce Sound from the Flute, and form the firſt Note, which is *D* below. I begin firſt to diſpoſe the Mouth; for which End I fix upon the Barrel a Bar under the Lever, which anſwers to thoſe Parts of the Mouth that ſerve to increaſe the Opening of the Lips. Secondly, I fix a Bar under that Lever which ſerves to draw back thoſe Lips. Thirdly, I fix a Bar under that Lever which opens the Valve of that Receptacle of Wind, which is ſupplied by the ſmall Bellows that are not loaded. Laſtly, I fix a Bar under the Lever which moves the Tongue, to give a Stroke with the Tongue; ſo that theſe Bars in the ſame Time touching the four Levers, which ſerve to produce the foreſaid Operations, the Flute will ſound *D* below.

By the Action of the Lever, which increaſes the Opening of the Lips, the Action of a living Man is imitated, who increaſes that Opening for the low Sounds.

By

By the Lever which draws back the Lips, I imitate the Action of a Man who removes them farther from the Hole of the Flute, by turning it outwards.

By the Lever which gives Wind from the unloaded Bellows, I imitate the weak Wind which a Man gives, when he drives it out of the Receptacle of his Lungs, by only a light Compreſſion by the Muſcles of his Breaſt.

By the Lever which moves the Tongue, in unſtopping the Hole thro' which the Lips let the Wind paſs, I imitate the Motion of a Man's Tongue, when he pulls it back from the Hole to give Paſſage to the Wind to articulate ſuch a Note.

It will then follow, from thoſe four different Operations, that by giving a weak Wind, and making it paſs thro' a large Iſſue in the whole Bigneſs of the Hole of the Flute, its Return will produce ſlow Vibrations, which muſt be continu'd in all the Parts of the Body of the Flute, becauſe all the Holes will be ſhut, and, according to the Prinple ſettled in my firſt Part, the Flute will give a low Sound: and this is confirm'd by Experience.

If I wou'd make the Flute ſound the Note above, namely *E*, to the four firſt Operations for *D*, I add a fifth; I fix a Bar under the Lever, which raiſes the third Finger of the Right Hand to unſtop the ſixth Hole of the Flute; and I make the Lips to come a little nearer to the Hole of the Flute, by fixing or making a little lower the Bar of the Barrel which held up the Lever for the firſt Note, namely for *D*. Thus, giving an Iſſue to the Vibrations ſooner, by unſtopping the firſt Hole from the End, as I ſaid above, the Flute muſt ſound a Note above; which is alſo confirm'd by Experience.

All theſe Operations will be continued pretty nearly the ſame in the Notes of the firſt Octave, where the ſame Wind is ſufficient for forming them all. It is the diffe-

C rent

rent Opening of the Holes, by raiſing the Fingers, which characteriſes them: All that is requir'd is to fix on the Barrel Bars under the Levers which muſt raiſe the Fingers to form ſuch a Note.

In order to have the Notes of the ſecond Octave, we muſt change the Situation of the Mouth, that is, we muſt place a Bar under that Lever which ſerves to puſh the Lips beyond the Diameter of the Hole of the Flute, and thereby imitate the Action of a living Man, who in that Caſe turns the Flute a little inwards.

Secondly, we muſt fix a Bar under that Lever, which bringing the Lips towards one another diminiſhes their Opening; as a Man does to give a leſs Iſſue to the Wind.

Thirdly, a Bar muſt be fix'd under the Lever which opens the Valve of that Receptacle that contains the Wind coming from thoſe Bellows which are loaded with two Pounds; becauſe the Wind being then driven with more Force, acts in the ſame Manner as that with which a living Man blows by a ſtronger Action of the Pectoral Muſcles. Beſides, Bars muſt be plac'd ſo as to run under the Levers neceſſary to raiſe the Fingers requir'd.

From all theſe Operations it will follow, that a Wind driven with more Force, and going thro' a ſmaller Paſſage, will double its Swiftneſs, and conſequently produce double the Number of Vibrations; and theſe make the Octave.

As you riſe up to the higher Notes of this ſecond Octave, the Lips muſt ſtill be brought cloſer, that the Wind in the ſame Time may encreaſe its Velocity.

In the Notes of the third Octave, the ſame Levers that go to the Mouth act as in thoſe of the ſecond, with this Difference, that the Bars are a little higher: Which makes the Lips advance quite over the Edge of the Hole of the Flute, ſo as to leave but a very ſmall Hole. You muſt only add a Bar under that Lever which

which opens the Valve of the Receptacle which has its Wind from the moſt loaded Bellows, that is thoſe that are preſs'd down with four Pounds. Conſequently the Wind, blown with a ſtronger Compreſſion, and going thro' a Paſſage ſtill ſmaller, will increaſe its Velocity in a triple Ratio; whereby you will have the triple Octave.

In all theſe different Octaves ſome Notes are harder to produce than others; and then they muſt be managed by bringing the Lips over a greater or a leſs Chord of the Hole of the Flute, and by giving a ſtronger or a weaker Wind, which is the ſame that a Man does to ſound the ſame Notes, being oblig'd to manage his Wind, and to turn the Flute inwards or outwards, more or leſs.

It is eaſy to conceive that all the Bars fix'd upon the Barrel muſt be longer or ſhorter, according to the Time that each Note muſt have, and according to the different Situation neceſſary for the Fingers: which I ſhall not particularize here, leaſt I ſhould exceed the Limits of a ſhort *Memoire*, ſuch as I propoſed to give.

I wou'd only have it obſerved, that in ſwelling of Notes, I have been oblig'd, during the ſame Note, inſenſibly to ſubſtitute a ſtrong Wind to a weak, and a weaker to a ſtronger, and at the ſame Time to vary the Motion of the Lips; that is, to put them into the proper Situation for each Wind.

For a ſoft Sound, that is to imitate an Echo, I have been oblig'd to advance the Lips over the Hole of the Flute, and ſend a Wind ſufficient for forming ſuch a Tone; but whoſe Return, by ſuch a ſmall Iſſue as its Entrance into the Flute, can only ſtrike a ſmall Quantity of external Air; which, as I have ſaid, produces an Echo.

The Quickneſs and Slowneſs of different Airs have been meaſur'd upon the Barrel, by Means of a Lever; one End of which being arm'd with a Steel Point ſerv'd to mark the Barrel, as the Lever was ſtruck upon. At the

other End of the Lever was a Spring, which immediately raiſed the Point up again.

The Movement was ſet a going, which turn'd the Barrel with a Velocity proportionable for the ſeveral Tunes.

At the ſame Time a Perſon play'd on the Flute the Tune whoſe Time was to be meaſured; whilſt another Perſon beat Time upon the End of the Lever, whoſe Point mark'd the Barrel, and the Diſtances between the Points prick'd on were the true Meaſure for the Tunes to be mark'd. Then the Intervals were ſub-divided into as many Parts as the Meaſure had Times or Bars.

The Fear of tiring you, GENTLEMEN, has made me paſs over a great many little Circumſtances, which tho' eaſy to ſuppoſe are not ſo ſoon executed: the Neceſſity of which appears by a View of the Machine, as I found it in the Practice.

GENTLEMEN, after having drawn from your *Memoires* the Principles which have guided me, it wou'd be no ſmall Satisfaction to me, if I could flatter myſelf to ſee you acknowledge, that I have happily applied thoſe Principles in the Execution of my Work. In the Approbation that you will deign to give it, I ſhall find the moſt glorious Reward of my Labour, and ſhall have greater Encouragement to purſue Hopes yet more flattering, which make my utmoſt Ambition.

An ABSTRACT of the Regiſter of the ROYAL-ACADEMY of SCIENCES.

April 30, 1738. N. S.

THE Academy having heard Mr. VAUCANSON's Memoire *read, containing the Deſcription of a wooden Statue, copied from the Marble* Faune *of* Coyſevaux, *that plays on the* German-Flute; *on which it performs twelve different Tunes, with an Exactneſs which has deſerv'd the Admiration of the Publick, and of which great Part of the* Academy *has been Witneſs; they have judg'd this* Machine *to be extremely ingenious, and that the Author of it has found the Means of employing new and ſimple Contrivances, as well for giving the Fingers of that Figure the neceſſary Motions, as for modifying the Wind which goes into the Flute by encreaſing or diminiſhing its Velocity,*

Velocity, according to the different Notes; by varying the Poſition of the Lips, and moving a Valve which performs the Office of the Tongue; and laſtly, by imitating by Art all that is neceſſary for a Man to perform in ſuch a Caſe. Beſides, Mr. VAUCANSON's Memoire *is written with all the Perſpicuity and Exactneſs that the Subject is capable of; which ſhews the Author's Skill and great Knowledge in the different Parts of Mechanicks. In Witneſs whereof I have ſign'd the preſent Certificate.* Paris, May 3, 1738. N. S.

FONTENELLE, Perpetual Secretary of the ROYAL-ACADEMY of SCIENCES.

The Approbation of the Royal Cenſor.

I Have, by Order of my Lord Chancellor, *read a Manuſcript entitl'd,* The Mechaniſm of an *Automaton* playing on the Flute, preſented to the Gentlemen of the Royal-Academy of Sciences, by Mr. VAUCANSON, Author of this Machine. *Mr.* VAUCANSON *explains in his* Memoire *thoſe phyſical Principles that he has employed for the Invention and Execution of his* Automaton, *which is one of the moſt wonderful Productions of Art: It imitates a true Player on the Flute ſo perfectly, that the Publick continues to ſee and hear it with Admiration. Therefore we believe that the Impreſſion of Mr.* VAUCANSON's Memoire *will be very uſeful to ſatisfy fully the Curioſity of the Publick.* Paris, June 12, 1738.

H. PITOT

Mr. VAUCANSON's Letter to the ABBE *De Fontaine.*

MY ſecond Machine, or Automaton, *is a* Duck, *in which I repreſent the Mechaniſm of the Inteſtines which are employed in the Operations of Eating, Drinking, and Digeſtion: Wherein the Working of all the Parts neceſſary for thoſe Actions is exactly imitated. The* Duck *ſtretches out its Neck to take Corn out of your Hand; it ſwallows it, digeſts it, and diſcharges it digeſted by the uſual Paſſage. You ſee all the Actions of a* Duck *that ſwallows greedily, and doubles the Swiftneſs in the Motion of its Neck and Throat or Gullet to drive the Food into its Stomach, copied from Nature: The Food is digeſted as in real Animals, by Diſſolution, not Trituration, as ſome natural Philoſophers will have it. But this I ſhall treat of, and ſhew, upon another Occaſion.*

The Matter digeſted in the Stomach is conducted by Pipes, (as in

in an Animal by the Guts) quite to the Anus, *where there is a Sphincter that lets it out.*

I don't pretend to give this as a perfect Digeſtion, *capable of producing Blood and nutritive Particles for the Support of the Animal. I hope no body will be ſo unkind as to upbraid me with pretending to any ſuch Thing. I only pretend to imitate the Mechaniſm of that Action in three Things,* viz. Firſt, *to ſwallow the Corn;* ſecondly, *to macerate or diſſolve it;* thirdly, *to make it come out ſenſibly changed from what it was.*

Nevertheleſs, it was no eaſy Matter to find Means for thoſe three Actions, and thoſe Means may perhaps deſerve ſome Attention from thoſe that may expect more. They will ſee what Contrivances have been made uſe of to make this artificial Duck *take up the Corn, and ſuck it up quite to its Stomach; and there in a little Space to make a Chymical Elaboratory to decompound or ſeparate the Integrant Parts of the Food, and then drive it away at Pleaſure thro' Circumvolutions of Pipes, which diſcharge it at the other End of the Body of the* Duck.

I don't believe the Anatomiſts *can find any thing wanting in the Conſtruction of its Wings. Not only every Bone has been imitated, but all the Apophyſes or Eminences of each Bone. They are regularly obſerv'd as well as the different Joints: The bending the Cavities, and the three Bones of the Wing are very diſtinct. The* firſt, *which is the* Humerus, *has its Motion of Rotation every Way with the Bone that performs the Office of the* Omoplat, Scapula, *or* Shoulder-Blade: *The ſecond Bone, which is the* Cubitus *of the Wing, has its Motion with the* Humerus *by a Joint which the* Anatomiſts *call* Ginglymus; *the* third, *which is the* Radius, *turns in a Cavity of the* Humerus, *and is faſten'd by its other Ends to the little End of the Wing, juſt as in the Animal. The Inſpection of the Machine will better ſhew that Nature has been juſtly imitated, than a longer Detail, which wou'd only be an anatomical Deſcription of a Wing. To ſhew that the Contrivances for moving theſe Wings are nothing like what is made uſe of in thoſe wonderful Pieces of Art of the* Cock *mov'd by the Clock at* Lyons, *and that at* Straſburgh, *the whole Mechaniſm of our artificial* Duck *is expoſed to View; my Deſign being rather to demonſtrate the Manner of the Actions, than to ſhew a Machine. Perhaps ſome Ladies, or ſome People, who only like the Outſide of Animals, had rather have*

have ſeen the whole cover'd; that is, the Duck *with* Feathers. *But beſides, that I have been deſir'd to make every Thing viſible; I wou'd not be thought to impoſe upon the Spectators by any conceal'd or juggling Contrivance.*

I believe that Perſons of Skill and Attention, will ſee how difficult it has been to make ſo many different moving Parts in this ſmall Automaton; *as for Example, to make it riſe upon its Legs, and throw its Neck to the Right and Left. They will find the different Changes of the* Fulchrum's *or Centers of Motion: they will alſo ſee that what ſometimes is a Center of Motion for a moveable Part, another Time becomes moveable on that Part, which Part then becomes fix'd. In a Word, they will be ſenſible of a prodigious Number of Mechanical Combinations.*

This Machine, when once wound up, performs all its different Operations without being touch'd any more.

I forgot to tell you, that the Duck *drinks, plays in the Water with his Bill, and makes a gugling Noiſe like a real living* Duck. *In ſhort, I have endeavour'd to make it imitate all the Actions of the living Animal, which I have conſider'd very attentively.*

My third Machine, or Automaton, *is the Figure playing on the* Tabor *and* Pipe, *which ſtands upright on its Pedeſtal, dreſs'd like a dancing Shepherd. This plays twenty Tunes, Minuets, Rigadoons, and Country-dances.*

One wou'd at firſt imagine that the Difficulty in making of this has been leſs than in the Figure playing on the German-Flute. *But, without making a Compariſon between the two Machines, to praiſe one more than the other; I would have it obſerv'd, that here an Inſtrument is play'd upon, which is very croſs-grain'd and falſe in itſelf; that I have been forc'd to articulate Sound by Means of a Pipe of three Holes only, where all the Tones muſt be perform'd by a greater or leſs Force of the Wind, and half ſtopping of Holes to pinch the Notes: That I have been oblig'd to give the different Winds, with a Swiftneſs which the Ear can hardly follow; and that every Note, even* Semi-Quavers, *muſt be tongued, without which the Sound of this Inſtrument is not at all agreeable. In this the Figure out-does all our Performers on the* Tabor-Pipe, *who cannot move their Tongue faſt enough to go thro' a whole Bar of* Semi-Quavers, *and ſtrike them all. On the contrary, they ſlur above half of them; but my Piper plays a whole Tune, and tongues every Note. What a Combination of Winds have I been oblig'd to make*

for

for that Purpoſe? In carrying on my Work, I have made Diſcoveries of Things which could never have been ſo much as gueſs'd at. Cou'd it have been thought, that this little Pipe ſhou'd, of all the Wind-Inſtruments, be one of the moſt fatiguing to the Lungs? For in the playing upon it, the Performer muſt often ſtrain the Muſcles of his Breaſt with a Force equivalent to a Weight of 56 *Pounds: For I am oblig'd to uſe that Force of Wind, that is, a Wind driven by that Force or Weight, to ſound the upper* B, *which is the higheſt Tone to which this Inſtrument reaches: Whereas one Ounce only is ſufficient to ſound the firſt Note, or produce the loweſt Tone, which is an* E. *Hence will appear, how many different Blaſts of Wind I muſt have had to run thro' the whole Compaſs of the* Tabor-Pipe.

Moreover, as the different Poſitions of the Fingers are ſo few, ſome wou'd be apt to think that no more different Winds wou'd be neceſſary than the Number of Notes on the Inſtrument; but the Fact is otherwiſe: that Wind, for Example, which is able to produce a D *following a* C, *will never produce it, if the ſame* D *is to be ſounded next to the* E *juſt above it; and the ſame is to be underſtood of all the other Notes. So that upon Computation it will appear that I muſt have twice as many different Winds, as there are Tones, beſides the Semi-Tones, for each of which a particular Wind is abſolutely neceſſary. I own freely, that I am ſurpriz'd myſelf to ſee and hear my* Automaton *play and perform ſo many and ſo differently varied Combinations: And I have been more than once ready to deſpair of ſucceeding; but Courage and Patience overcame every Thing.*

Yet this is not all: This Pipe employs but one Hand; the Figure holds a Stick in the other, with which he ſtrikes on the Tabor *ſingle and double Strokes, Rollings varied for all the Tunes, and keeping Time with what is play'd with the Pipe in the other Hand. This Motion is none of the eaſieſt in the Machine; for ſometimes we muſt ſtrike harder, ſometimes quicker, and the Stroke muſt always be clean and ſmart, to make the* Tabor *ſound right. The Mechaniſm for this conſiſts in an Infinite Combination of Levers, and different Springs, all moved with Exactneſs to keep true to the Tune: But theſe wou'd be too tedious to give a particular Account of. In a Word, this Figure in its Contrivance is ſomething like that which plays on the* German-Flute; *but differs from it in many of the Means of its Operations.*

FINIS.

The TRANSLATOR to the READER.

THOSE who have neither ſeen, nor heard a true Account of M. VAUCANSON's *Machines, may wonder that I ſhould take any Pains to promote the Advantage of Perſons who are expoſing any thing to publick View: As it would be very mean to cry up trifling Performances, and commend what amuſes the great and ſmall Vulgar, by Confederacy, ſuch as the pretended* Mathematical Figures, *&c. But on the other hand, it is laudable to encourage thoſe who are truly ingenious, by doing Juſtice to the moſt curious Peices of Art that perhaps have ever been perform'd; which I cannot do better than by tranſlating into Engliſh this* Memoire *of Mr.* VAUCANSON, *that in a few Words gives a better and more intelligible Theory of* Wind-Muſick *than can be met with in large Volumes. And here the Reader will alſo find a clear Explication of every Part of his Contrivances, which requires no ſmall Skill to do with ſuch Perſpicuity, without Figures.*

In giving this Paper an Engliſh *Dreſs, I am ſtill acting in my Province, which has been for many Years to explain the Works of Art, as well as the* Phænomena *of Nature.*

J. T. DESAGULIERS.

P. S. *Whilſt this* Memoire *was printing, I received the Deſcription of the Duck and that of the Figure playing on the Tabor and Pipe; which Mr,* VAUCANSON *deſcribes in a Letter to a Friend. Therefore to do him Juſtice in every Reſpect, and for the Satisfaction of the Curious, I have ſubjoined the Tranſlation of his Letter.*

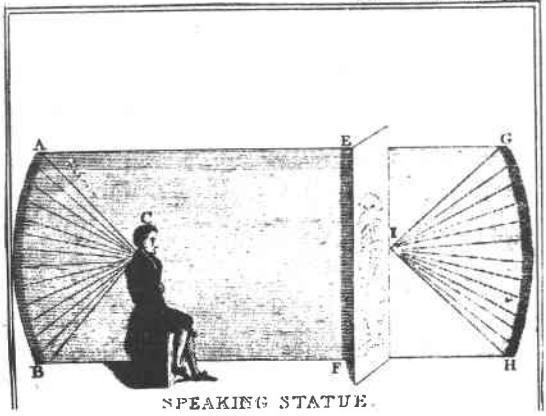
Speaking Statues

There are many accounts of statues and heads in the past which could speak. Some, such as the statue of Memnon in Egypt, were musical in their utterings. Others like the statue of Orpheus at Lesbos not only spoke but accurately predicted events in history.

In the same way that the fantasy of the automaton dancer captured the imagination of many an operatic librettist, so, even if to a lesser extent, did the speaking statue. One appears, for example, in Mozart's 'Don Giovanni'.

Was the speaking statue fact, fantasy or deceit? The following article appeared in a book entitled "Curiosities for the Ingenious – Selected from the most authentic Treasures of Nature, Science and Art." and published in 1822.

Plates XI & XII to face p.124.



SPEAKING STATUE.

How to make a Statue speak.

PLACE a concave mirror of ten, or gilt pasteboard of about two feet diameter, as A B (Plate XI.) in a perpendicular direction. The focus of this mirror may be at fifteen or eighteen inches distance from its circumference. At the distance of about five or six feet, let there be a partition, in which there is an opening (E F) equal to the size of the mirror; against this opening, place a picture printed in water colours on a thin cloth, that sound may easily pass through it. Behind the partition, at the distance of two or three feet, place another mirror (G H) of the same size as the former, and let it be diametrically opposite to it.

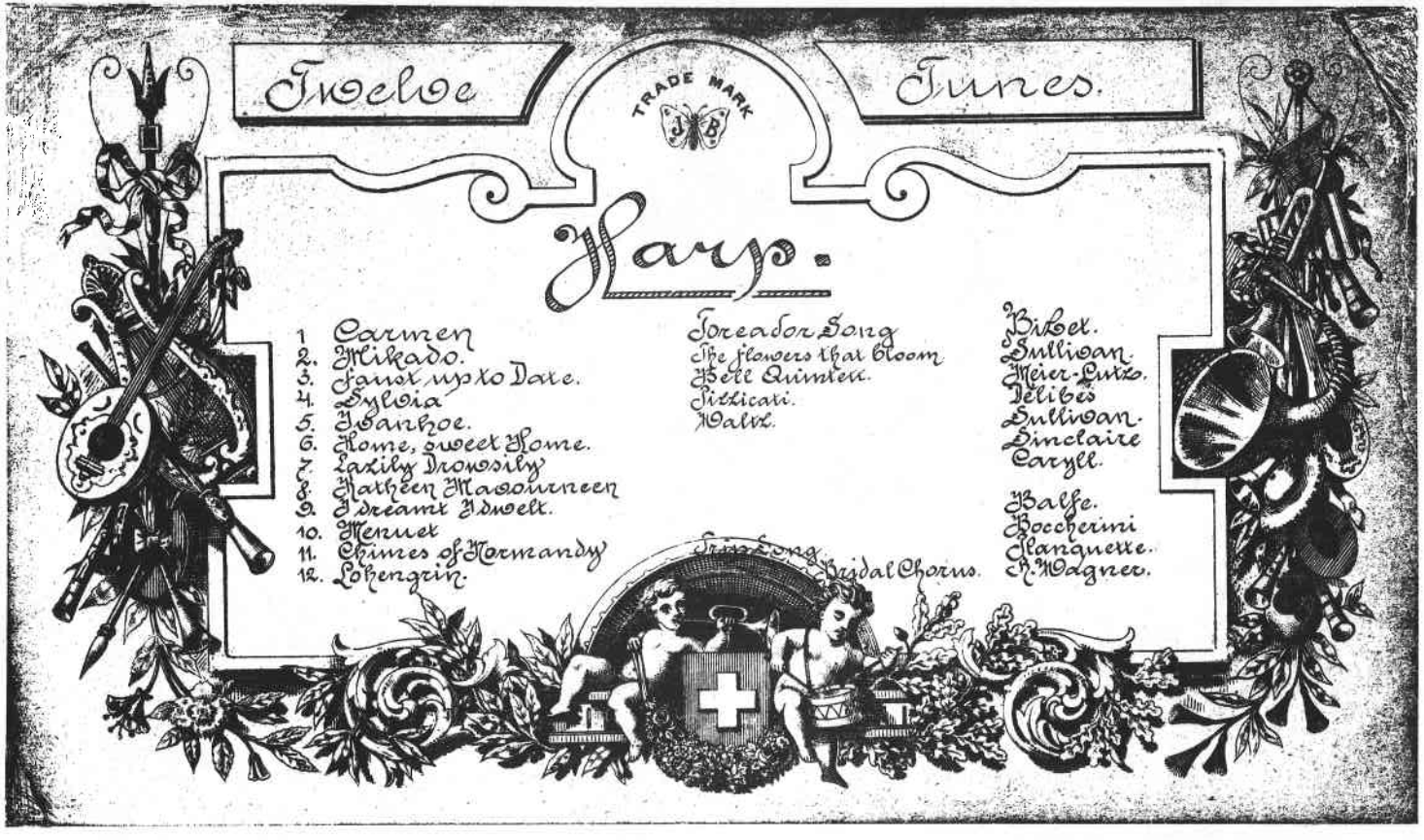
At the point C let there be placed the figure of a man seated on a pedestal, and let his ear be situated exactly in the focus of the first mirror; his lower jaw must be made to open by a wire, and shut by a spring; and there may be another wire to move the eyes; these wires must pass through the figure, go under the floor, and come up behind the partition.

Let a person properly instructed be placed behind the partition, near the mirror. You then propose to any one to speak softly to the statue, by putting his mouth to the ear of it, assuring him that it will answer instantly. You then give the preconcerted signal to the person behind the partition, who, by placing his ear to the focus I of the mirror, G H will, by the reflection of the sound, hear distinctly what the other said; and moving the jaws and eyes of the statue by the wires, will return an answer directly; which will, in like manner, be distinctly heard by the first speaker.

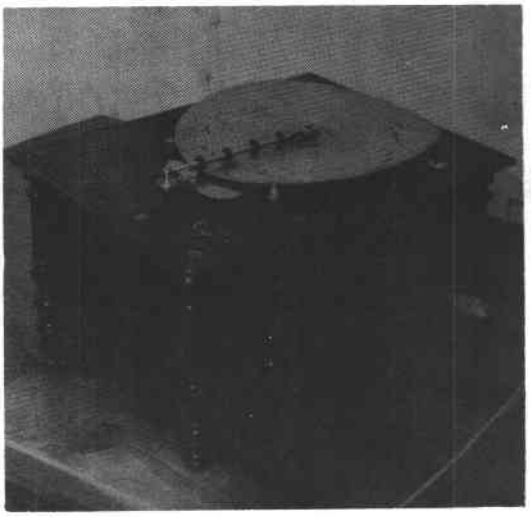
The more effectually to conceal the cause of this illusion, the mirror A B may be fixed in the wainscot, and a gauze or any other thin covering thrown over it, as that will not in the least prevent the sound from being reflected.

An experiment of this kind may be performed in a field or garden, between two hedges, in one of which the mirror A B may be placed, and in the other an opening artfully contrived.

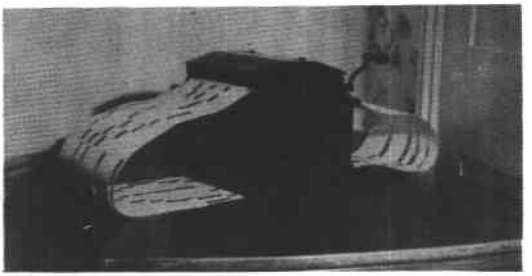
This experiment appears to have been derived from the Century of Inventions, by the Marquis of Worcester; whose designs, at the time they were published, were treated with ridicule and neglect, as being impracticable, but are now known to be generally, if not universally, practicable. The words of the Marquis are these: "How to make a brazen or stone head in the midst of a green field or garden, so artificial and natural, that though a man speak ever so softly, and even whisper into the ear thereof, it will presently open its mouth and resolve the question in French, Latin, Welsh, Irish, or English, in good terms; uttering it out of its mouth, and then shutting it, until the next question be asked."



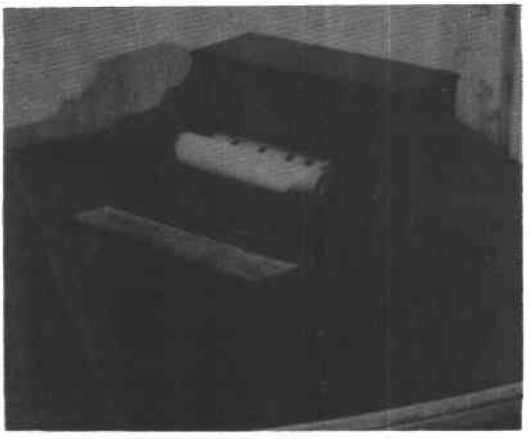
This tune sheet comes from a cylinder box made by Jean Billon-Hiller and bears the Billon-Hiller butterfly trade mark. The words "SWISS MADE" are stamped on the cock. Unlike most of the latter boxes by this maker which had interchangeable cylinders and featured a separate locking stopwork on the spring barrel to hold the power whilst cylinder changing, this box is a perfectly straightforward single-cylinder movement. By courtesy of Graham Webb.



One of the larger of the Amorette models – the 24 note playing a 12" metal disc.

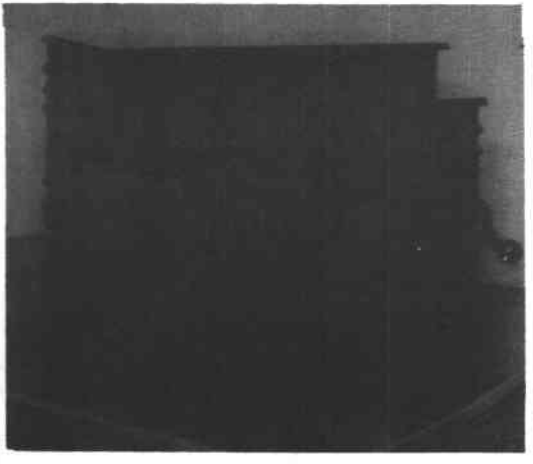


Paper bands, some of enormous length, are played by this Royal "orguinette".

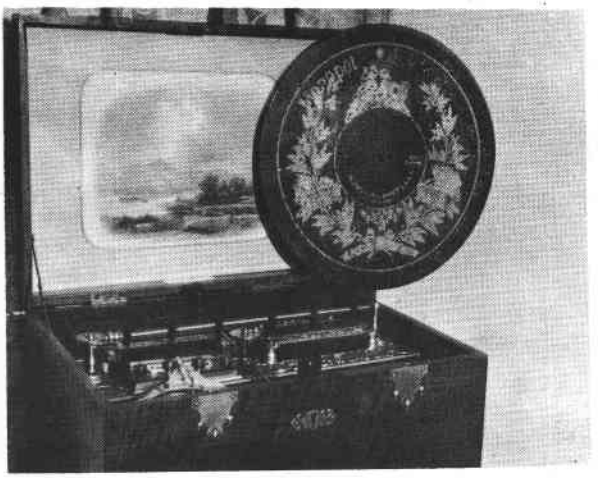


This Melodia organette plays a paper roll 8" wide and has 14 notes.

An unusually deep cabinet houses this 8¼" twin comb 60 tooth Symphonion.



The large Mignon has 22 notes and a swell flap each side of the case.



Monopol model no. 184, 84 teeth and zither attachment on both combs.

17¼" Stella in ornate bureau type cabinet. (Former property of The Editor who rescued it from a chicken house in Sussex)

These pictures are of Founder Member Frank Greenacres' collection at 164 Lowestoft Road, Gorleston–on–Sea. Great Yarmouth.

From the library of The Editor

This particularly attractive barrel organ belongs to Member Ralph Heintz of Los Altos, California. It was made by John Langshaw who was born in 1718 and died in 1798 (vide Langwill & Boston). Langshaw worked with Snetzler in the construction of the first mechanical organ for the Earl of Bute under the direction of John Christopher Smith, Handel's amanuensis. The organ has survived with its complement of three barrels, each playing tunes.

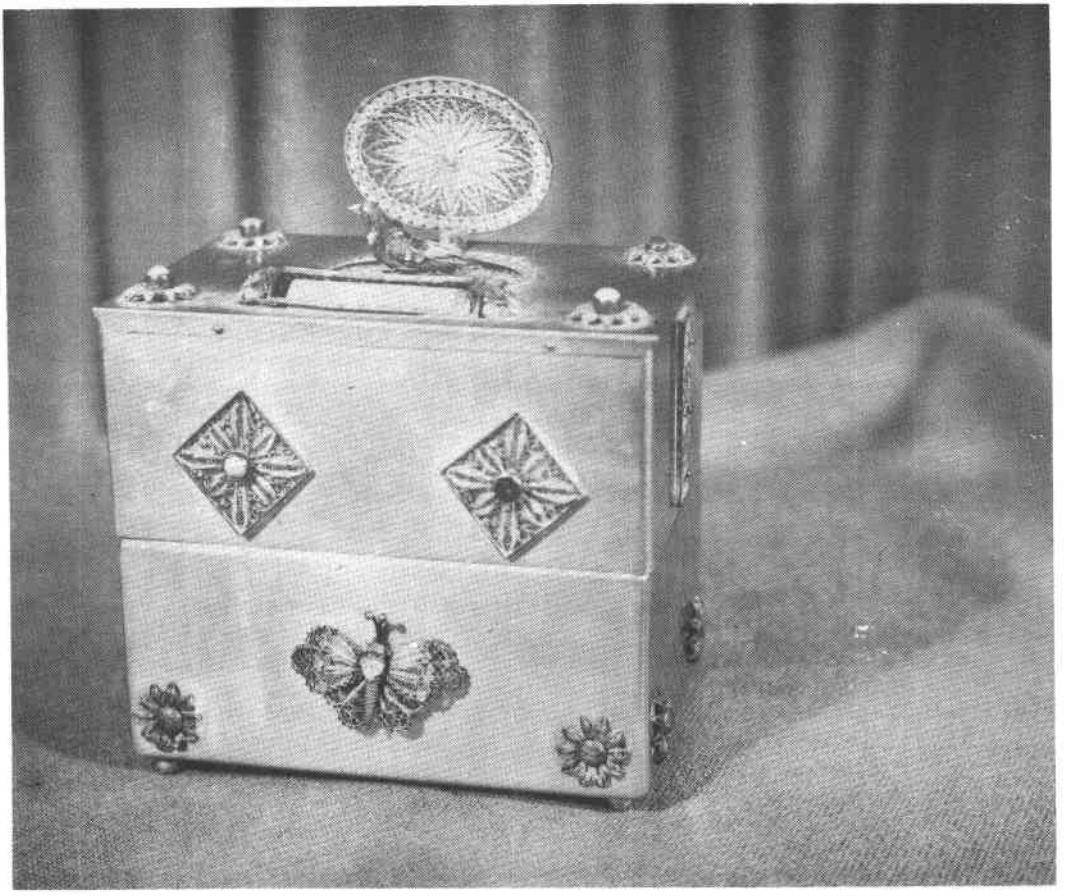
The first barrel plays (1) Dorchester 135th Psalm; (2) Evening Hymn, (3) Psalm 15th; (4) Bedford 23rd or 146 Psalm; (5) The 100th Psalm; (6) Cornish 76th Psalm; (7) Hanover 104 Psalm; (8) Bristol 108 Psalm; (9) St. David's; (10) Dr. Heighington's 18th Psalm.

The second barrel is devoted to secular music with dances, whilst the third has the usual batch of traditional tunes and popular airs including God Save the King, Clarinet March, Duke of Brunswick's March and Fisher's Minuet.

The organ has 4 stops and 60 pipes. Apparently in keeping with the majority of early chamber barrel organs, the stop knobs were simply extensions to the sliders and were thus situated on the left hand side of the organ case. This makes artistic playing rather difficult. It is interesting to note that barrel organs made by William Hubert Van Kamp have very similar-shaped upper and lower limits to the dummy pipe front.

Another item from Member Ralph Heintz' collection is this unusual singing bird box. In front of the bird is a small cylinder which is indexed to a different radial position each time the start button is actuated, so bringing a different stanza of a poem into view. The whole poem reads:

It can be said with flowers,
With bows and smiles in showers,
But I can't speak a single word,
'Cause I am only a little bird,
So I'll say it with a song,
"I think a lot of you" ... So long.



From "The Rotunda". September - October 1934. Library of The Editor.

ABOUT BARREL ORGANS

by PERCY A. SCHOLES

The well-known Music Critic and Author

ANY writer on music in whom, as in me, the fine, solid quality of conscientious thoroughness is happily blended with the gentler and even more attractive one of perfect modesty, must sometimes feel a little disconcerted on realising how the productive fields of his painfully acquired knowledge are bordered by a desert that still awaits the labour of his spade. For thirty years have I benevolently contributed to the instruction of the musical public, *yet what do I know of the Barrel Organ?*

This humiliating thought swept over me lately like a black cloud over a sunny day. I decided to take stock of my knowledge on the subject and found it tiny. There were at one time hundreds of these admirable instruments aiding the devotions of English Christendom, yet almost all my information can be recorded in the course of one brief article. Here is what I know:

Barrel Organs "came in" during the 18th century and continued to "come in" half way through the 19th —gradually displacing the bands of fiddles, flutes, clarinets and bassoons that until their advent occupied the west galleries of village churches, which bands apparently survived in many places until, with the invention of the cheap and handy harmonium, the last of them retired discouraged. (I should suppose that the musical descriptions in Thomas Hardy's *Under the Greenwood Tree* refer to a district socially in arrear. By the author's mention of "Queen's Scholars" the period cannot be earlier than 1870, and yet he shows us village bands maintaining their losing fight simultaneously against "harmonions and barrel-organs," both of them, as the village orchestralists rather too indiscriminatingly assert, "miserable dumbledores." Yet barrel organs had appeared in churches in most districts long, long before this, and had, indeed, by then mostly disappeared again. Laggard Mellstock!)

It looks to me probable that the Barrel Organ was fairly well known as a domestic luxury even before it took its place as almost an ecclesiastical necessity. Readers of *The Rotunda* happily still keep before the public two fine Fantasias composed by Mozart for a privately owned instrument on the barrel-organ principle, nearly a century and a half since (1790-1), but what about the music Handel wrote for one half a century earlier? Here my ignorance abashes me. I do not know this music. Handel's name has, I admit, come my way sometimes in various connections, but should I ever have met with the once-famous name of "Langshaw" but for the circumstance of its owner's association with Handel in the magnificent enterprise of providing barrel organ entertainment for an earl? For this, apparently, is John Langshaw's claim to a niche in our national Valhalla. The Earl was, as I gather, that famous one of Bute, who so long exercised a not altogether happy influence over George III and the foreign policy of

our country. He was as intimate with George in his chrysalis or Prince-of-Wales state as in his more glorious later development, and may well have shared that great music-lover's admiration for Handel. The diligent but oft-erring Fêtis, in his *Biographie Universelle des Musiciens*, turns "Bute" into "Bath." Here is Fêtis translated:

> "LANGSHAW, Organist and mechanician of great merit, born in England about 1718. Became known by some mechanical cylinders that he adapted to a superb organ belonging to the Earl of Bath. This lord having asked Handel for some pieces for the instrument the great musician wrote them and charged Langshaw with the duty of transferring them to enormous cylinders which revolved according to varying systems of motion, and of which the combinations produced majestic effects. Langshaw was employed by the Earl for more than a dozen years in perfecting his instrument. In 1772 he obtained the position of organist at Lancaster. He occupied it for more than twenty-five years and died in that town in 1798."

The *Dictionary of National Biography* and *Grove* refer to some part played in Handel's barrel-organ excursion by his amanuensis, John Christopher Smith; both assure us that "*the barrels were set in so masterly a manner that the effect was equal to that of the most finished player*," and that barrelling was (at a somewhat later date, at any rate) not incompatible with "finish" we must concede on the assertion of the great Dr. Burney who, after touring Europe and listening critically to the most "finished" performers of every sort, was able to declare of the barrel-organ that "*the recent improvements of some English artists have rendered the barrel capable of producing an effect equal to the fingers of the first-rate performers.*" (See his long article on the Organ in Rees' *Cyclopædia or Universal Dictionary of Arts, Sciences and Literature.*)

Here I pause to ask if any reader of THE ROTUNDA is better instructed than I as to the nature of an instrument that Burney must have heard in his earlier days, the "Microcosm." A reader of *The Gentleman's Magazine* in 1796 became anxious about it. "*I shall be much obliged to you*," he writes to the Editor, "*to inform me what became of the Microcosm, carried about through most parts of Europe, and the English America, about 40 years past, by a Mr. Bridges.*" To which he gets a reply in the next issue which, however informative, does not answer his question. "*Mr. Henry Bridges was a carpenter of Waltham Abbey, who, by nine years' study, performed and finished such a musical machine, or surprizing microcosm or musical clock,* whose performance to the most curious has given such general satisfaction, nay even beyond common fame or belief.*" He is also told that in Farmer's *History of Waltham Abbey*, 1735, "there is a print of the machine, and two copies of verses addressed to the artist." The said Farmer's *History* I have not at hand, so I can say no more about the Microcosm; but from the fact that the *History* appeared in 1735 it is clear that as early as two hundred years ago the mechanical production of music was a means of attaining widespread (if short-lasting) fame.

The most magnificent example of the mechanical organ ever constructed I take to be the Apollonicon, which had nothing "micro" about it and certainly could not have been carted about "most parts of Europe and the English America." Here again an earl seems to have been the instigator, and once again a Scottish one—the Earl of Kirkwall. The enthusiastic Burney, in Rees' *Cyclopædia*, gives no fewer than eleven columns to a description of the Earl's acquisition and assures us that —when "*His royal highness the prince regent lately dined with lord Kirkwall and a select party of nobility they were entertained by the performance of the celebrated opera of Mozart, the Zauberflute, by the barrel part of this instrument.*" (What he means by "the performance of the opera

* I have a suspicion that "clock" in such a connection sometimes means merely "clockwork."

I cannot say, especially as he goes on to say that this was "followed by the march in the same piece.") He declares that "*the machine produces the various accompaniments of a whole band of music, in such dulcet as well as forcible tones, that no one would credit without an opportunity of hearing the instrument.*" The Apollonicon, like the old organ in the Æolian Hall in our own day, was capable of being played either by hand or without it, and Burney tells us that these alternative means were common—"*Barrels are now very generally added to chamber organs, operating on the same pipes as the finger-keys.*"

Although I have for convenience called the Earl's instrument "Apollonicon," I am not sure that he actually knew it by this name, which rather seems to be one that its builders, Flight and Robson, introduced when they went one better than themselves. The *Harmonicon* in 1830 tells us that:

> "Encouraged by the praise bestowed on this comparatively small instrument, the builders were induced to undertake, on their own account, the construction of one of much larger dimensions and increased powers; and, about the year 1812, issued prospectuses announcing the intended Apollonicon — the Prince Regent, with recent recollection of the pleasure he had received from hearing that built for Lord Kirkwall, giving them permission to use his name as patron of the undertaking."

This larger instrument took nearly five years to construct and cost £10,000; it had 1,900 pipes and between 40 and 50 stops. It was publicly opened in 1817 with barrel performance of overtures of Mozart and Cherubini. It remained on exhibition on the firm's premises for a quarter of a century. It had three huge barrels, each a couple of feet in diameter, and it is my impression that these barrels were not in alternative but in simultaneous use. (As not merely the performance of the notes but also the changing of the stops was mechanically performed, perhaps the multiplicity of barrels is thus accounted for; the picture before me shows one long barrel in the middle and smaller ones on each side of it.) Like most such instruments on the larger scale, this one could be played by hand. The blind organist, John Purkis, was one of the earliest "hand" performers. Thomas Adams ("the Thalberg of the Organ," as Grove calls him) "for many years superintended the annual evening performance on the Apollonicon." I do not know what this "annual evening performance" was—probably an annual season of evening performances is intended. From *The Harmonicon* of 1830 I learn that Purkis had been for many years giving regular Saturday recitals, and the editor, with an apology for having neglected hitherto to notice the interesting instrument, assures his readers that "*there is not, perhaps, an exhibition in town at which their time or their money will be better or more satisfactorily bestowed.*"

We have heard lately of Sir Walford Davies' ingenious introduction of a console for a second performer at St. George's, Windsor. Although from what we are told as to the recitalizing of Purkis and of Adams we may suppose that the Apollonicon could be satisfactorily manipulated by one individual, it could, if desired, accommodate as many as *six!* I see in the picture of it six reading desks, and Busby's *Concert Anecdotes* (1825) declares:

> "It is furnished with six distinct collateral sets of keys, which are simultaneously performed on by as many different performers. These, acting in concert, develop the various powers of organic construction, and operate on the nerves and feelings of the auditors in a truly surprising manner."

It is clear from this that the Apollonicon was three times as good an instrument as the present-day Windsor one.

It is curious to note that, whilst Flight and Robson were busy spending their ten thousand pounds on their nineteen hundred pipes and concomitants, a somewhat similar instrument to theirs was announced to be exhibited in

London. This was Maelzel's "Panharmonicon," the London placard of which, reproduced by Busby, promised "the Grand Symphony of Mr. Beethoven, so well known and admired in London." But apparently Londoners never heard the "Panharmonicon," for Maelzel quarrelled with his friend "Mr. Beethoven," who was to have accompanied him, but who, instead, wrote begging the musicians of London not to support the project. It will be remembered that Beethoven's *Wellington's Victory*, with its *Rule, Britannia; Marlbrook* ("For He's a Jolly Good Fellow"), and *God Save the King*, was composed in expectation of this visit and planned for the Panharmonicon, so not only are Handel and Mozart to be numbered amongst composers for the Barrel Organ, but we may almost also claim Beethoven. (If we include the once popular instrument, the "Flute Clock," we may add Haydn to the list, for he wrote pieces for it, as did also his brother Michael Haydn, C. P. E. Bach, Friedemann Bach, Quantz, Graun and Kirnberger—see Leichentritts' article in the *Musical Quarterly* for January last, Beethoven wrote for this instrument also.)

I suggest that it may have been the publicity resulting from the display of the Apollonicon and similar instruments that led to the widespread adoption of barrel organs in church use in the early part of the 19th century. All these instruments, from giant to pigmy, are on the same revolving cylinder principle (a principle which was probably first adopted in connection with the Carillon and which, I understand, has been applied to it from the 13th century).

Bryceson, of Tottenham Court Road, seems to have been active in supplying churches with barrel organs, and an advertisement pasted inside that now to be found in the Wesleyan church at Rowde, near Devizes, affirms not only his conviction that "*the Tunes are so correctly set as to be equal in performance to a Finger Organ*," but also his belief that the "Barrel" instrument will "*entirely supercede*" its "Finger" rival. The "*great Expense of a Finger Organ and the Salary of an Organist*" are given as the foundation of this rather too sanguine expectation. For "50 *Guineas to* 100 *or upwards*," says Bryceson, he supplies "*excellent Barrel Organs, built on a peculiar Construction and adapted for the service and dimensions of any Church.*"

But long before Bryceson Barrel Organs had been made for and sold to churches, and according to John Arnold, in his *Compleate Psalmodist* (1761), some of them performed not only "our ancient Psalm-Tunes, with their Giving-out and Interludes," but also a "Set of Voluntaries." There are a number of church Barrel Organs in existence to-day (and one or two even in use), but I have never heard of one that supplies more than the tunes of metrical psalms and hymns plus three or four chants for the prose psalms and canticles and (occasionally) a set of Responses for the Commandments.

Arnold strongly recommends "Mr. Parker, Organ Builder, at the lower end of Gray's Inn Road, Houlborne," as being "very eminent in his profession." He says that "Box-Organs" are for sale "of a very small structure . . . likewise of the machinery kind," priced at ten to fourteen guineas, on the barrels of which organs you might have set "Tunes of your own chusing."

The Barrel Organs still to be found in our churches have four to eight stops. Many, apparently, are blown as well as played by the turning of the winch, but I should suppose this not to be so with those that include chants on their barrels, as the ceasing to turn the handle for the holding of the reciting note would let the wind out. Some enthusiast with time on his hands ought to make a tour of inspection of these organs and supply us with a full and careful description. The following are all the churches in which I know them to exist (my list being largely compiled from the unexpectedly large correspondence I received as a result of a recent article on Barrel Organs in the *Radio Times*):

(1) BARNSTON, ESSEX.—Built by Bev-

ington. Five barrels. Still in some use. The Rev. R. L. Gwynne, Rural Dean of Dunmow, reports to me that when he took duty in this church lately the organ "played fine voluntaries before and after the service." Will not some musician make an investigation and tell us what these voluntaries are?

(2) BLACK CHAPEL, ESSEX.

(3) BOBBINGTON, ESSEX.

(4) BRIGHTLING, SUSSEX.—The famous instrument given to the church by the eccentric Squire Fuller. This organ was in regular use up to 1913, and since then has been used on alternate Sundays for voluntaries. At the funeral last year of Mr. Herbert Croft, Parish Clerk (who played it for 40 years—up to 1931), his favourite hymns were accompanied by it.

(5) BUSSINGHAM, NEAR DISS.

(6) CHESHUNT, HERTS.

(7) COMPTON WYNGATES, NEAR BANBURY.—In a private chapel. Two barrels, each with eleven tunes. Four stops. Not now in use, but in good order.

(8) FAULKBOURNE, ESSEX.

(9) FOBBING, ESSEX.—Built by Bevington.

(10) HENLEY, SUFFOLK.

(11) HOLME, NEAR SPALDING.—Three barrels; 24 tunes and 6 chants.

(12) KILTON, SOMERSET.—This must be an unusually late specimen, for Mr. J. T. Lightwood, author of our standard work on Hymn Tunes and editor of *The Choir*, states that its tunes include some not in use until 1860.

(13) LONG COMPTON, WARWICKSHIRE.

(14) MILTON, CAMBRIDGESHIRE.

(15) MUCHELNEY, SOMERSET.—Built in 1807 by Gray & Davison. Twenty-five hymns, 3 chants, and responses to Commandments. A correspondent in March this year told me that there was then a proposal to give a recital on the Barrel Organ to raise funds to repair the Finger Organ. It seems to be adding insult to injury when the discarded is called upon to support its supplanter! However, this recital may not have taken place, since one of the oldest inhabitants gave the warning on hearing the proposal, "There beant nobody in Muchelney to-day that could play un like John Waldern used to do."

(16) PENNARD, NEAR SWANSEA.—Said to be of 18th century date.

(17) ROWDE (WESLEYAN), WILTSHIRE.—In good order but not now in use. Four stops, Stopped Diapason, Principal, 12th and 15th. (When you draw the Principal, the 15th comes with it—curious!)

(18) SHELLAND (BETWEEN STOWMARKET AND BURY ST. EDMUNDS).—Built by H. Bryson, 38 Long Acre. Six stops; 3 barrels; no chants (self-blowing). In regular weekly use, although the church contains another organ. Mr. Ashton Long, of Diss, reports to me a recent visit: "When it came to chanting the Psalms, the Chaplain left the lectern and tried to play them on the finger-organ. But it was damp and would not work. There was a squeak, grunt and growl. He said, 'She won't go; we shall have to read them.' It was a revelation to hear the congregation keep in tune with the old organ and pause when twiddly runs came in. I have been to many a cathedral service and not enjoyed it half so much."

(19) SUTTON, NORTHANTS.—Built by Walker.

(20) TROTTESCLIFFE, or TROSLEY, KENT.—Built by Bates. Six barrels each with 10 tunes (a big repertory!) Very sweet toned. In use up to 1899.

(21) WEAVENHAM, CHESHIRE.

(22) WISTON, or WISSINGTON, NEAR COLCHESTER.—The clergyman reports that they have only to advertise that the Barrel Organ will be used to get a large congregation. It is said to have a very mellow tone, but the mechanism is heavy and the pace consequently slow.

It will be seen that most of these instruments are in the South of England and that Essex seems to be predominant. I understand that at Arnold's Old School Organ Works, Thaxted, Essex, there are to be seen several barrel organs removed from churches.

My friend George Parker, Mus.D., of Over Hulton, Bolton, writes: "I have a Barrel Organ where the handle works both the blowing and the barrel, so what of Chanting here?" Colonel A. S. Bates, of Marydown Park, Basingstoke, tells me of three in one family—one given by his grandfather to the church of Wootton St. Lawrence about 1872 (and apparently still there, though, like many such instruments, now unbarrelled), one he himself gave to Basingstoke Museum, and one in his store room. And Mr. Walter Hart, chiropodist, of Ramsgate, offers to sell me a Barrel Organ by Flight & Sons, with three barrels and in good order. Alas! of how many fine things would I like to be the proud owner!

But what is a chiropodist thinking of to sell a pedal-less instrument? It isn't business!

The following open letter has been received from Dr. Cyril de Vere Green, Founder Member and Secretary of the Musical Box Society of Great Britain.

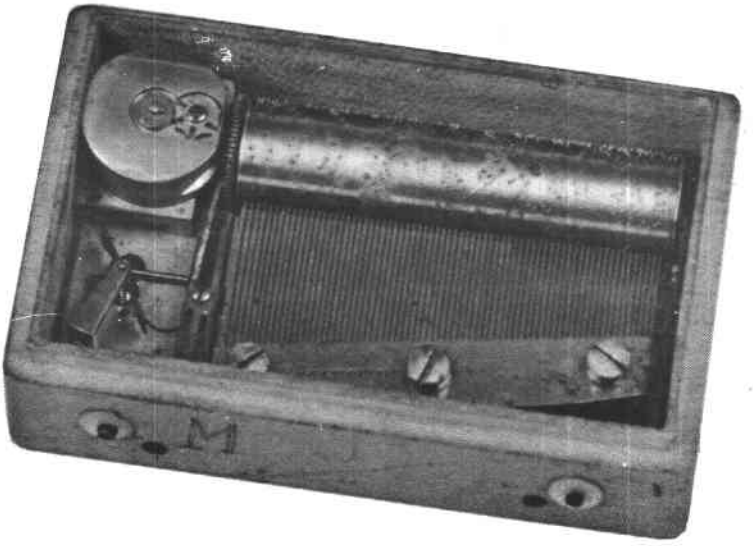
This issue of our Journal coincides with the handing over of the position of Honorary Secretary of your Society to Mr. John Entwistle.

During the past few months, it has become apparent to me that my professional and academic commitments have been increasing, and I have found it difficult to devote my time and resources to the affairs of our Society as I would wish.

May I therefore use a little space in our Journal to express to our Members throughout the World my sincere thanks for all the loyal support which you have given me during the past eight years. I wish also to acknowledge the encouragement, helpful suggestions and the practical help which has been given to me by the Officers of the Society, and also by my wife Bertha, in the execution of my duties.

I should like to assure our Members and our new Secretary that the Society will continue to receive from me all the support which I am able to provide.

As a Founder Member, I have been particularly gratified at the way in which the Society has developed from a handful of fellow enthusiasts to the international body which it today forms. That I have been able to play some part during these years has been a privilege for which I thank you all.



Small snuff box in painted wooden box. The comb is 2½ inches long and is stamped "H.Lecoultre". From the collection of Keith Harding.

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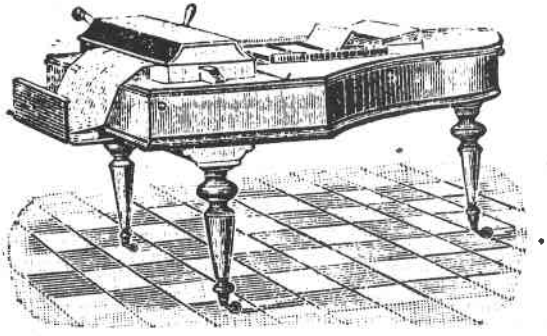

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From "Weltadressbuch der Musikindustrie" by Paul de Wit, Leipzig, 1903. From the library of The Editor

Next Society Meeting

The next meeting of the Musical Box Society of Great Britain will take place on Saturday, November 29th, at the Great Western Royal Hotel, Paddington, London - our usual venue. A programme of events is at present being prepared by your Committee and details will be circulated by Mr. de Vere Green in due course.

Classified Advertisements

Advertising rates for Members are 3d per word (Bold type 6d per word). Box numbers are not permitted. Display and semi-display rates are available on request.

FOR SALE

Weber (London) Pianola piano, Boudoir grand Aeolian action. Beautiful instrument, rosewood case. Approximately 60 music rolls (musical comedy selections, dance tunes 1920's &c.), some hand-played including Paderewski and Percy Grainger. Price for instrument and music rolls £160. Mrs. E.M. Finney, Beaumont Cottage, Beaumont Fee, Lincoln, Lincolnshire.

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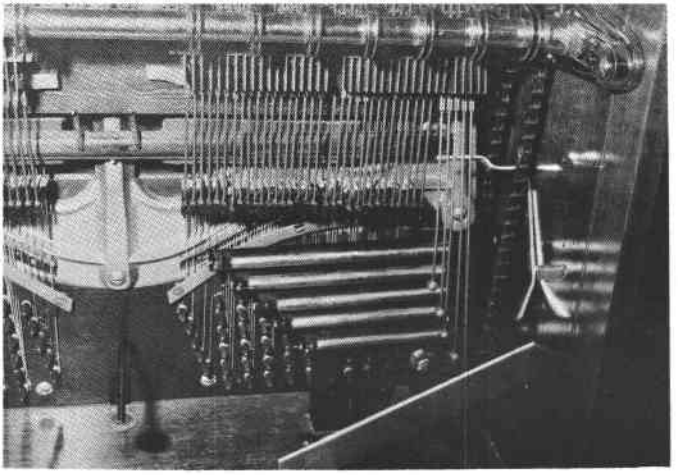
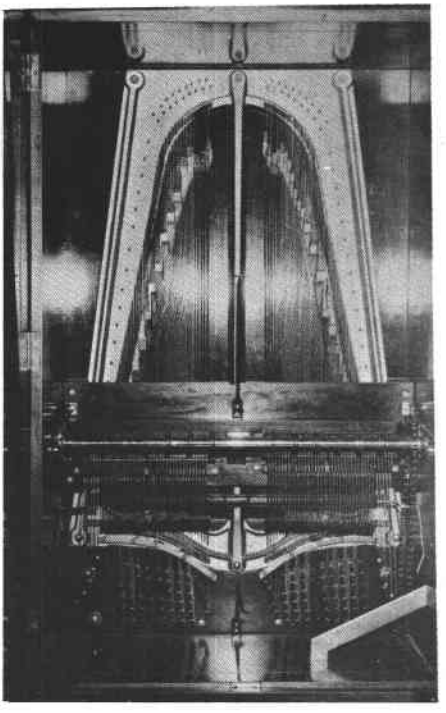
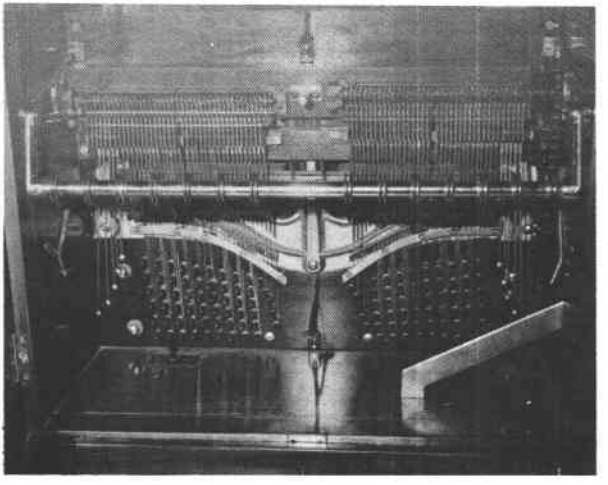
Keith Harding has vacancies for full-time craftsmen. Disc musical box specialists particularly required. Excellent pay and conditions. Apply to Keith Harding Antiques, 93, Hornsey Road, London, N. 7.



The Lochmann Konzert Piano described in the letter on the opposite page. Above: This view shows the dulcimers, hammers and damper bar as well as the chain drive from motor to starwheel row. Right: The complete instrument restored, but not tuned.



Left: General view inside cabinet showing the divided harp or 'sublime harmonie' arrangement and the disc pressure bar. Below: Here the disc pressure bar is in the fully lowered position. The dulcimers were not fitted when this was taken.



LETTERS TO THE EDITOR

Member Leonard Elliott, curator of Bryan Jackson's Museum of Sound Technology and Transport, Auckland, New Zealand, writes:

Would somebody please help, I am losing my hair, getting splinters in my fingers (from scratching my head), will need glasses soon (from reading for information) and getting like a bear with a sore head from frustration. What's causing all this chaos? Well, the answer is very simple, a Lochmann Konzert disc paino.

I have completed; from a pile of rotting timber and rusting metal found leaning against a fowl-house, the restoration of this unusual instrument. You ask yourself, "Well, what's wrong, he should be happy." My nemesis is, it won't play! Dash it, there goes some more hair again. The coin in slot mechanism works perfectly, the motor motors as it should. the 205lb. weight winds up and drops at the right speed; in fact everything is perfect, well almost. The only item I can't get right is the tuning.

The 64 strings, in two banks of 32 have defied the efforts of the piano tuner and myself to make the disc play something that resembles the 'Light Cavalry' overture by Suppe. The problem we encounter is when the bass string is tuned and rising in ½ note graduations the last few treble are so tight they break. When working in reverse, the bass strings are so slack they don't sound. So please, if you don't want me to go bald, blind and batty, I implore you, please help a fellow enthusiast from the bottom of the world. I will answer any letters regarding this machine.

The technical details of the machine which is causing all this trouble are: It stands 62 ins. high, 32 ins. wide and 22 ins. deep without the base. The string frame is like a rounded-off pyramid. The 25¾ in. disc has a rolled edge and the disc pressure bar which is mounted horizontally folds out to allow the disc to be positioned. The outer peg activates 10 horizontal removable tube bells – five either side – mounted on cast iron frames directly above the motor dividing board. The coin slot is on the right which drops to a circular cup, and this cup is tipped sideways allowing an arm to protrude through the base of the cup to displace the penny. A bicycle type chain transmits the power from the 205 lb. iron weight driven motor to the periphery wheel mounted on the right of the divided star wheel rack. The star wheels activate small hammers to strike the double strings. The reason fo having only one disc in playable condition a the moment is that the others were used as 22 calibre rifle targets, and those not punctured r affected with rust and missing protrusions.

This letter may seem disjointed, but to on in my condition what else can be expected. Ou museum is expected to open at Easter 197(which makes my request urgent.

It may seem unbelievable, but even thoug I advertised on radio for the piano score of th 'Light Cavalry' overture, as this is the onl legible title, it did not bring a single reply. Sc back to square one and more splinters. On bended knees I implore you, **HELP!**

EDITOR'S COMMENT

As Mr. Elliott states, the Lochmann Konzert is a rare instrument and I have no notion of the tuning scale. But, since this instrument is not a tremolo piano, and since the hammer action of this type of instrument is inherently slower than, say, that of a comb-playing movement, I feel it likely that the tuning of all but the bass notes probably includes unison notes. The tuning is therefore likely to be arranged like a sublime-harmonie Symphonion rather than, say, a Mills Violano piano. This suggests that one note on each half of the harp will be tuned to the same pitch. Mr. Elliott does not state whether the notes are bi-chords or tri-chords. It is unusual to find an instrument of this type without the scale marked somewhere on it - a favourite of the zither-makers and mechanical dulcimer-makers was to stamp the scale actually on to the head of each wrest pin in the wrest plank. Unless any Member can provide the actual tuning scale, I think Mr. Elliott will just have to fortify himself with suitable liquid stimulant, lock his workshop doors and experiment. I doubt if the scale is fully chromatic. The score of Suppe's 'Light Cavalry' overture will be of only limited help, I feel, since the disc arrangement will certainly be an abbreviation, concentrating more on the theme. It is possibly this which he will do best to experiment with. Any comments or advice from anyone else?

LIST OF MEMBERS

415 J.G. Fox, Coton, Exton, Exeter, Devon.

416 W.G. Brown, 11, Kitson Road, Barnes, London, S.W. 13.

† 417 Dr. J.R. Heyworth, 1683, Renfrew Street, Vancouver 6, B.C. Canada.

† 418 Philippe Rouille, 2, Avenue du Stade de Coubertin, 92 Boulogne, France.

† 419 Mr. Cooprider, 6751. Hohenecken, Sommerstrasse 14, West Germany.

420 R. Trender, 143A, Askew Road, London, W.12.

† 421 R. Burgis, 8, College Crescent, Hornsby, New South Wales, Australia, 2077

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128 K. Thompson, "Grange End", 8, Byron Close, Bletchley, Buckinghamshire.

303 R. Coulson, 24, Biddlestone Road, Heaton, Newcastle-upon-Tyne 6.

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