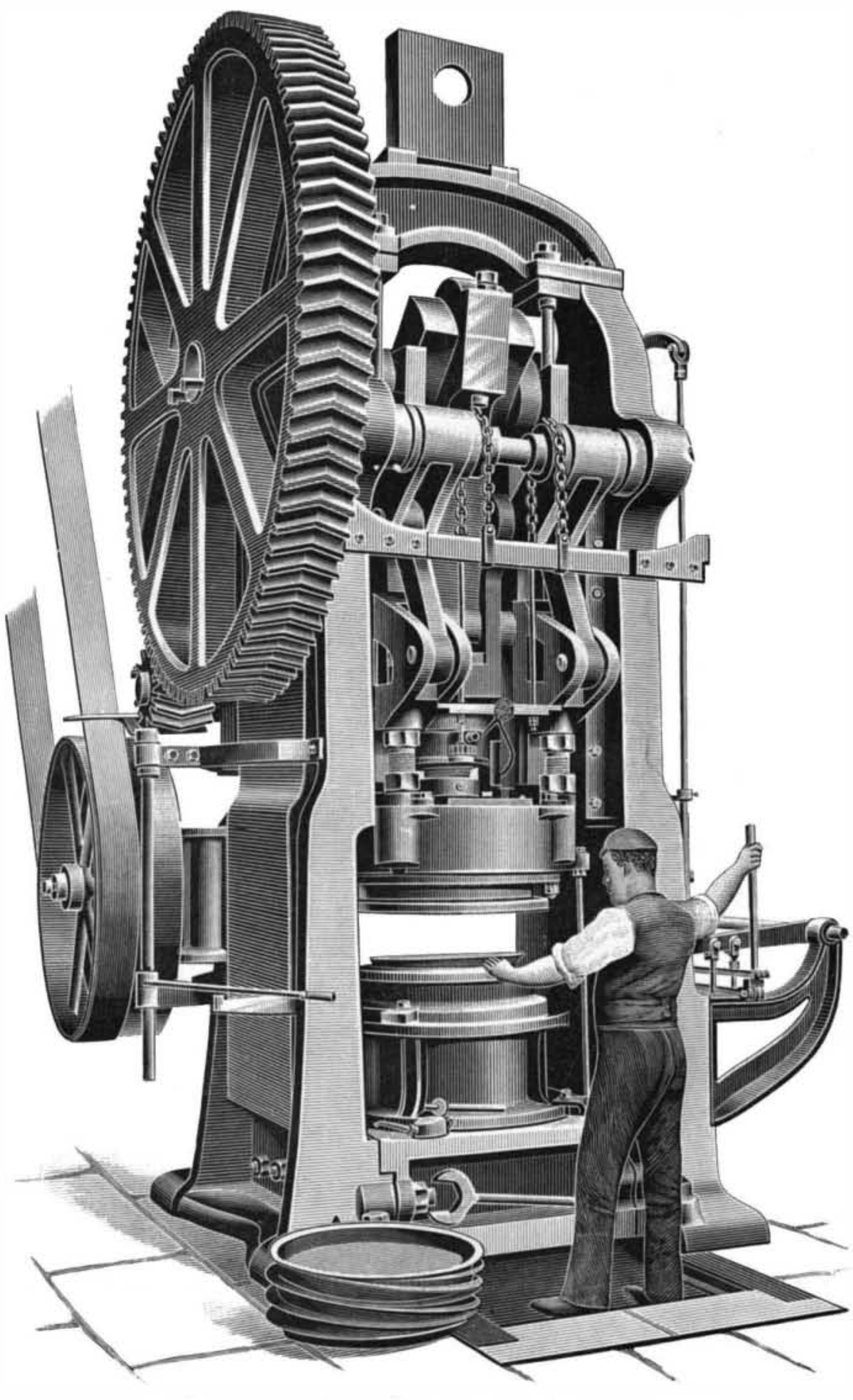
PRESS FOR MAKING STEEL BICYCLE RIMS.

One of the most recent examples of the ingenuity of the modern bicycle maker is the production of a jointless felly, or rim, for wheels. The importance of the cycle industry at the present day is well illustrated by the fact that quite a large factory has been established for the production of these jointless rims.

The advantages of the jointless rim are a nearer approach to uniformity in size; a more equal tension of the metal; and, by avoiding the heat of brazing, the metal is not softened.

The steel sheets from which the rims are made come in from the rolling mills in the form of squares. The steel is of a kind made specially for the work, the composition having been decided by Mr. C. H. Pugh, the designer of the machinery about to be described, after a long series of chemical and physical tests. It is, of course, the product of the Siemens furnace, and must necessarily be of a very excellent quality, otherwise it would not stand the treatment to which it is subjected. To judge by its working, we should suppose it to be a steel made from hematite ore in a basic lined furnace, but on this point we have no information.

The square sheets are taken through a circle cutting machine and the corners sheared off. There is formed in this way a blank, consisting of a flat circular sheet of metal, and this is taken to a big power press, which we illustrate. These presses have been designed specially for the work, and supplied by Messrs. Taylor & Challen, of Birmingham. They are placed three in a row. They are powerful machines, each weighing about 35 tons, and are capable of admitting a blank 44 inches in diameter, which they will draw down to a pan-shaped piece 22 inches in diameter and 11 inches deep, if required.



PRESS FOR MAKING STEEL BICYCLE RIMS.

In these presses the circular sheets are pressed into the form of a shallow dish with a turned-over rim. In the view of the press a number of the blanks that have just been stamped are shown. In working the press the blank is placed on a flat ring of metal or die. The outer slide then comes down and holds the blank round its circumference. In this way a ring of metal is between the annular tools, it being held tightly enough to prevent the steel from buckling when dished, and yet not so tightly as to prevent it flowing between the tools when the stamp comes down. It will be easily understood, under these circumstances, that the press has to be very carefully made. The steel blank being held in this way, the inner slide descends, and the circular sheet is pressed into the dished form. It will be seen that, so far, the practice followed in the preparation of hollow ware is here adapted to the manufacture of bicycle wheels.

The next process is to cut out the center of the blank, by which operation it is converted from its dish or plate like form to that of a circle, and begins to have some sort of resemblance to a wheel rim. The cutting out of the center is done in a lathe having a pair of revolving shears mounted on a slide rest. The inside cutter is brought up until it just touches the work, and the cutter on the other side is then pressed home by a lever. The partly formed rim is then brought to the requisite section by a number of spinning processes.

Hollow fellies are composed of two separate rings, which are ultimately soldered together. These are known as the block and tread, each of which is prepared in the same general manner, for each has to be brought to a shallow U-section, though the block or inner ring is a deeper U than the tread, or outer ring, against which the India rubber tire abuts. The block, it will be understood, is that part which is drilled to take the spokes. We are now describing roughly an ordinary form of rim for pneumatic tire. There are many special forms required for varying descriptions of tires, but the same principle of construction governs all. When the central part of the dish-shaped blank was cut out, as described, a ring somewhat of Z-section was left, or more correctly speaking, of the section of an angle bar and reverse angle, the corner of one angle having been previously rounded off. By means of the various spinning lathes, one angle is gradually turned over, and, during successive operations, the corners are rounded off to form the U. The chief point of interest about these lathes is the method of chucking. In one series of operations a large split chuck is used, the work being held by its inner flange between two disks. The spinning tool is brought up by a slide rest, and is recessed to the shape required for the work, the latter being pressed between the tool and the edge of the chuck, which is also of the required contour, naturally the same as the tool, but in relief in place of being recessed. In another operation, the rim, having been brought approximately to shape, is placed between two disks, the rims of which are beveled and hollowed so that when they come together they form a moulding surface upon which the rim can be pressed to shape by the spinning tool.

After the two parts of the rim have been spun to the required section, the edges are trimmed off in a lathe, a pair of circular revolving shears being used as a cutter. The next operation is to put the treads in a press and flatten them so that their edges lie in one plane exactly, the true running of the wheel when finished naturally depending upon accuracy in this respect.

The parts are next tinned, having previously been treated in weak acid to remove grease. The tinning is performed by turning the rim vertically while its lower part dips into a bath of melted tin, the excess of metal being rubbed off by boys with rags or cotton waste.

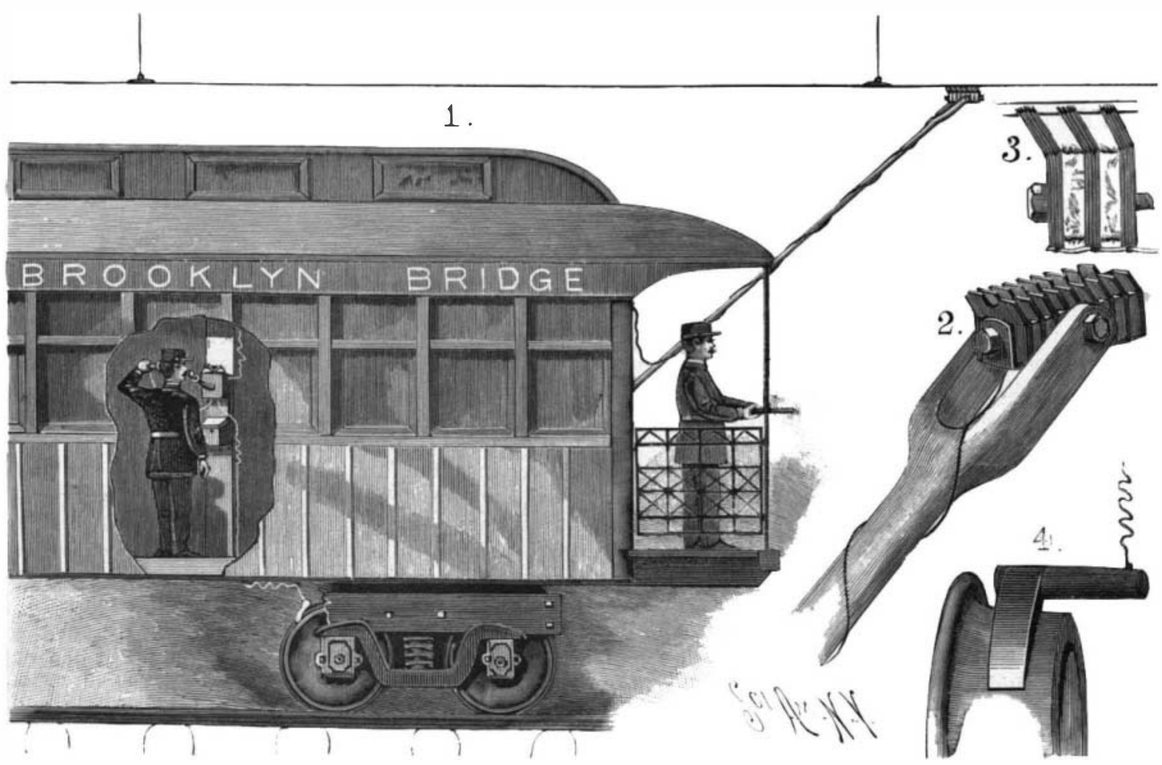
After a careful examination has been made of the tinned parts, the tread and block are put together so as to form the hollow rim. It is at this part of the operation that the necessity for accuracy in the work is most apparent. Unless the two parts are of the required diameter within extremely narrow limits of error, the wheel will be ill-formed and weak in structure, or not of the required dimensions.

When the tread has been fitted into the block, the edges of the latter overlap those of the former, and these overlapping edges are worked up by spinning in a lathe and gradually turned over the edges of the tread. The felly or rim as now formed consists of two hoops of steel placed one within the other. They are both U-shaped or hollow in section, the convexity of each being in the same direction. The tread is formed to a curve of larger radius than the block, and as the edges of each ring are brought together they necessarily meet in a cusp, or, in other words, the space between the two rings, which gives the hollow felly, is crescent-shaped in section.

It now only remains to solder the two parts together in order to make the turned-over joint firm. This is done in the same manner as the tinning operation, before described.

The test for breaking is equal to the strain that would arise if the rim were placed horizontally, supported only at two opposite points of its circumference, and a 14-stone man were to stand on it, each foot being midway between the points of support. After being subjected to such a test, the rim is tried in a lathe to see if it has received any permanent set.

We are indebted to Engineering for our illustration and the above particulars.



TELEPHONING FROM MOVING CARS.

TRAIN TELEPHONY.

Some interesting experiments have recently been tried by Mr. Kingsley L. Martin, assistant engineer on the New York and Brooklyn Bridge, in the line of establishing telephonic communication between moving trains and between trains and the train dispatcher's and bridge offices.

The necessity of some adequate method of train communication and signaling in cases of fog or some emergency has been felt, but there have been difficulties in the way of establishing telephonic communication with moving trains that have prevented it from being put into practice.

Mr. Martin has overcome these difficulties and has succeeded in communicating with moving trains with the same facility as between fixed points. The bridge is provided with a trolley wire for electrically lighting the trains. This wire, which was used in the telephone experiment, was connected with the train dispatcher's office and with the bridge offices, and upon the cars were placed arms provided with compound brushes which touched the trolley wire. The circuit was completed through the car truck and track rail, the connection between the circuit wires and truck being completed by a brush resting on one of the car wheels.

The compound brush consisted of a number of brushes of brush copper fastened together with intermediate pieces of soft rubber. The brushes being electrically connected with each other and with the telephone wire, arranged in this way, unbroken conversations could be carried on while the trains moved along. The electrical contact of the compound brush with the trolley wire was so perfect that the sliding of the brush on the wire produced no noticeable effect.

It is proposed to permanently equip the cars with telephones and to provide a suitable electric conductor on the bridge in convenient position for contact with the brushes carried by the cars.

THE THERMOPHONE.

The thermophone is an instrument for measuring temperature, particularly the temperature of a distant or inaccessible place. It was devised by Henry E. Warren and George C. Whipple, in 1894, for the purpose of obtaining the temperature of the water at the bottom of a pond. The first experiments were so successful, says the Progressive Age, that they were encouraged to study further into the capabilities of the instrument, with a view to adapting it to various scientific and commercial uses. These studies led them to believe that the thermophone is an instrument of great value, not only for obtaining deep sea temperatures, but for many meteorological and scientific purposes.

The apparatus which is here presented for inspection resembles Siemens' resistance thermometer more than any other. It takes advantage of the fact that different metals have different electrical temperature coefficients. The accompanying diagram illustrates the general arrangement.

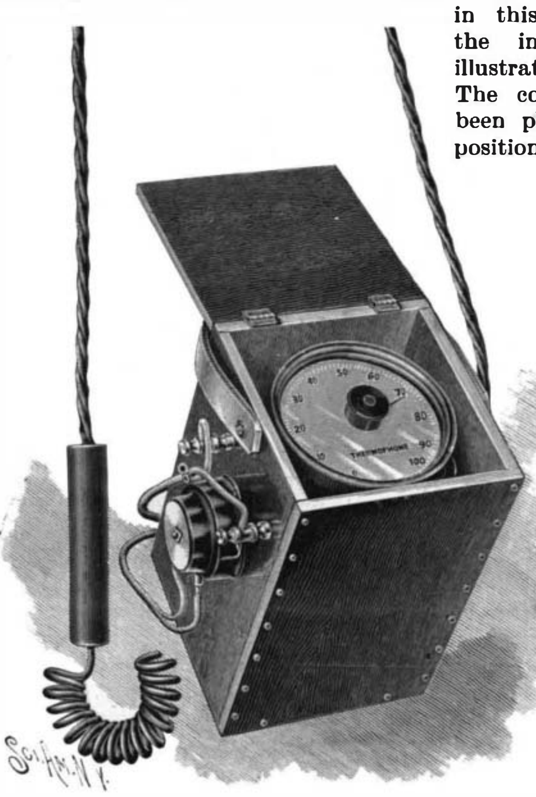
A and B are coils of different metals placed in proximity and joined together as shown in the figure. These coils are connected with a slide wire, CD, by means of the leading wires, L and L'. The two ends of CD are connected in circuit with a battery, M. A galvanometer, G, is put into a leading wire connecting the junction of A and B with a movable contact, Y, on the slide wire. The galvanometer will indicate zero current when $\frac{A}{B} = \frac{CY}{DY}$ But A and B, having different temperature coefficients, will vary in resistance at different rates with changes in temperature; consequently there will be a different value of $\frac{A}{B}$ for every temperature. The value of $\frac{A}{B} = \frac{CY}{DY}$ may be directly read from a scale placed under the sliding contact, Y, or the temperature corresponding to the given ratios of $\frac{A}{B}$ may be marked upon the scale.

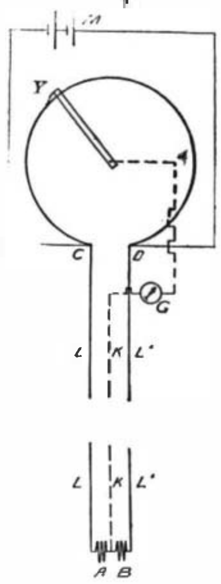
The slide wire is wound around the edge of a disk above which there is a dial graduated in degrees of temperature. The hand on the dial is directly over the movable contact on the slide wire, and both are moved by turning a knob in the center of the dial.

It is easily seen that the temperature of the slide wire, CD, has absolutely no effect upon the reading of the instrument, for being made of one piece of metal, which has the same temperature throughout its length, each portion of it will rise or fall in resistance at the same rate with changes in temperature; consequently the ratio of its parts will not vary. The effect of temperature changes on the leading wires, L and L', will not sensibly affect the reading for the same reason.

In place of the galvanometer it has often been found advisable to use a telephone, in connection with a circuit breaker, to show the presence of a current. It is in this form that the instrument is illustrated here. The coil having been placed in the position where the temperature is desired, the transmitter is taken from its hook on the left hand side of the box and held to the ear while the right hand of the operator turns the knob over the dial until a point is reached where no sound is heard. The dial hand then indicates the true temperature. If desired, a number of coils can be located permanently at a number of distant points and thrown into connection with central dial box, at will, by means of a little switch board; a scheme which might be valuable for practical application in a large gas works, as it would enable the superintendent to ascertain the temperature at any given set of points in the works at any time without his leaving his office or desk. This instrument, as we are informed, is more sensitive than a mercurial thermometer. It can be made with any desired range, and its readings are independent of pressure, an important feature in a deep sea instrument.

E. S. Ritchie & Sons, Brookline, Mass., are manufacturers for the United States and Canada.





THE THERMOPHONE.

THE FRILLED LIZARD—CHLAMYDOSAURUS KINGI.

The above named lizard inhabits the northern or tropical territories of the Australian continent, and is tolerably abundant in both North Queensland and the Kimberley district of Western Australia.

The habitat of the frilled lizard is essentially sylvan, its resort being the thickly wooded scrublands, and its favorite abiding place the trunks and lower limbs of the larger trees. The length of the finest examples rarely exceeds three feet, and of this the long, rough, though slender tail monopolizes the greater moiety. Living specimens exhibit a considerable individual color variation. The predominant hue of the body is pale brown with reticulated markings, while the frill, in the males more especially, is usually decorated with interblending tints of yellow, scarlet and steel blue.

No living example of this singular lizard had, up to the present year, been brought alive to Europe, a circumstance which will account, to a large measure, for the fact of certain abnormal phenomena connected with its life habits having hitherto attracted little or no scientific attention. Through the possession of living specimens of Chlamydosaurus in both Queensland and Western Australia, several interesting data concerning the species have fallen within my notice.

Having, furthermore, succeeded in bringing one out of several examples embarked safely to England, my presentation of the animal to the Zoological Society's Gardens, where it was on view for some weeks, has afforded many fellow naturalists the opportunity of verifying the phenomena here recorded. The most conspicuous structural feature of Chlamydosaurus kingi is the extraordinary development of the cuticle of the neck, that gives to it its popular title. This takes the form of a voluminous frill or collar, which, while the animal is at rest or undisturbed, is neatly folded in symmetrical pleats around the creature's neck and shoulders. No sooner, however, is the lizard excited to hostility by the approach of a threatening assailant, than, coincident with the opening of the mouth, the frill is suddenly erected, much after the manner of the unfurling of an umbrella, and stands out at right angles to the longer axis of the body, measuring under such conditions some seven or eight inches in diameter.

The mechanism by which the erection and depression of the frill of Chlamydosaurus is accomplished is intimately connected with a slender process of the hyoid bone, which traverses the substance of the frill on each side, and is so adjusted that the opening of the creature's mouth and the erection of the frill are synchronous operations. A characteristic photograph from life of this lizard in a condition of excitement, and standing at bay, with mouth open and frill erect, is afforded by Fig. 1, representing one of many I was fortunate in securing from the specimen I brought to England.

The function of the frill in Chlamydosaurus is, as apparently indicated by the circumstances and conditions under which alone it is displayed to view, purely that of a "scare organ," wherewith by its sudden expansion many of its would-be assailants are frightened and deterred from attacking it. Instances have, in fact, been recorded to me of dogs, which will readily rush upon and kill other and larger lizards, such as Varani, refusing to come to close quarters with so formidable looking an object as Chlamydosaurus, when it turns upon them with gaping mouth and suddenly erected frill.

Chlamydosaurus displays, however, additional defensive tactics. When approached these lizards will often spring aggressively at the intruder, and in addition to using their not very formidable teeth, will lash sideways with their long, rough tails with such vigor as to smartly sting the hand which may fall within range of the unexpected impact.

The natural food of the frilled lizard consists almost exclusively of Coleoptera and other bark-frequenting insects, a fact which emphasizes the difficulty of keeping them long in a state of captivity. The several specimens in my possession became fairly accus-

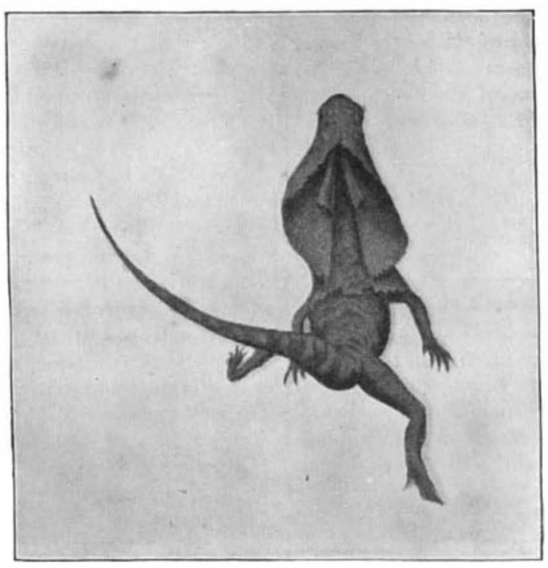


Fig. 2.—CHLAMYDOSAURUS RUNNING ERECT.
Posterior View, taken with Anschutz hand camera.

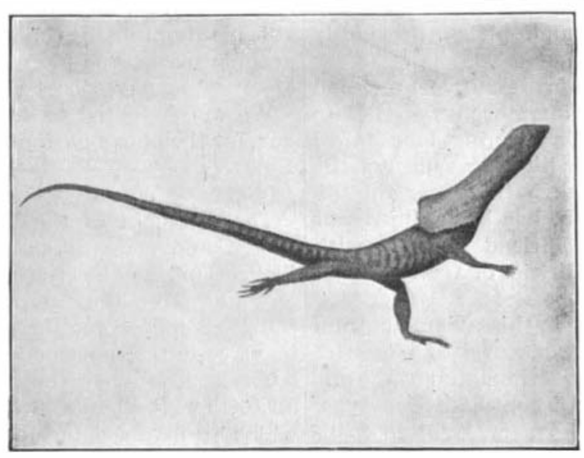


Fig. 3.—CHLAMYDOSAURUS RUNNING ERECT.
Profile View.

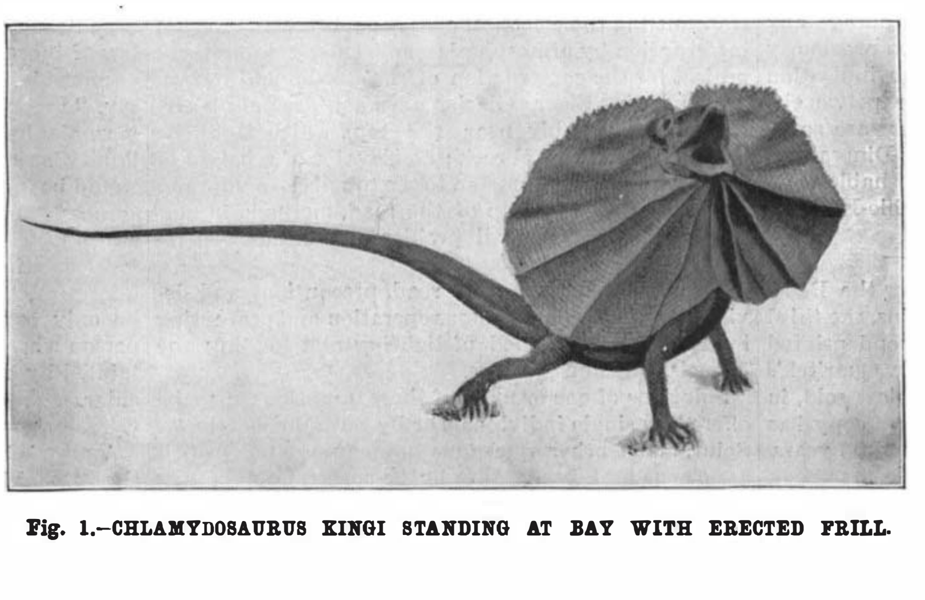


Fig. 1.—CHLAMYDOSAURUS KINGI STANDING AT BAY WITH ERECTED FRILL.