of resistance coils joined up in series, and so arranged that by the movement of the handle any number of them can be included in the field magnet circuit, and so add to its electrical resistance, causing a corresponding decrease in the current flowing through it, and consequently reducing the intensity of the magnetic field. From the junction between each adjacent pair of coils a conductor is led to a contact piece on the top of the box, just as in a Gramme ring a wire connects the coupling piece of each pair of bobbins to the commutator. The commencement of the first coil is connected to the first contact piece, and the end of the last coil to the last contact piece. The positive conductor from the pole of the armature is coupled also to the first contact piece, and the conductor leading to the coils is joined to the spindle upon which the handle turns. Thus when the handle is at zero the current passes through it from the first contact piece without traversing any of the resistance coils; when it is (say) 90 deg. one-fourth of the coils are included in the circuit and the current must circulate through them before it can reach the handle and proceed to the magnets.

In this country the use of self-regulating generators is gradually displacing devices of this kind, but in theatres and places of amusement where many graduations of illumination are required, they will probably always be used. Fig. 4 illustrates a combined electric and gas bracket as erected in the Bijou Theatre, Boston, U.S.A., by the Edison Company for Isolated Lighting. The state of nervous apprehension which has been developed in large audiences by the fearful disasters which have occurred in theatres during the last few years, has rendered them peculiarly liable to panic, and there are but few cases where electric light installations are so organized that total extension is an impossibility. Therefore, as managers naturally decline to place entire dependence upon electricity, the Edison Company has boldly faced the situation and has brought out a fitting which admits of the use of both illuminants, either of which can be turned up or down with equal facility.

Figs. 2, 3, and 5, page 309, are illustrations of three other varieties of electric light fittings used by the Edison Company for Isolated Lighting. Fig. 2 shows an inexpensive form of jointed bracket with shade. The joints are mechanical not electrical, the current being carried by a flexible cord, and they are provided with thumb-screws by which they can be set in any position, a very convenient provision, as it allows of the use of long branches. In designing such fittings there is much greater scope than in gas brackets, for, although it is both unhealthy and dangerous to bring a gas flame down to a level of the table, an incandescent lamp may be placed in the most convenient position which can be found, provided the direct rays are screened from the eye. Fig. 2 shows an epergne with four lamps, the design representing four luminous flowers, set in a bouquet of metal work. Fig. 5 is a bell fitting of 10 lamps, the whole enclosed in large globe to protect them from dust and injury.

EVOLUTION OF THE STETHOSCOPE.

By Samuel Wilks, M.D., F.R.S.,

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Instead of placing on the table every imaginary form of stethoscope manufactured out of every possible material gathered from the shops of the instrument-makers, I will carry you back to the origin of the stethoscope, and you will see how, on the principle of selection and the survival of the fittest, the primitive instruments have departed from the scene and are now only to be found among the fossilized curiosities, the relics of former ages, on the antiquated shelves of some very old medical practitioner. The stethoscope, as you know, was invented by Laennec. He relates how in the year 1816 he happened to recollect the well-known fact in acoustics of solid bodies conveying sound, and he goes on to say: "Immediately on this suggestion I rolled a quire of paper into a kind of cylinder and applied one end of it to the region of the heart and the other to my ear, and was not a little surprised and pleased to find that I could thereby perceive the action of the heart in a manner much more clear than by the application of the ear... The first instrument which I used was a cylinder of paper formed of three quires completely rolled together and kept in shape by paste." Laennec then goes on to describe how he copied this roll of paper in wood, metals, glass and other substances, and finally he says: "In consequence of these various experiments I now employ a cylinder of wood an inch and a half in diameter and a foot long, perforated longitudinally by a bore three lines wide and hollowed out into a funnel-shape to the depth of an inch and a half at one of the extremities. It is divided into two portions, partly for the convenience of carriage and partly to permit its being used of half the usual length. The instrument in this form—that is, with the funnel-shaped extremity—is used in exploring the respiration and rattle; when applied to the exploration of the heart and the voice, it is converted into a simple tube with thick sides, by inserting into its excavated extremity a stopper or plug traversed by a small aperture and accurately adjusted to the excavation. The instrument I have denominated the *stethoscope*."

Fig. 1, page 309, represent Laennec's roll of paper, and Figs. 2 and 3 the copy of this in wood as he describes. The latter figure is drawn from an instrument kindly given me by Dr. Galton, of Norwood, being the stethoscope long used by his father. It does not separate into two pieces, but contains the plug which can be removed so as to leave the end hollow. Fig. 4 is the same instrument with the sides cut out to make it lighter and more elegant, the ear-piece being the same as before, and the mouth also hollowed out. This was the stethoscope used and recommended by the late Dr. Hughes. By making the instrument still more elegant and slender we have the modern stethoscope in endless variety, as in Fig. 5. It is thus very evident how the modern instrument has been framed out of the original block of wood which was made the counterpart of Laennec's roll of paper.

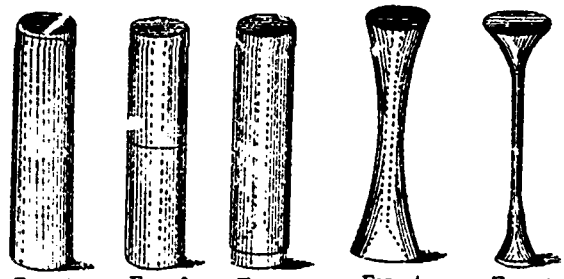

Fig. 1. Fig. 2. Fig. 3. Fig. 4. Fig. 5.

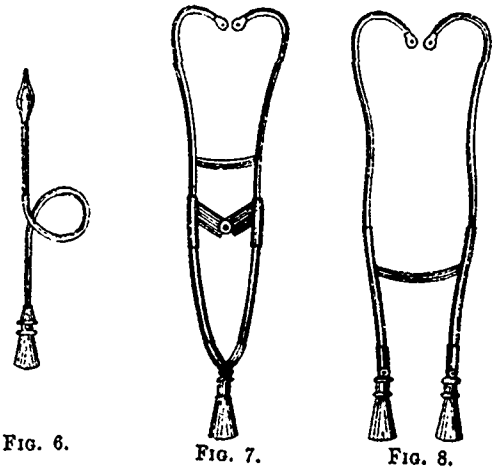

Fig. 6. Fig. 7. Fig. 8.

I know not who invented the instruments with flexible tubes, but I have no doubt that a search into medical history could tell us. I remember, however, that the first flexible stethoscope which I ever saw was the one depicted in Fig. 6, and used by Dr. Golding Bird when he saw out-patients in the year 1843. *Being much crippled with rheumatism, and therefore* not wishing to rise from his chair, he found this instru-