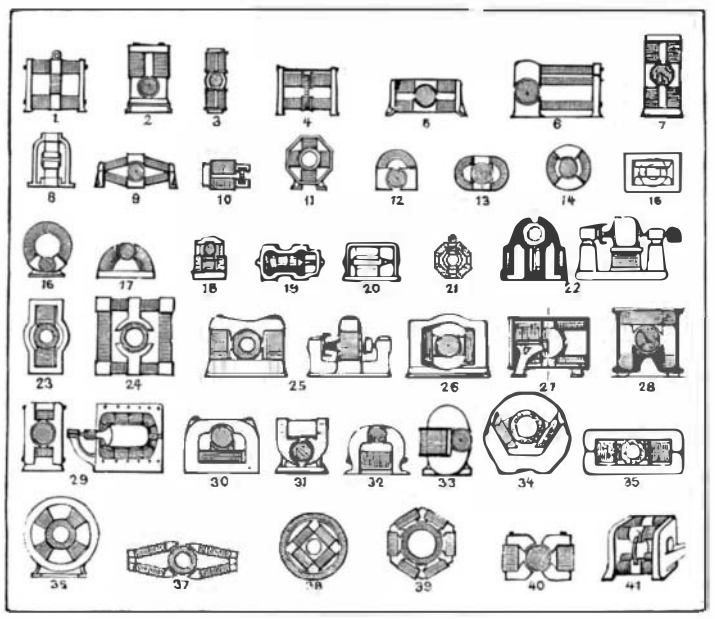
DYNAMO MACHINES.

If there are any apparatus that have particularly exercised the imagination of inventors, they are assuredly lamps, commutators, and dynamo machines. These latter, especially, have become very numerous in recent years. It is easy, however, to establish a classification between the different models. Every dynamo comprises two principal parts, viz., the armature and the inductor. The various kinds of continuous current armatures may all be referred to three well known types of winding—the Gramme, the Siemens, and the Edison. Besides these there are still other types that we must consider, and, in particular, the Desroziers winding. We shall not dwell upon the details nor upon the advantages and disadvantages of these various armatures, as they have already been presented to our readers.

As for the inductors, the same is not the case. It is but a few years ago that the labors of electricians indicated the conditions that these parts of the dynamo must satisfy. Among such conditions we may mention one in particular: it is necessary to reduce as much as possible the magnetic resistance of the current, or the resistance offered to the flux of force through the iron of the electros, and the air between the iron of the electros and the iron of the ring. The flux of force, as we know, is the product of the intensity of the magnetic field created by the surface embraced. Moreover, it must not be forgotten that a wire surrounding a piece of iron, and being itself traversed by a current, magnetizes such iron and creates in the interior a magnetic field of a certain intensity. If we take the product of such intensity by the surface of the piece of iron, we obtain the flux of force, the consideration of which is a most important matter in the construction of dynamos. These few remarks suffice to show that, in a good dynamo, the flux of force should have a maximum value. It is well, then, for a given number of windings of wire, to be careful as to the nature of the metal of the inductors, to employ iron of very great magnetic permeability, and to reduce as much as possible the resistance of the air necessarily interposed between the inductor poles and the armature. This latter condition imposes the obligation of placing the inductors as near as possible to the armature, leaving just the space necessary for the motion of the armature, and afterward of making the latter embrace the widest surface possible.

The second part of a dynamo machine, the inductor, gives rise, as may be seen, to more numerous inventions than the armature. In fact, there has been no want of models. One of our most learned electricians has conceived the happy and original idea of bringing together, in one plate, the various types of inductors of continuous current machines, which we reproduce in the accompanying engraving.

No. 1 represents the well known Gramme machine, No. 2 the Edison-Hopkinson, and No. 3 shows us the arrangement of the Siemens dynamo, with drum armature and horizontal inductors. This machine bears also the name of Hefner Alteneck, the engineer in chief of the Siemens establishment. In No. 4 we find the Schuckert type, with disk armature, and in No. 5 the form of the Weston machines with drum armature, of the Burgin ring machines, and of the Crompton, Paterson, and Cooper machines. No. 6 shows the large Edison machine of 1880, which was adopted by all the American central stations and by the Milan station. No. 7 represents a third type of the Edison dynamo of four or five bobbins. To this type is referred the English machine Phœnix. No. 8 gives the aspect of one of the first types of the Gramme machine. Messrs. Burgin & Crompton devised a dynamo, which is represented in No. 9, but which is now abandoned. In this we find the first principles of the Meritens and Jackson machines. Fig. 10 gives a diagram of the Kummer & Co. machine, which is similar to the Jones dynamo and the Gramme motor. In No. 11 is found represented one of the first models of the Gramme machine with several poles—a model which has since been constructed with more or less modification by the Oerlikon and Allgemeine Gesellschaft Companies, of Berlin. In all these machines we find a large external polygonal ring, to which, according to the radii, are adapted iron arms which, in the center, leave between them an annular space, in which the bobbin revolves. No. 12 shows a motor devised by Silvanus Thompson. No. 13 is a modification of the inductors of the dynamo No. 9, proposed by Mr. Kapp for the reduction of the magnetic resistance of the circuit. No. 14 is a section of the well known Griscom motor. No. 15 is a new form of motor for electric railways, constructed by the Thomson-Houston Co. In No. 16 is figured a section of the Eddy & Mather American machine. No. 17 shows a Furgersen dynamo. No. 18 shows one of the commonest forms of the Goolden and Trotter dynamos. The dynamo of the Telephone Company, of Zurich, is represented in No. 19, the Guzzi-Ravizza and Ironsides in No. 20, and the Tyne dynamo, of Scott & Moutain, in No. 21. No. 22 gives a section and profile of a superior type of Gramme dynamo, devised by Kapp, and since imitated by a number of manufacturers. No. 23 represents the Hochausen dynamo, No. 24 the Elwell Parker and Crompton dynamos, and No. 25 the Manchester type, due to Hopkinson. It is to this latter type that belong the Brown of Oerlikon, Mather & Platt, Sautter & Lemonnier, Tighe, Joel, Clark-Muirhead, Blakey, Emmot & Immisch, and Sprague machines. Nos. 26, 27, 28, 29, 30, and 31 show respectively the Lahmeyer, Thomson-Houston, Wenstrom, Eickmeyer, Continental, and Mordey & Jones machines. No. 32 represents a form common to several American motors, notably to the Patten and United States and Jenny motors. Silvanus Thompson devised the dynamo shown in No. 33, and Mr. Fein the dynamo shown in No. 34. No. 35 gives the form of Kennedy's iron-clad dynamo machine. Finally, the Alioth Helvetia, Elwell, Siemens (with interior poles), Thury, Kester, Brush or Schuckert-Mordey or Victoria dynamo machines are represented in Nos. 36, 37, 38, 39, 40, and 41. This enumeration comprises but a few of the principal types of continuous current machines, now no longer new. Doubtless, among all these dynamos, there are several that are superior to the rest, but still, the same qualities are sometimes reached by various means and different forms, and it is often difficult to fix one's choice between several models. The question of cost alone intervenes. The short history that precedes shows the path that the dynamo machine has traveled since its invention, and it proves that the mind of inventors has not remained inactive.—*La Nature.*



PRINCIPAL FORMS OF THE INDUCTORS OF DYNAMOS.

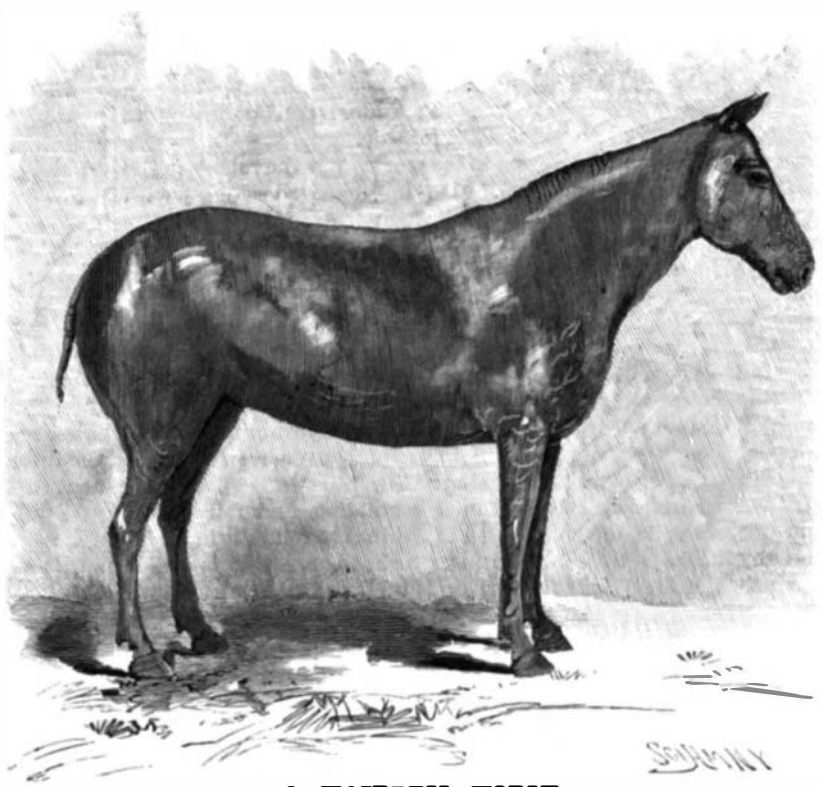
ALCOHOL is the mother of sorrow.—*Dr. B. W. Richardson.*

The Salt Industry of India.

The annual revenue derived from salt in the Indian empire is 7,000,000*l.*—$35,000,000—4*s.* per cwt. being the tax imposed. A large part of the salt consumed is imported, some of it is made from sea water, but most of th native manufactured article comes from the northwest provinces. In the Rajpootana district there is an important salt lake—the Sambhar—20 miles long by 5 miles broad, which yields from 100,000 to 120,000 tons of salt annually. This is a lake only in the rainy season, and it is before that—March to July—that the salt is fished out from the mud by natives. At this time the brine is of sp. gr. 1·08, and deposits the salt in crusts. It is not clearly known where the salt comes from, but the most likely theory is that the rain streams bring down with them saline matters into the lake valley, and, as there is no outlet, the salt in the course of time crystallizes out. Another source of salt is found in the brine pits of Gurgaon in the Dolhi district. There the soil is highly charged with saline matters, and it is only necessary to dig holes in the ground in order to get a plentiful supply of strong brine. The trouble with this is that the brine contains magnesium sulphate as well as salt, and that rendered the salt bitter and unmarketable. Dr. Thomson was deputed by the government to find out a remedy for this, and he did, in the addition of 2 per cent of slaked lime, which converted the magnesium sulphate into hydroxide—thus providing a salt free from bitterness. Two per cent of lime was required; nothing less would do, although, strange to say, the whole of it did not enter into the reaction. The process was too expensive on a large scale. There is also a range of salt mountains further north (N.W. part of the Punjaub), where there are old mines now worked economically under government supervision, and yield 40,000 tons annually. It is calculated that there is enough salt here to last for 40,000 years. Dr. Thomson defended the salt tax on the ground that it is the only imperial tax which the poor pay, and it amounts to 5*d.* per head per annum. The tax has existed for 250 years.

THE HAIRLESS HORSE.

Some weeks ago we gave a description and illustration of a horse with phenomenal growth of the hair of the mane and tail, the rest of his coat being quite normal. In the present issue we give an example of the opposite extreme, from a life study of the curious animal portrayed. This is a horse absolutely destitute of hair. Neither neck nor tail nor any part of the body shows the least hirsute growth. The texture of the skin is silky and smooth; the color is almost a full black. The animal is of rather heavy type, and with his delicate surface does not produce any unpleasant impression. There are said to be two such horses known to exist in this country. One of them was foaled in the West; the one we illustrate is credited to Australia.



A HAIRLESS HORSE.

The skin in one of these animals is affected curiously, the perspiratory function seeming to be absent. The horse does not sweat when exercised, and the mouth or nose seems to provide the escape for what would otherwise be true skin perspiration.

Rich without Money.

Many a man is rich without money. Thousands of men with nothing in their pockets, and thousands without even a pocket, are rich. A man born with a good, sound constitution, a good stomach, a good heart and good limbs, a pretty good head piece, is rich. Good bones are better than gold, tough muscles than silver, and nerves that flash fire and carry energy to every function are better than houses and land. It is better than a landed estate to have the right kind of a father and mother. Good breeds and bad breeds exist among men as really as among herds and horses. Education may do much to check evil tendencies or to develop good ones, but it is a great thing to inherit the right proportion of faculties to start with. The man is rich who has a good disposition, who is naturally kind, patient, cheerful, hopeful, and who has a flavor of wit and fun in his composition. The hardest thing to get on with in this life is a man's own self. A cross, selfish fellow, a despondent and complaining fellow, a timid and care-burdened man, these are all born deformed on the inside. They do not limp, but their thoughts sometimes do.—*Source unknown.*

THE University of Oxford has the reputation of having been founded by King Alfred in 872. It numbers at present about 12,000 members.