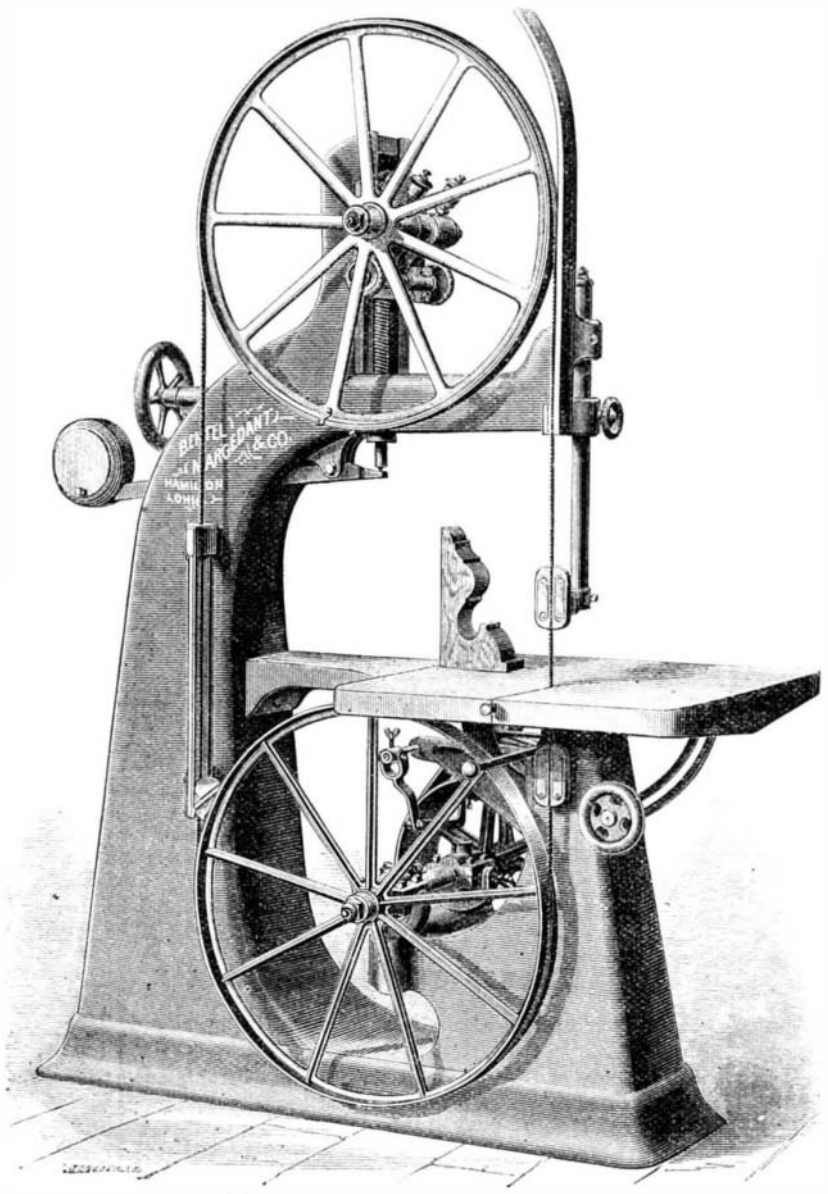
IMPROVED BAND SAWING MACHINE.

From the year 1809, when William Newberry, of London, England, constructed the first band saw, and up to the year 1862, that useful machine met with little favor at the hands of woodworkers, principally on account of the disadvantages encountered in the breakage of the saws and the difficulty of joining them. Since the last mentioned year, however, mechanics have found easy ways of attaching together the parts of the dissevered blade, and consequently thereupon the band saw has rapidly grown in usage; but in preventing the breakage, certainly a more important desideratum, little has been accomplished. Why band saws break is not difficult to understand. Forming, as the delicate thin ribbon of steel does, the sole connection between the pulleys over which it runs, it is obvious that, if one pulley be started into sudden motion, the saw must slip over the other pulley before the inertia of the latter is sufficiently overcome to allow of the imparting to it of a velocity, say, of 400 revolutions per minute. Slipping produces friction; friction, heat and crystallization of the steel blade, and hence conditions are determined which, coupled with the strain set up, ultimately may break the saw. At the same time further injury is done by the rubbing of the blade over the covering of the pulley. So also, when work is presented to the blade, its speed is retarded and the momentum of the upper driven pulley causes it to overrun the lower or driving one, and thus friction is again created between blade and surface; the same ensues on the sudden stoppage of the lower wheel. Various methods have been tested to avoid this trouble, and of these the most common is making the upper wheel less heavy than the lower one. In the machine which we now illustrate, a new plan enters, which admits of both wheels being constructed of the proper strength and weight.

In the rim of the upper cast iron pulley is formed a recess about $\frac{6}{16}$ inch deep, which has a number of projections that are ground to a circle corresponding to the diameter of the wheel. The space between the projections is filled with plumbago, and over all is located a band of steel or other material, rolled true to the diameter of the projections. The band is open, and after being placed in position is so closed as to allow of adjustability of its diameter. It is covered with leather or rubber as desired. With this device, when the lower wheel is started, before the inertia of the upper wheel is overcome, the band slides in the recess, rubbing on the projections, and thus the upper wheel is gradually set in motion without any friction taking place against the saw. As soon as its velocity equals that of the driving wheel, the pressure of the band is sufficient to maintain the same, since it requires more power to slide the band on the periphery than to run the wheel on its axis. Now, when a piece of wood is put to the saw, it is obvious that the effect of the band is to equalize the speed of the wheels: and so also, when the lower wheel is suddenly stopped, the upper one will expend its momentum in running on inside the band, the saw remaining at rest. It is usual to cover the upper wheel with elastic material which, to some extent, yields to the irregularity of motion. The manufacturers of the present machine point out that the band above referred to forms a very excellent elastic bed, as its tendency is to be thrown outward by centrifugal force, in opposition to which is the pressure of the blade. So that the band is in a condition of equilibrium, and constitutes a yielding surface to the saw.

The use of the band, it is further stated, permits the employment of a direct brake acting quickly and not endangering the lower wheel. To this end an improved clutch brake is arranged, which takes hold of the outside and the inside of the tight pulley rim, pressing at each side with equal force, so that its tendency is not to dislocate either pulley or shaft. By turning a small screw, friction may be increased or diminished, or wear compensated for. The saw guide consists of lateral and back thrust guides or supports. The former are flat pieces of wood on each side of the saw, which may be closed up to the blade and adjusted to compensate for wear. The back thrust guide consists of a series of chilled iron balls, with steel washers, balls and washers lying on each other alternately in a cylindrical inclosure drilled in the cast iron support. The back of the saw comes in contact with the balls through a groove in the cylinder; and as the balls rest only on the edge of small holes made through the supporting washers, all can be brought forward and adjusted to the back of the blade which, passing downward, rotates the balls without cutting them. Devices are added which cause the balls to revolve irregularly, presenting gradually the whole surface of the ball to the support of the blade. By this general arrangement, it is claimed, the friction of the fast passing blade is reduced to a minimum, while heating is avoided.

The last improvement, of the four which constitute the principal features of the invention, is the device for making the adjustment, for straining the saw blade, more sensitive to the varying length of the latter. The short arm of a weighted lever presses against a regulating screw, which passes through horizontal miter gear, and engages therewith, by means of a slot and feather, to a nut on the idler wheel carriage. By turning a hand wheel connected to the miter gear, the carriage is raised and lowered on the guide slide. For changing the plane of rotation of the upper wheel, the journal boxes are connected by a circular flange provided with circular V slides. The latter are engaged and held by a sliding cross head. Adjustment is made by a worm and screw, and is permanent and not affected by vibration. There are numerous other advantages of construction embodied in this machine. The principal ones are, however, before the reader; and if to them we add that the apparatus (which was patented through the Scientific American Patent Agency, November 30, 1875) is the manufacture of the well known house of Bentel, Margedant & Co., of Hamilton, Ohio, and received the first premium at the recent Cincinnati Industrial Exposition, no further statements relative to its remarkable excellence and value will be required.



BENTEL, MARGEDANT & CO.'S BAND SAWING MACHINE.

A SENSIBLE AND SUBSTANTIAL GRINDING MACHINE.

The engravings given herewith represent a grinding machine that is claimed to obviate a great many of the difficulties hitherto existing in this class of machinery. It is built to stand very firmly on the floor, its greatest length being in the direction of the motion of the wheels. Its journals are large and long, and can be placed in any position on the top of the machine or bed, or underneath by means of a slot placed in the top and bottom of the bed, in which the holding down bolts can be moved. This allows the wheels to be placed in any position, as the special work to be done requires. And if it is desired to use only one wheel, the pulley can be hung on the outside of the frame and the emery wheel inside, where the pulley is shown in the engravings. If only one wheel is used, and the boxes are hung underneath the bed, the wheel can be made to project above the top of the bed, and the side of the wheel can be used, the upper side of the bed forming a rest, upon which the work can be passed in grinding. Or the wheel can be lowered, so that the face of the wheel will only project through a table secured to the top of the bed, and in this manner a surfacing machine is made. It will be almost im-

Fig. 1.

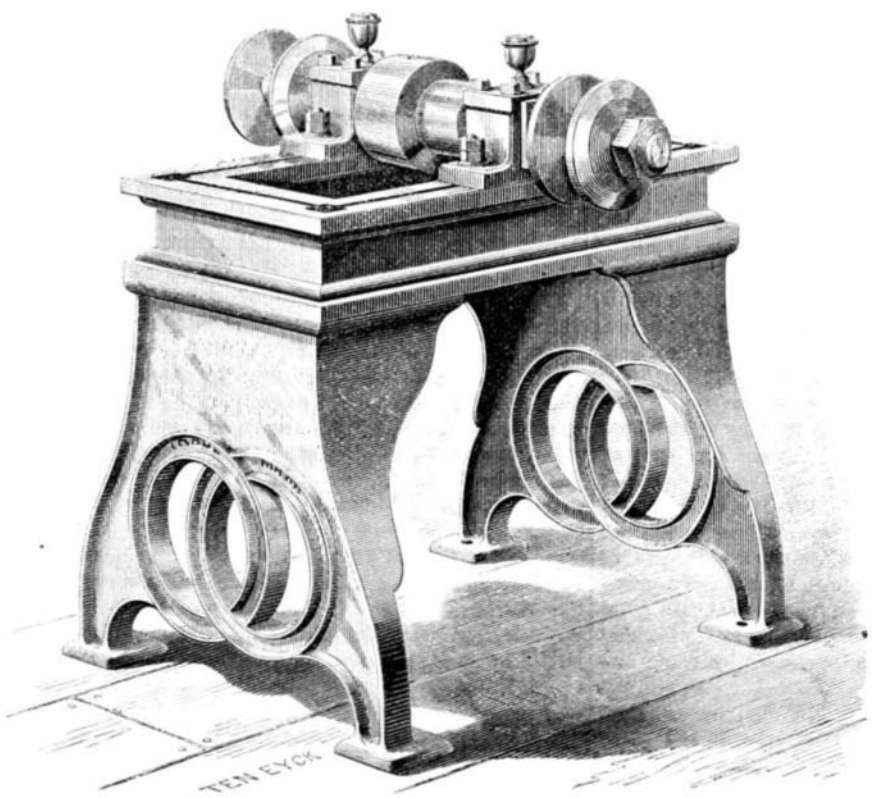
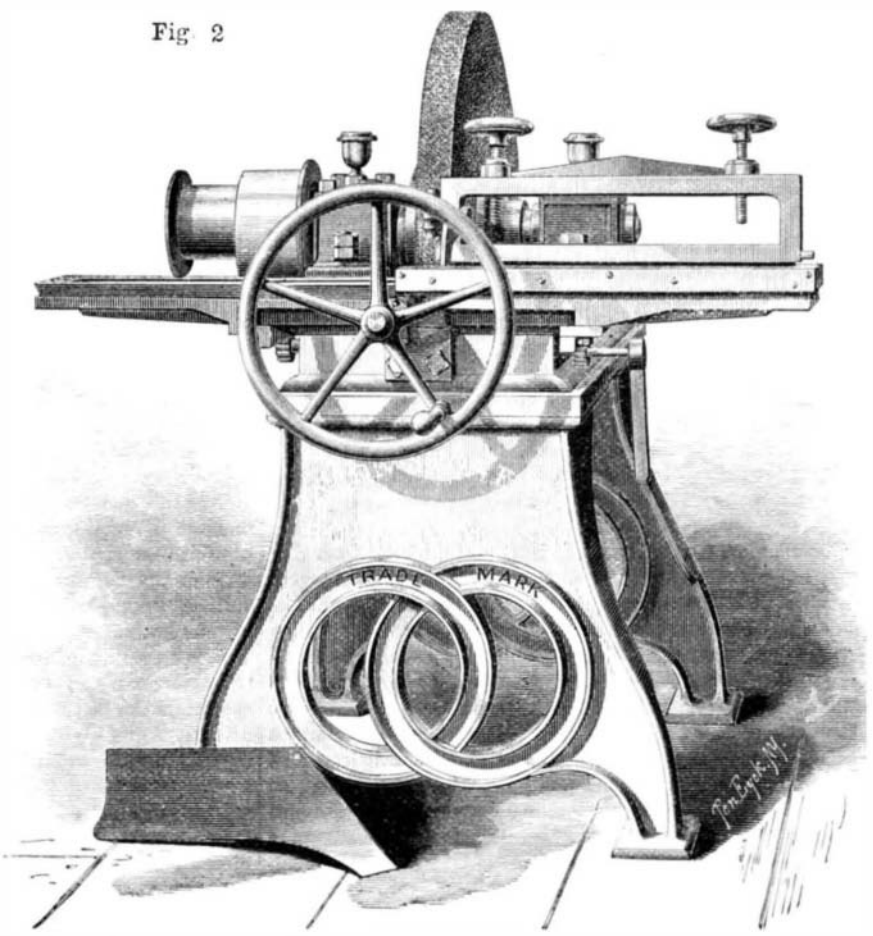


Fig. 2



THE UNION STONE COMPANY'S GRINDING MACHINE.

possible to give in detail the various positions into which the machine can be adjusted, but those acquainted with machinery will readily see that the apparatus will really form a foundation upon which almost any attachment for special work can be placed. The bed of the machine is very strong, and the slots in it can also be used to hold the various attachments; so that, without any alteration in the frame, the various devices can be put on or taken off at a moment's notice, and thus one machine can be made to take the place of several special machines. A number of attachments have already been applied to this machine, among them those adapted to the following purposes: Jointing plows (as shown in Fig. 2), beveling boiler plates, grinding the faces of pulleys, grinding car brasses, etc. Four different sizes of machines, after the style of the one illustrated, are made, with 1¼, 2¼, 3, and 3½ inch arbors, weighing about 600, 800, 1,000, and 1,500 lbs. each. The smallest are to carry small wheels to 18 inches in diameter: the largest, wheels to 6 feet in diameter.

Large emery wheels are more economical than small ones, when they can be used at all; and with substantial and heavy machines like the above, manufacturers will soon see that their interest lies in using emery wheels in place of grindstones, and large emery wheels in place of small ones.

A patent for this machine has been applied for through the Scientific American Patent Agency. For further particulars, address the Union Stone Company, 38 Hawley street, Boston, Mass.

THE PENGUIN FAMILY.

The penguins are a family of web-footed birds, with very imperfectly developed wings; they are found in immense numbers around the rocky coasts of the Southern Pacific Ocean, and on the shores of the Cape of Good Hope. The king penguin is one of the best known of the species; it belongs to the genus *aptenodytes*, being particularized by zoölogists as *aptenodytes Pennantii*. The bill is slender and curved at the points, which are acute; and the wings are very small, resembling fins in appearance, and having no quill feathers or plumes; they are therefore unfit for purposes of flight. Indeed, it would appear that this singular tribe is entirely unfitted for traveling through the air, as the bones have no air chambers, are filled with marrow, and are very heavy. The feet are very far back, and the posterior surface touches the ground as the bird walks.

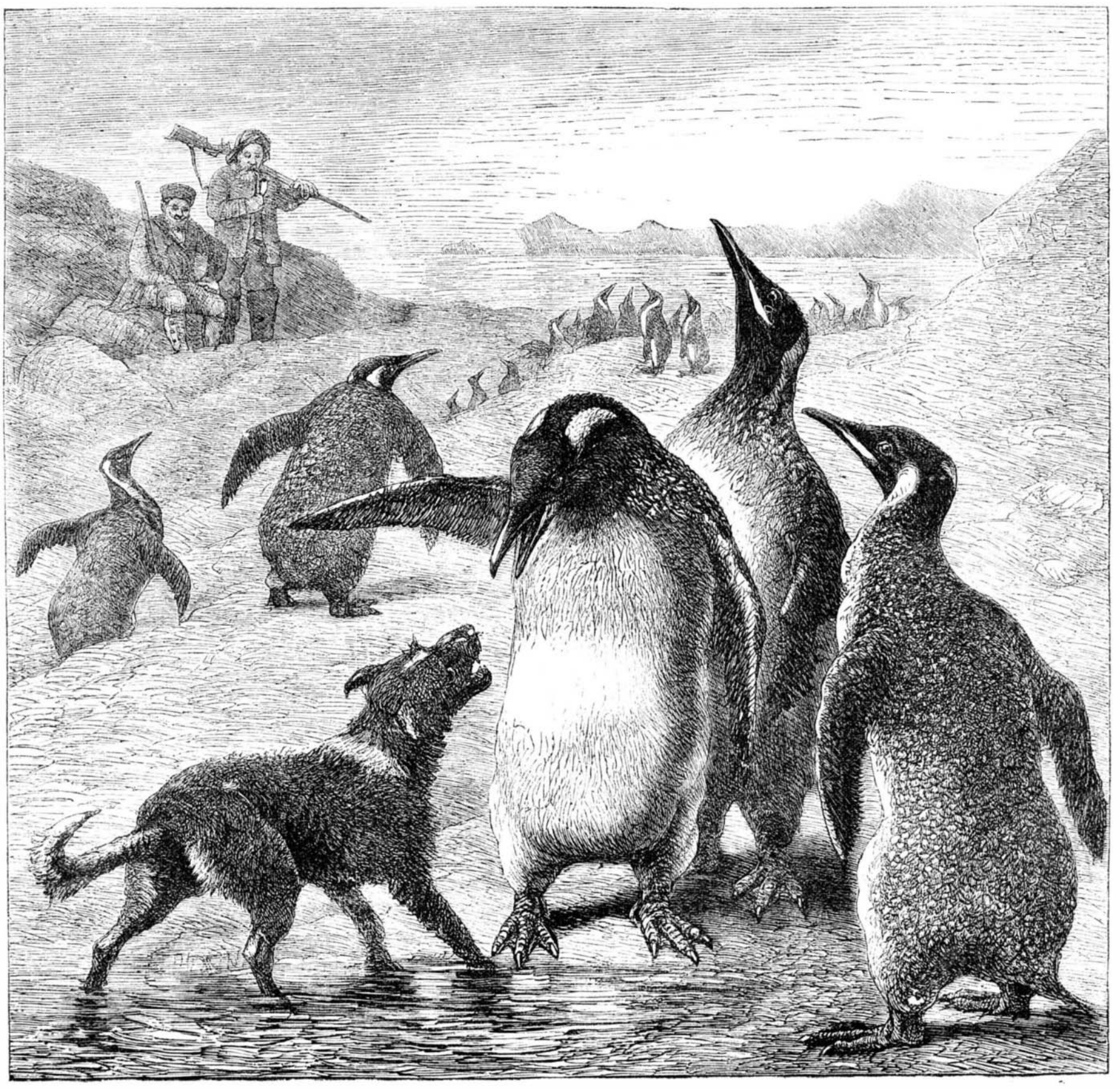
Great numbers of these birds were found on Kerguelen's Island, a rocky island in the Indian Ocean, by the expedition which traveled thither to observe the transit of Venus, which took place on December 9, 1874. At a distance they appear as white stationary bodies; but on approaching, they are seen to be waddling along with an indescribably ludicrous gait, which is made still more absurd by the turned heads, as the birds look back distrustfully at their pursuers. As the body sways from side to side, the bird looks like an animated coat with empty, swinging sleeves. When attacked at close quarters, as shown in our engraving (which represents a scene on the coast of Kerguelen's Island), the penguins will use their beaks with considerable effect; but their sense of helplessness is strong, and they soon take to running away. Being clumsy and slow in walking, they frequently fall on their breasts, and move their wings (as if they were in the water) like fins. When congregated in numbers, they will unite to resist an attack, and will form a close phalanx. They are frequently killed for the sake of their skins, which are covered on the breast with fine, close feathers of remarkable softness, and are used, in place of furs, for wearing apparel. They are generally slaughtered by being knocked on the head with a club; but sometimes they are taken alive with a lasso thrown over the head. If they can reach the water, they can usually elude the pursuer, as they swim and dive with astonishing rapidity, remaining under water for some time and reappearing at a considerable distance from the place of first immersion.

The king penguin, the largest of the species, has an orange tinted breast, which becomes white near the abdomen. The back is grayish black, and the front and back are separated by a sharply definitive line of a steel gray color. They stand about 2 feet 9 inches high, and their plumpness gives them considerable weight. Their diet causes the flesh to be rank and fishy, but it is eaten by the natives of some countries.

Professor Osborne Reynolds as a Water Wheel Inventor.

Professor Osborne Reynolds, M. A., of Owen's College, England, has taken an English patent for what he supposes to be a new invention in turbine water wheels, which is engraved and described in a recent number of the *English Mechanic*. Briefly, the Professor's invention consists in using a double turbine, or two turbines in combination instead of one, the water passing necessarily through both.

The invention also consists in the use of what he terms curved movable vanes or plates, by which the water openings are enlarged or diminished, according to the head of water or the speed required. From the description given, it seems evident that Professor Osborne has simply reproduced some of the inventions already patented in this country. For example, the American patents of A. P. Conant, April 10, 1866, for turbine, of C. Shaw, February 15, 1870, and others that might be cited, appear to fully anticipate Professor Osborne.



KING PENGUINS ATTACKED BY A DOG.