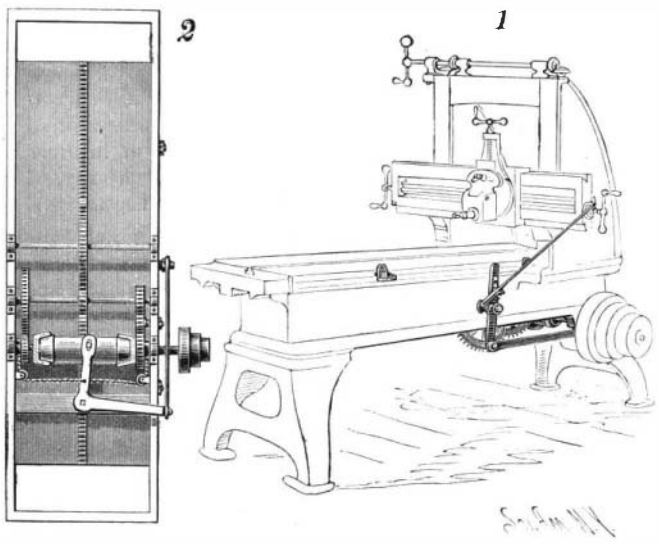
A REVERSING DRIVING GEAR FOR PLANERS.

A driving gear for planers, by means of which the motion of the bed may be quickly reversed without shifting the belts, is shown in the illustration, and has been patented by Mr. George F. Welivar, of Milton, Pa. Fig. 1 shows the improvement applied to a planer, Fig. 2 being an inverted plan view representing the details of the mechanism. On the main driving shaft is the usual cone pulley, and near the other end of the shaft a gear wheel is mounted to turn loosely and to mesh with a gear wheel on a transverse shaft. A pinion centrally secured on the latter shaft meshes into a large gear wheel on another transverse shaft, the latter wheel also meshing in a rack on the under side of the bed. Near the cone pulley end of the driving shaft is another loosely turning gear wheel, which meshes into an intermediate gear wheel, the latter meshing into a wheel on the transverse shaft carrying the central pinion. On the inner face of each of the loosely turning gear wheels is a conical flange, these flanges being adapted for alternate engagement with the conical ends on a clutch which turns and slides on the driving shaft, the clutch having an annular groove engaged by a shifting fork fulcrumed to the bed frame. The fork has an arm pivotally connected by a link with a vertical lever fulcrumed on the side of the bed frame. Adjustable dogs on the bed engage this lever at the end of each stroke, thus shifting the fork to bring the clutch into engagement with the opposite gear wheel, whereby the motion of the bed is reversed at the end of each forward and backward stroke without shifting the belt, which is run continuously on a single pulley. The planer may also be run at different speeds by simply changing the belt on the cone pulley, without any change of pulleys on the line shaft or cutting of belts, while it is designed that the planer shall make a positive stroke capable of planing to a scratch line.



WELIVAR'S DRIVING GEAR FOR PLANERS.

Friction collars on the loose gear wheels are connected by chains with the shifting fork in such manner as to form flexible connections adapted to hold the clutch in engagement with either flange, preventing accidental displacement by the jarring of the machinery or otherwise, and constituting practically automatic tighteners, adapting the clutch for heavy or light work.

THE LITTLE ANT-EATER IN THE ZOOLOGICAL GARDEN AT BERLIN.

The tamandua, or little ant-eater, is one of those animals which, according to the reports of travelers, are very numerous in their native land, but seldom reach Europe alive. This is easily accounted for when we consider the peculiar nature of the food required by the ant-eaters. Many unsuccessful attempts have been made to accustom the larger, plume-tailed members of this family to different food, for it is one of the most attractive creatures in the animal trade, and would bring a high price. But, as the colonist or seaman cannot expect a reward for his trouble, who can blame him for not burdening himself with such an uncertain and unprofitable charge? That may be the reason why this tamandua, which was received here last spring, was the first that I had ever seen alive, and, apparently, the first that had ever lived in a German zoological garden. To be sure, it did not live long, but long enough to give our artist many opportunities for careful studies from life, which resulted in the excellent drawing published in connection herewith.

The little ant-eater, or tamandua (*Myrmecophaga tetradactyla*, L.) is really the medium sized one, for, besides the large ant-bear already mentioned—which is nearly as high as a large dog—there is still another, quite a dwarf, which is little known except by name, even the stuffed specimens being very rarely seen in our museums. The tamandua is about the size of a cat, and differs from the large ant-bear in many respects, a very noticeable difference being the shape of its tail, which is naked at the tip and has the prehensile qualities possessed by many South American apes. The prehensile tail is specially noteworthy, as it indicates a difference in the mode of life within the narrow limits which confine the habits of ant-eaters, the great ant-bear destroying ants and termites—those pests of the tropics—on the ground, while the two smaller species carry on their work in the trees. Let it be mentioned here that the ant-eater, when free, lives less on ants than on termites, which are very different creatures, belonging to a different order of insects. This, perhaps, explains why the ant-eaters in captivity care little for our dry ants and their eggs, preferring gruel and chopped meat with egg. The tamandua is further characterized by the number of its toes, of which there are five on the fore feet and four on the hind feet, being just the reverse of the arrangement of the toes of its larger relative. These large claws serve to destroy the termite nests, and also as powerful weapons in defending themselves against the attacks of dogs and other animals. Many a dog has paid with his life for an indiscreet attack on a large ant-bear, and Hensel states that he has seen one of the smaller ones hold its own against two. The tube-like head and worm-like tongue complete the equipment of the ant-eater. Its color is black and white, but the coloring of the individuals varies considerably, some being almost of a solid color. It has not yet been ascertained whether this has any geographical significance, which does not seem improbable in view of their wide distribution throughout the forests of South America.

The ant-eaters are edentates, and with the scale-covered animals form the family of Vermilinguia. The similarity of their tongues would seem to indicate a common origin, but this is not possible, as they belong to different lands; the ant-eaters being natives of South America, and the others of Africa and India. They were placed in the same class because they ate the same food, the construction of their tongues making this a necessity, but this classification is no longer accepted. On the other hand, the animals with the worm-like tongue show here and there, in the construction of their bodies, an unmistakable resemblance to the Australian monotremes, which, by the old system, were classed with the edentates, but this classification is not upheld by the discoveries of paleontology, and, therefore, the edentates now living seem to be the scanty and reduced descendants of a widespread and much larger race of animals of past ages, the history of which will remain in darkness until scientific investigations can be undertaken in distant parts of the world.—*Illustrirte Zeitung.*

THE LITTLE ANT-EATER.

Steam Pipe Required for Heating.

The question often arises, How much pipe is required to heat a building of a certain cubic capacity? Of course, this varies with the temperature of the steam used, the degree of heat required to be kept up, the frequency with which the doors are opened, the temperature of the outside air, the intensity of the wind, the area of window surface, etc. There are no two places in which the conditions are exactly alike, and it would be hard to lay down an absolute rule for any fixed set of conditions. But there are some good data which will do to start from, and a writer in the *Mechanical News* calculates it as follows:

We may start out with the fact that one unit of heat will raise 55½ cubic feet of air from 62 deg. to 63 deg. F., and can use these figures, no matter what the temperature and the steam are of the building to be warmed, or what outside atmosphere.

For low pressure steam—say about 5 pounds above atmosphere or by the gauge—the length of 4 inch pipe required for heating the air is found by multiplying the volume of air in cubic feet per minute, to be warmed, by the difference of the temperatures in the room and outside, and dividing by 336. The answer will be the length of 4 inch pipe in feet, and will be also about the number of square feet of pipe, as a 4 inch pipe has 12·57 inches circumference, hence but a very trifle over 144 square inches of surface per foot of length. (For 1 inch pipes the divisor required is 84 instead of 336.)

It will take one square foot of direct boiler surface, or its equivalent of floor surface, to keep a temperature of 60 deg. F. in a room with steam at 5 pounds by the gauge, and the ordinary range of temperatures in and out of the room.

The Set of Steel Wire.

Mr. G. Leverich, of the Brooklyn Bridge staff of engineers, was associated with the late Colonel Paine for over twenty years, and relates some interesting reminiscences of his connection with the big structure. When the big sustaining cables for the bridge were being constructed, considerable difficulty was experienced with the coils of steel wire, which, being pretty hard, had a strong tendency to spring back into coil form after being straightened out. This wire in the manufacturing process is reduced to proper size by being drawn through holes in a steel plate. Colonel Paine found that the coiled wire was not so strong by 10 or 15 per cent as if it had been kept straight, and he tried to get the manufacturers and Colonel Roebling to have the defect remedied. One day Colonel Paine drove up to his house in Jersey, and taking a box of coiled wire out of the vehicle stretched it out straight and lo! it remained as it was, without any tendency to coil up again. The colonel had discovered an extremely simple method of accomplishing the desired result, which was, instead of coiling up the wire close to the perforated steel plate after it had been drawn through, and thus make it set, to draw it out some considerable distance before coiling.

Florida Camphor.

According to a paper read by Professor Maisch at the October meeting of the Philadelphia College of Pharmacy, the camphor tree is being cultivated successfully in Florida (*Am. Journ. Pharm*, Nov., p. 565). It seems to flourish in almost any soil, and the tree grows rapidly. It is believed that in ten years time there will be more camphor trees than orange trees in Florida, and that the camphor industry will prove to be more profitable than that of sugar. The camphor obtained from the Florida trees approaches more nearly to that of Japan than to Chinese camphor, since the odor of safrol is distinctly recognizable.

THE work of connecting Paris with London by means of a telephone line is now in progress.