Immense Pecuniary Losses Occasioned by Insects.

A recent number of *Insect Life* says:

No very recent estimates of the loss arising from insect ravages have been made, but some of the older estimates are here given. Twenty-five years ago B. D. Walsh, the entomologist of Illinois, estimated the loss from this source at from $200,000,000 to $300,000,000 per annum. The great increase in acreage of crops and orchards since that date has been attended, of course, with a corresponding increase in destructiveness; but methods of prevention and remedies have so multiplied and improved that the ratio of loss has greatly decreased. Fitch, then New York State entomologist, estimated the damage to the wheat crop of that State in the year 1854 by the wheat midge at $15,000,000. The loss to wheat and corn on account of the ravages of the chinch bug in the State of Illinois alone in 1867 was estimated at $73,000,000. The loss occasioned in 1874 to corn, vegetables, and other crops by the Rocky Mountain locust in the States of Kansas, Nebraska, Iowa, and Missouri was estimated by Riley, from carefully collected data, at $100,000,000, to say nothing of the indirect loss by stoppage of business and other enterprises, which would probably increase the total loss to the neighborhood of about $200,000,000. The ravages in the principal cotton States of the cotton worm have amounted to a loss of about $30,000,000 in years of great abundance, while for many years the average annual loss was not less than 15 millions. A more recent estimate than those given may be mentioned.

The damage occasioned by the chinch bug in the year 1887 was estimated in the annual report of the Agricultural Department for that year at not less than $60,000,000. Dr. Riley has in fact repeatedly published the general estimate that the average annual loss to the United States from injurious insects exceeds $300,000,000.

The investigations of the United States Entomological Commission and of the Division of Entomology, Department of Agriculture, and also of State Experiment Station entomologists and private workers, have led to the discovery of remedies and preventives which, properly and thoroughly applied, result in saving a large percentage of the loss occasioned by insects, and the statement that these investigations have paid for themselves many thousandfold is indubitably true.

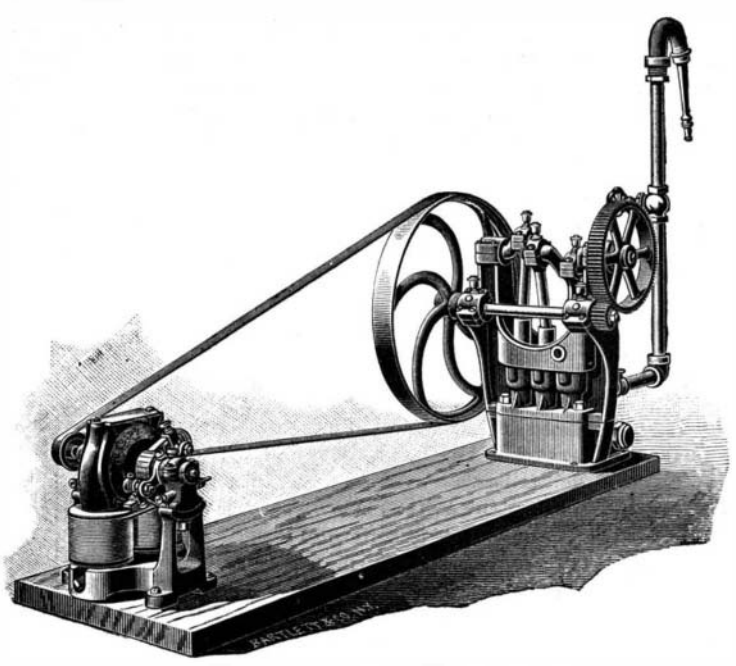
We may add that if the general government and the State governments were to spend fifty times more money than is now granted for investigations respecting the habits of insects and the modes of destroying those that are noxious, it would, doubtless, be of great advantage to the country.

ELECTRICAL PUMP.

Naturally, along with the general adoption of electric lighting, there comes the use of a current for motive power for all kinds of industries, and for use outside of what are properly called industries in which manual power is displaced by electric motors. Prominent among these is the pumping of water in dwellings and other buildings in cities and villages where this work has usually been performed by hand. Electricity lends itself to this use in a peculiarly efficient manner, as it is perfectly automatic in its action, setting about its work when the tank becomes empty and stopping as soon as it is filled.

The motor shown in the annexed engraving is the smallest made for the purpose of pumping, by the Thomson-Houston Motor Company, of 620 Atlantic Avenue, Boston, Mass. It is a ⅛ h. p. electric motor, connected by a belt with a 1¼ × 2 inch Gould triplex pump. Connected with this outfit is an automatic slow-acting switch, for stopping the motor as the water in the tank reaches its full height, and starting it again just before the tank is emptied. This pumping outfit has a capacity of 100 gallons an hour raised to a height of 30 feet. The next size, a ¼ h. p., with a 1¾ × 2½ inch Gould triplex pump, has a capacity of 250 gallons an hour raised to the same height. The number of gallons delivered varies inversely as the height to which the water is raised.

This company furnishes pumping outfits of any desired capacity and for any pressure. In the larger sizes, beginning with the 4 × 4 pump run by a 1½ power Thomson-Houston motor, the pump and motor are placed upon the same base and connected directly by gearing.

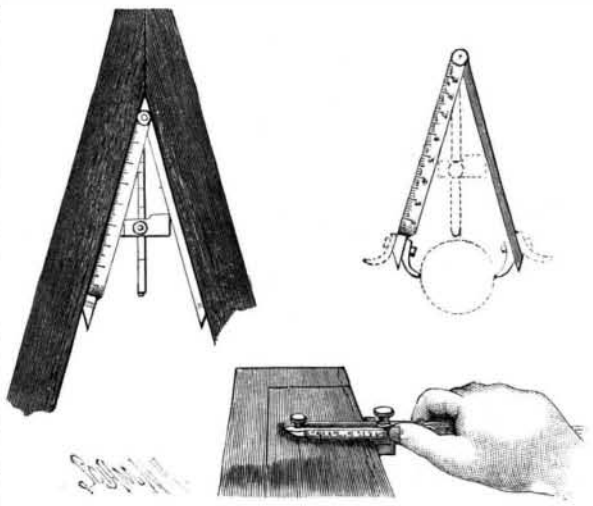


THOMSON-HOUSTON ELECTRIC PUMP.

ACCORDING to the authors, rape oil consists of the glycerides of three distinct fatty acids, one of which, melting at 75°, occurs only in very small quantities. The other two, erucic acid and a liquid acid which the authors name rapinic acid, are present in equal quantities. Lead erucate is readily soluble in hot ether. The zinc salts of the fatty acids can be separated by means of ether.—*Reimer and Will, Deutsch. Chem. Gesell.*

A MEASURING AND DRAWING IMPLEMENT.

The illustration represents an implement which can be readily manipulated to measure inside or outside angles and obtain their miters, or used for calipering, or as a depth and end marking gauge, dividers, compasses, etc. One view shows the implement as applied to take an inside angle and its miter, while in another it is arranged as a pair of calipers, the third view showing its application as a marking gauge. Three arms are jointed at a common pivot, the middle arm carrying an adjustable block adapted to engage the other two arms. The pivot has in its center an annular flange separating the middle arm from one of the



JAMES' MEASURING AND DRAWING TOOL.

side arms, the other arm being forked, and the outer ends of the forks hung on the pivot, which is threaded near its ends and engaged by nuts, by the adjusting of which the jointed ends of the arms are pressed upon to lock the arms in position. On the middle arm is fitted to slide a block, held in place by a set screw, the block indicating on a graduation representing degrees and subdivisions of angles measured by the outer edges of the other arms. The side arms have points at their lower ends, so that by removing the block from the middle arm and folding the latter into the forked arm the device can be used as a pair of dividers, in one leg of which a pencil may be fastened when it is to be used as a compass. In the outer ends of the main arms, also, at or near the points, are threaded apertures in which may be fastened curved finger pieces, fitting the device for use for inside or outside calipers. In adapting the device for a marking gauge, the forked arm only is used in connection with the block and set screw, a pointed screw then screwing in the threaded aperture near the end of the arm.

This improvement has been patented by Mr. Charles W. James, of No. 4140 Parrish Street, West Philadelphia, Pa.

Progress in Military Ballooning.

There can be no doubt that balloons are destined to play an important part in the great European war which every one assigns to a more or less indefinite future. As a means of observing the movements of the enemy, and at times of enabling messengers or others to escape, they must have high value. The question is receiving at least as much attention on the Continent as in this country, and it is claimed that important advances have been made in the portability and simplicity of balloon equipments. There are large works near the Champ de Mars, Paris, which are entirely occupied in the construction of balloons and aerostatic machinery and material. Plants have been supplied to almost every foreign government, and complete schools of military aerostation have been fitted up in Italy, and more recently in Russia. The system employed in this balloon may be called the portable captive, and its adaptability to the conditions of actual warfare has recently been tested by the Italians in their campaign around Massowah. The total weight of all the plant necessary for the transport and inflation of the latest type of portable captive balloon does not exceed six or seven tons, so that it can easily be forwarded over long distances by rail. It is carried upon three wagons of special construction adapted to rapid conveyance over rough ground.

The entire equipment, besides the balloon itself, consists of an apparatus for the generation of the gas and a winding drum for the cable by which the balloon is secured. The generator produces hydrogen gas by the decomposition of water, and is of rapid and continuous action, supplying from 8,750 to 10,500 cubic feet of gas per hour. It can be set to work anywhere where there is a supply of water, such as is afforded by the proximity of a river or pond. The winding drum is worked by steam, and it unrolls not only the cable, which is over a quarter of a mile long, but also a telephonic wire, through which constant communication can be maintained with the occupants of the car. The capacity of the balloon varies from 17,500 to 21,000 cubic feet, and by an automatic arrangement the car is always maintained in a perfectly vertical line, notwithstanding the inclination of the cable. The makers of these equipments have at present under construction the largest balloon that has ever been constructed. The enormous captive balloon which made continuous ascents at the Paris Exhibition two years ago was of 105,000 cubic feet capacity, and carried twelve persons. The one now being made will be over 2,000,000 cubic feet, will be able to accommodate no fewer than 180 passengers, will have a car 35 feet in diameter, and will be held by a cable nearly 1,200 yards long.

But the most extraordinary product of the works referred to is a mysterious invention known as an "aerial torpedo boat," which has been ordered by the Russian government. All that is known about it is that it is an elongated balloon, 170 feet long, furnished with a steam engine of 50 horse power, and impelled at a speed of 25 miles an hour by a screw 36 feet in diameter. This is evidently the latest development of the familiar "flying machine" notion. The trials are to be conducted in secret at St. Petersburg. It is to be hoped that the Russian government will not have reason to regret its expenditure; but it is of ominous augury that nothing further has been heard of the trials that the French government commenced last year at Havre with another vessel of a similar design.—*The Engineer.*

The Pike's Peak Railroad.

Our Colorado correspondent writes from Manitou, Col., at the foot of Pike's Peak, June 28, 1891, that the date of the opening of the new road to passenger transportation to the summit of Pike's Peak, heretofore so frequently and erroneously stated, seems at last truly at hand.

A small army of Italians are to-day shoveling snow at or near the top, at an elevation of over fourteen thousand feet above sea level, and a large force of mechanics are at work adjusting the track, hurriedly laid last summer and somewhat disarranged by last winter's frosts.

The rack rails were found quite uneven, failing to accurately fit the cogs on the engines, causing unnecessary friction, necessitating an excessive consumption of steam and fuel, and making travel rough, noisy, unpleasant and expensive.

All the old cog wheels on the engines have been removed and new and heavier ones substituted, made of a tough and elastic steel, that will spring about sixteen per cent without breaking, obviating all danger should a tooth accidentally fail.

These cogs have now been gauged to within a sixtieth of an inch for the correct distance, so that a ton of coal, formerly consumed in a distance of three miles, now lasts the entire trip.

Cement for Parchment Paper.

The best cement for pasting parchment paper, according to a lithographic authority, is casein glue. It is much better than so-called chrome glue, because the latter produces yellow or brownish spots where it has been employed. Casein glue is a solution of casein, which appears as whey or drop when milk is allowed to curdle. The glue is dissolved in a saturated solution of borax. When dried in the form of transparent gelatin it appears as grayish white and somewhat brittle matter, which can be easily dissolved in water, and possesses great adhesiveness. When employed for pasting parchment paper a thin paste is prepared, used in the customary manner, and the jointed places afterward exposed for a little while to a jet of steam.

THE largest bay in the world is Hudson Bay, measuring 850 miles north and south by 600 miles wide.