

known in Europe, and it is sincerely hoped that the experiment will be productive of beneficial results.—*London Grocer.*

What They Say About Us in India.

Campbell, the poet, in his poem on "The Last Man," has written verses which have attractions for most men, more or less. The Bible tells us the history of the first man, and unsatisfied curiosity peers forward, and wants to know the situation and position of the last man.

Almost numberless have been the speculations on this topic. The raciest of them which we have seen is that which we give elsewhere from the SCIENTIFIC AMERICAN, and to all of our readers who can enjoy genuine humor, based on good scientific knowledge, we commend the perusal of this very clever skit. *En passant*, we may say that for good sound scientific knowledge, clear cut and luminous engravings, combined with ability and liveliness in general conduct, the SCIENTIFIC AMERICAN has no peer. It is *sui generis*. There are English journals which give more scientific matter, but there is none which has such decided characteristics as those that make this publication peculiarly unique. One is sure to know from it the latest results of science put in the most attractive form, realizing, indeed, Tennyson's line:

"The fairy tales of science and the long results of time."

—*Madras Times.*

Ventilation of Soil Pipes.

At a recent meeting of the New York Board of Health it was resolved that soil pipes in tenement houses and vaults, when within twenty feet of any dwelling, should be carefully ventilated by pipes to be laid as the Board directs. After November 1, violations of this resolution will be prosecuted civilly and criminally.

ARCHER FISHES.

The chelmons are a species of fish indigenous to the Indian Ocean. They are divided by naturalists into two varieties, distinguished respectively by the short nose or snout, and by the disposition of the very beautiful colors which their bodies exhibit. The short-nosed chelmon has a greenish hue over its body; the fins are green with blue reflections. A black spot surrounded by a pearly white circle appears on the dorsal fin, and on the body itself are bands of blue and mother-of-pearl. The long-nosed chelmon, which is represented in Fig. 1, is of a citron yellow color. There is a large black spot beside the forehead, the front of which is azure blue. The eye is of a bright rose tint; and on the anal fin is a circular spot of black bordered with white.

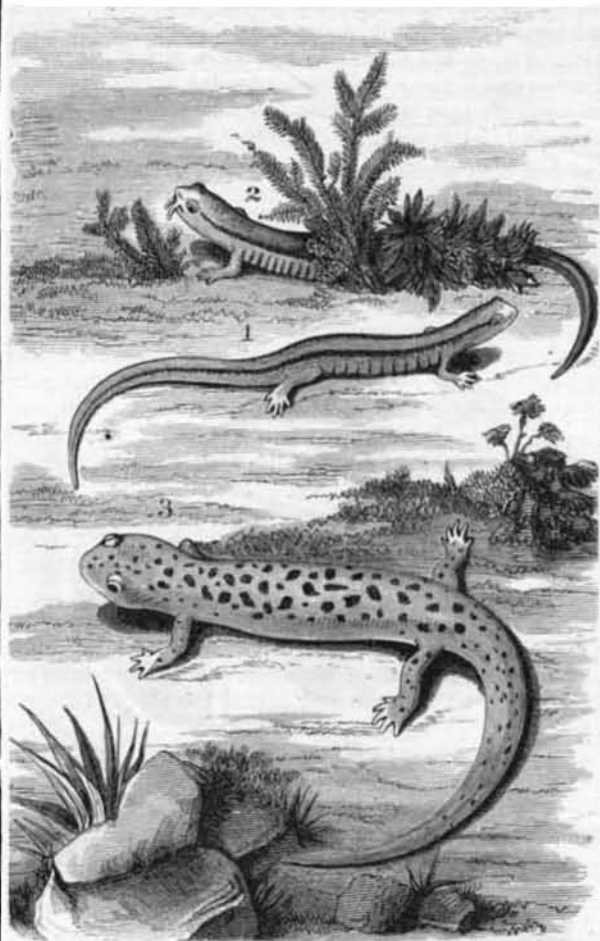
This fish has a singular way of obtaining its food, which has earned for it the name of archer fish or fishpump. It frequents the mouths of rivers, and especially shallow places, in search of the insects which exist on the marine plants, the stalks of which rise a little above the surface of the water. As soon as the fish spies its prey, it approaches cautiously as near as possible, and then, raising its snout above the surface, squirts out a fine stream of water with considerable force and unerring aim. The jet is often projected over a distance of 6 feet. The insect struck is stunned and falls into the water, and there is easily captured by the chelmon.

The representation of another group of archer fishes, and to which this name is more specifically applied, is depicted in Fig. 2. The body is elongated, the line of the back being nearly straight, while the belly is strongly curved. The color is olive brown, or yellow, marked with large oblong spots or bands. Although the mouth of this fish is of entirely different formation from that of the chelmon, it takes its prey in precisely similar manner. The Chinese keep the fish in tanks in their dwellings, as pets, feeding them by presenting the insect on the end of a straw, from which the fish knocks it off by ejecting his water jet.

THE RED AND THE TWO-LINED SALAMANDER.

BY C. FEW SEISS.

You may, perhaps, have seen in some brook or spring, a bright red, lizard-like animal, either lying motionless at the



bottom, or wriggling beneath a stone at your approach, to escape observation. This is the red salamander, Fig. 3, *spelerpes ruber*, Daudin. The whole superior surface of this animal, in life, is vermilion red, thickly spotted with black,

the spots smallest on the head and tail, and disappearing half way down the sides of the body. A few small spots on the under jaw and the legs. Beneath, spotless orange-red. The eyes are prominent, with a golden yellow iris; a dusky spot before and behind the pupil; pupil oval and black. The dark spots on the iris give it a linear appearance. It varies in size; I have seen it from 3½ to 6 inches in length.

Although so bright and pretty during life, a few hours' immersion in alcohol changes its bright vermilion color to a dirty white. It seems nonsensical to label a uniform soiled white, black-spotted animal, the *s. ruber*. Dr. Holbrook says "it is a land animal, and is found under rocks, fallen and decaying trees, etc." This is not the case with the red salamander in Pennsylvania and New Jersey, for I have never seen it captured out of the water. The finest specimen I ever saw was in a spring of cold water, and as the time was the middle of summer, it is not probable it had gone there only to deposit spawn. It can, however, remain out of water for a long time; specimens in our aquarium often remained upon floating objects for several successive hours. It is quite possible it could live in extremely moist situations for months at a time.

The food of the red salamander consists of insects and small earth-worms. In the aquarium it is showy and interesting, but as it is an air-breathing animal, it should be furnished with the means of quitting the water when it is so desired.

Another animal belonging to the same genus as the preceding, and frequently met with in Pennsylvania, is the two lined salamander, Fig. 1, *spelerpes bilineatus*, Green. It is a terrestrial species, but frequents only moist places, and most generally in close proximity to a stream of water or spring.

Occasionally during the breeding season two barbels or cirri appear upon the upper jaw of the male, between the nostrils and the lip. Green's *salamandra cirrigera* appears to be a male of this species thus adorned (see Fig. 2). The use of these barbels is unknown, but they seem to be simply ornamentations, to show, perhaps, when the possessor pays his addresses to the females, that "the sign of man is now upon his chin!"

The young or larva of this, as with other species, are provided with gills, and breathe water only. When the gills disappear it becomes a perfect salamander, and respiration

is performed with lungs. The young *bilineatus* resembles the adult in color, but the colors are less bright, and the lines less distinct. In mature animals the color is brownish yellow above, with a black line on each side beginning behind the eye, extending along the flanks, and lost near the end of the tail. Beneath, bright yellow. It is a small species, rarely exceeding three inches in length. In activity, it far surpasses the red salamander, and you will learn, as I have, "you must be quick with your hand if you wish to catch a *bilineatus*."

Pheasants Poisoned by Shot.

A short time ago the keepers on Sir H Tufton's estate at Ashford, England, noticed a singular mortality among the pheasants. The cause was not immediately discovered, but it was eventually found out that the birds swallowed the splinters from spent bullets lying about on the ground at the range of the local volunteers, which was close at hand. The lead did not produce immediate death, but caused lead poisoning, to which the birds by slow degrees succumbed. Other even more remarkable instances than the above have occurred with pheasants and grouse swallowing shot picked up in the coverts that have been shot, and among the heather, in mistake either for seed or gravel.

Last year a considerable number of pheasants died in one gentleman's preserve alone in Lancashire from this cause, and there is every probability that many of both pheasants and grouse casually found dead from some unknown cause owe their death to picking up pellets in this manner.

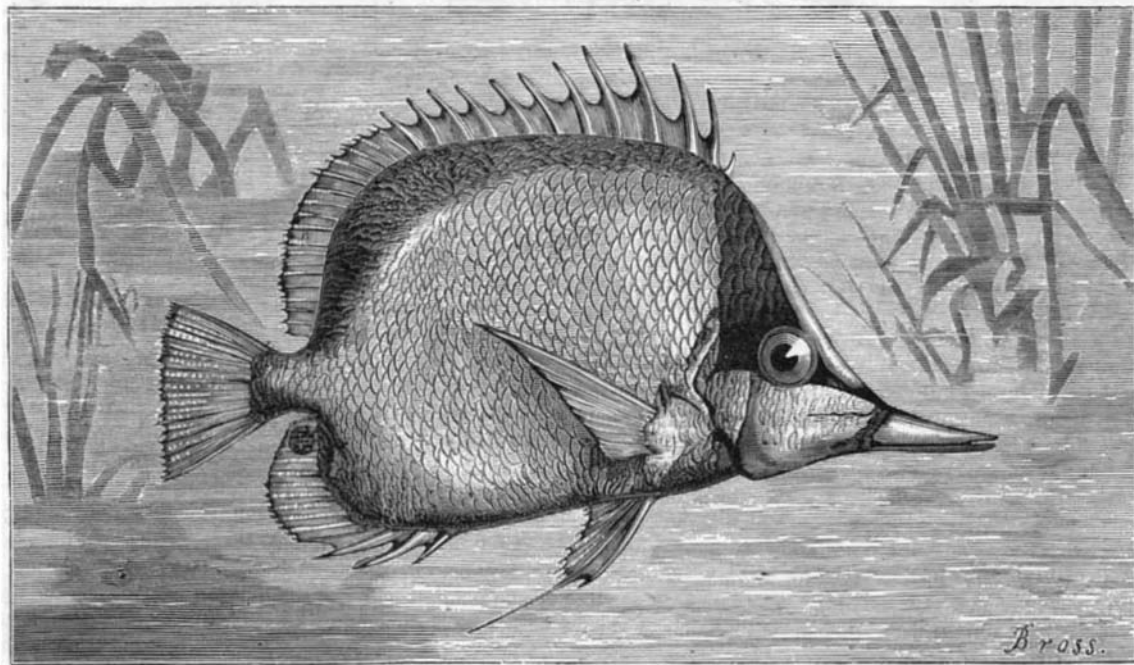


Fig. 1.—THE LONG-NOSED CHELMON.

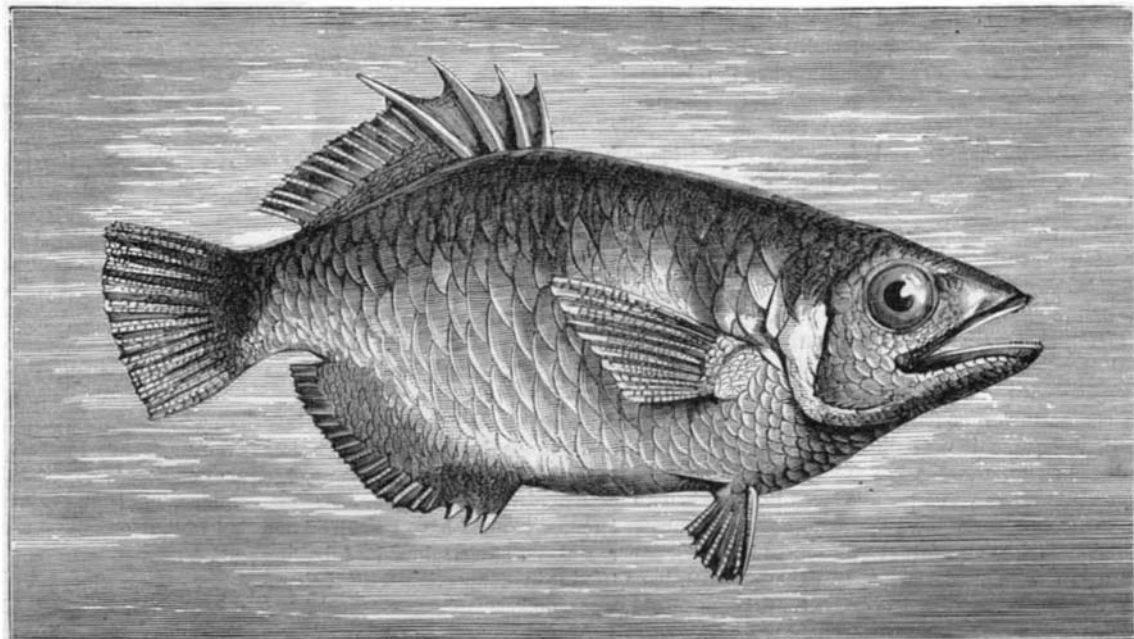


Fig. 2.—THE ARCHER FISH.

How Tomatoes are Canned.

The large consumption of canned goods in this country, and the market which is opening for them in Europe, the great variety of farm products which the factories demand, and the near home market which they make for perishable fruits and vegetables, render this industry a matter of interest to all intelligent farmers. Besides meats and fish preserved by this method, nearly all the more common and perishable fruits and vegetables are canned and made available for food during the whole year. A canning factory is one of the most useful and economical institutions that can be established in an agricultural community. The process of preserving is now so well understood, and the work is so thoroughly done that the goods will keep for years, and can be sent on long sea voyages to all climates and to the remotest countries. There is hardly any limit to the demand for these goods, so that a factory will make a good home market for nearly all fruits and vegetables that cannot be disposed of in the fresh condition. It is a complete remedy for any glut in the local markets; for when the hucksters or middlemen cease to pay living prices, the factory takes the overplus. The packing companies are one important factor in the solution of the question of a cheap food supply for the million. An almost inconceivable amount of wholesome food is gathered and marketed at cheap rates that would otherwise be lost. In many ways this industry stimulates the production of fruits and vegetables in districts remote from large markets. It gathers up the fragments, so that nothing is lost.

Mr. W. Clift, of Mystic Bridge, Conn., writing to the *Country Gentleman*, says: Your readers will be interested in a description of the canning process as carried on by the Dudley Packing Company at their factory, established in this place the present season. The capital called for in a factory that will use up a thousand bushels of tomatoes a day is about \$15,000. The company began with tomatoes, because the demand for them is very large, and they can be grown in quantity on short notice. Seeds were distributed during the winter and spring, and the farmers pledged themselves to cultivate at least 115 acres of tomatoes, and the price was fixed at 30 cents a bushel. It was regarded as an experiment, many of the farmers doubting whether the crop would pay at that price. The company engaged to take all that they would raise. Both parties have kept their engagements, and not only has the factory consumed all the tomatoes produced in this vicinity, but large quantities have been brought from New Jersey by steamer and rail for packing here. The yield on good land, well cultivated, has reached in some cases 400 bushels to the acre, which plays fairly for a rather bulky crop.

The company furnish crates, holding just a bushel, open at the top, and furnished with projecting posts at the corners, so that they can be packed one crate on the top of another without damaging the fruit. The payments are in cash on delivery of the goods. The first operation in the canning process is the scalding of the fruit to loosen the skin. The scalding tank is six feet long, three feet wide and two deep, and stands upon the platform, outside of the building, near the door. This tank is filled with water, and kept near the boiling point by steam. A sieve of iron wire fits into the top of the tank, and receives two bushels of tomatoes for a charge. A jet of steam is turned into the water, and the tomatoes remain in it a half minute, when they are raised by the sieve, which turns on a hinge, and are dropped into two boxes at the lower end of the tank. Two men manage the scalding tank, and a boy distributes the fruit among the peelers within.

Thirty-six women and girls attend to this department. They are arranged at the sides of troughs, elevated sufficiently for convenient handling, each workman having a pail and a box for the deposit of the skins and refuse; each tomato is peeled and cleaned of all decay and green around the stem. The price paid for this work is $3\frac{1}{2}$ cents a pail, and the day's work is from 30 to 40 pails to each operative, according to her skill and activity. The pails are carried by boys to the steamer, which is upon an elevated platform, and discharges into the hopper for packing. The overseer of the steamer carefully examines each pailful, as it is spread out, for any neglect among the peelers, and removes the unripe portion if any is found. She also gives a check for each pailful, which the boy returns to the operative, and these checks are the certificates of the amount of labor performed.

From the steamer the tomatoes fall into a hopper, and then into the stuffer, which is a cylinder worked by a treadle. The cans used here are quarts and gallons, of which a large stock is kept on hand in the loft above the packing room. The cans are passed down to the packer by a trough, which is kept constantly full. The filling is done through a hole about an inch and a half in diameter in the top of each can. This hole is placed over the end of the stuffer, and with a slight pressure of the foot upon the treadle, the packer fills his can, and nearly excludes all air and water. The next step in the process is regulating the cans for soldering. Some of the cans are a little too full, and some do not contain quite enough. This work is done by two girls. A boy fits the caps over the holes, and puts seven cans upon a tray, and delivers them to the solderers. This is done by boys at the Gulden's patent capping machine, which is exceedingly ingenious, and saves a great deal of labor. The can to be capped is put upon the platform of the machine. The soldering iron, a semi-circular piece of iron, adjusted to the size of the cap, is immediately lowered upon the edge of the cap, which the workman turns with one hand, while he

holds the strip of solder in the other. A stream of gas made from naphtha is thrown from the burner upon the soldering iron, which melts the solder and seals the can as fast as it can be turned upon the platform. Two cans are sealed every minute, when everything is ready. A boy will seal from 700 to 1,000 cans in a day, and the pay is 7 cents per 100. This work was formerly done by men at a cost of \$7 or \$8 a day, consuming twice as much solder, and this is a good illustration of labor-saving machinery.

The cans pass immediately from the solder to the cooking apparatus. The cooking tank is six feet long, three wide, and four deep, furnished with an elevator having a capacity of 112 gallon cans. The sealed cans are lowered into the tank, and cooked by steam for two hours. There are four of these cooking tanks. The cans are partially cooled after cooking, and vented by making a pinhole to let out any air within, and are immediately sealed again. They are then removed to the platform outside of the building, to complete the cooling. After this comes a thorough examination of every can, for any defect in the soldering which admits air. The smallest hole would spoil the contents of the can in a few days. Any leakage of air is indicated by the bulging of the head of the can. If it is perfectly tight, there is a slight depression of the head. The cleaning of the outside of the cans, and labeling, completes the work. The goods are then boxed and sent to Acker, Merrill & Condit, and to Park & Tilford, wholesale grocers of New York, who take all the tomatoes manufactured by this company. They are mostly consumed in the city and its vicinity.

The cases are made of half-inch pine, with inch heads, and come in shooks from Michigan, and are put together here. The cost of labor and material is about 15 cents a case.

Besides the canned goods, catsup is manufactured from the skins and the refuse that is rejected from the hopper. The whole mass first passes through a mill, which separates the pulp from the skins. From the vat of the mill the pulp is pumped upstairs into a reservoir. When a sufficient quantity has accumulated, it is drawn from the reservoir into the cooking tank, and cooked three hours. It is then drawn off into barrels, and allowed to ferment one week. The pulp settles at the bottom, free from impurities, and the water at the top is poured off, and the barrel filled again with the tomato pulp. It is then returned to the cooking tank and heated; the spices are added, and the catsup is barreled and sent to market, where it is bottled, labeled and sent to the retailers. Charles Gulden of New York takes all the catsup made by this company, at 15 cents a gallon.

Apples will follow tomatoes in due order, and have already begun to come in from the neighboring farms in limited quantity. These are packed in gallon cans, and are designed for pies and sauce in family use. There is a large demand for canned apples in the European markets, and it is not improbable that they will supersede the shipment of apples in barrels, which are greatly exposed to decay and loss, both on the voyage and after arrival. The canned goods are a safe article for shipment, and, if necessary, can wait a long time for market and consumption, without damage.

The large piles of apples in the store-house, the streets about the factory crowded with teams waiting to unload, the platforms filled with tomato crates, the busy crowd inside the factory, and the daily shipment of canned goods, look like the revival of business in this community.

Applications of Steam Power.

BY JAMES BINX.

It seems to me that something more might be profitably said during this season of extreme drought, when many are adding, and others are thinking of adding, steam engines to their plant of machinery. Many owners who partially rely upon steam power to run their mills, and who are not advantageously situated for fuel and freight, and who have not perhaps applied their steam power in as economical a manner as possible, count the cost of so applying it, and solemnly shake their heads when anything is said upon their having soon to apply it altogether. But for all that, I believe the day is near at hand when a steam mill, well located as to freights and fuel, will be a better investment than a water mill, unless the latter is situated on a never failing water power, with moderate water rent and freights.

A mill, to run wholly by steam, should be so designed from the foundation. Such a mill does not need rotary boilers. The boiling should be done in tubs with the exhaust steam from the main steam engine. The engine should be of ample size, economical in the use of steam, and one as little affected by back pressure as possible.

In boiling bleach tubs by exhaust steam there will be back pressure, and it will amount to from ten to eighteen pounds, according to the depth of the bleach tub. Many have fitted up mills without taking this into account, and have been grievously disappointed with the result.

Steam engines running under a boiler pressure of sixty pounds and losing fifteen pounds by back pressure lose twenty-five per cent of their effective power. A steam gauge placed in the exhaust pipe will always tell the tale.

While on this subject let me say that I have known of two instances in which paper makers, having heard of boiling by exhaust steam, have tried it in connection with their rotaries. I knew an old paper maker in Connecticut, of excellent reputation as a paper maker, but with a poor education, who made this blunder. He owned a mill which was extremely short of water. He bought a large engine and

put it in. He had the exhaust piped to his rotary, and only found his mistake when back pressure shut his engine down. The same man, when the engine was put in, had her speeded ten revolutions faster than the water wheel; and, of course, as the head of water went down (the revolutions of the wheel consequently falling off), the steam engine had all the work to do and carry the water wheel besides. This gentleman told me he was disappointed in his engine, and did not see but what he did just about as well without it, and will tell me to-day that it is not to be thought of as a motor for a paper mill.

Within the past year a Jersey firm concluded to utilize the exhaust from a steam engine they had put in to run the machine. Instead of using it for drying their paper, as they might have profitably done, they piped it to the rotary, and found out their mistake when the Connecticut man did—that is, when the engine stopped from back pressure. Comment is unnecessary. These men lacked knowledge. In the latter case they gained it, in the former I am afraid they never will.

I once ran a mill in which the machine was driven by a steam engine. There was no speed shaft on the machine, and the owners ran her on low grades of bleached papers, in weight anything from box lining to card middles. The engine would not drive the machine over sixty feet, nor less than forty, and the engine had to be slowed down until she ran unsteadily to make the latter speed. We pretended to dry by exhaust steam; the driers were also piped for live steam. When on card middles the engine ran so slow she would not exhaust steam enough to dry, and we had to use some live steam. The engine ran so unsteadily we let her exhaust into the open air, thinking we could get a slower steady speed, and dried by live steam. We could not then make steam enough in the boiler to keep us running in that manner, and the owners were obliged to do what I recommended at first—put in a speed shaft for the machine. When this was done the steam engine ran a regular speed, and we could run the machine anywhere from ten to one hundred feet. The exhaust would dry anything we made, and we had exhaust steam to spare, and did run our feed water, after leaving the exhaust pump, twelve feet in the exhaust pipe, heating it so hot that the hand could not be borne on the feed water pipe between the engine and boiler, and our steam troubles vanished.

In a mill running wholly by steam, the boiling of stock and drying of paper can be done for but a trifle more of expense than if the engines exhausted into the open air, and if the owner attempts to substitute live steam he will immediately (if able to make steam enough) find the amount of his loss in his fuel account.

Mills running partially by steam and part by water, where the water wheel and engine are attached or drive the same line of shaft, should have the wheel at or near one end of the shaft and the steam engine at the other end. The couplings on the shaft should be faced. Then, as the water in the steam fell off or gained, these couplings could be fastened or unfastened, adding rag engines to the steam engine, or detaching therefrom, as the capacity of the stream demanded. I know of some mills where steam has been added, that the water wheel cannot be detached from the main line, and sometimes when there is not even water enough to drive the wheel, the wheel gates are shut, and the engine is obliged to carry it also.

Steam engines coupled on to water wheels seldom work well together. A large machine shop and foundry in Ansonia, Conn., formerly had a 600 horse power engine, which they tried to run conjointly with a water wheel. After numerous breakages they gave up the attempt, and ran them separately. This concern has turned out some of the best mechanics in the country. If both motors were speeded alike, and the head of water constant, it seems to me they ought to work, but it is evidently a safer, surer mode of working to have them separate. You then know what each is doing.

The connecting pipes between the boiler and engine should be of ample size; it is better to err on the large side. Steam engines should be located as near the boiler as possible, for reasons obvious to any one.

There are many inventions that are urged on paper manufacturers and others as economizers of steam. I once worked for a wealthy manufacturer in the Western States, who was a great economist in his own estimation, and who bought everything that came along that promised to lessen running expenses. He invested in a patent boiler setting that was to save a certain per cent, a feed water heater and lime extractor ditto, a boiler and pipe composition covering ditto, super-heater ditto, water-trap ditto. Coming to figure them up one day he found to his astonishment that his economy had run ahead of his arithmetic. He was saving 133 per cent. There is no doubt that many of these are great helps, but the inventors' claims can usually be discounted fifty per cent without doing them injustice, and often more. It has been frequently demonstrated that the average gain of the best feed water heaters cannot be over ten per cent, and that for non-condensing engines. For condensing engines, which take their feed water from the hot well, it cannot be over five per cent.—*Paper Trade Journal*.

ZINC WHITENASH.—Mix oxide of zinc with common size and apply to the ceiling with a brush. Then apply a wash of chloride of zinc, which will form a smooth, shining surface.

Japanese Process of Varnishing.

In 1873 Professor Rein, of Marburg, was sent by the Prussian Minister of Finance and Commerce to Japan, to study those branches of industry in which that people excel, and thoroughly examine processes of manufacture. Upon his return he gave a course of instruction in varnishing, or japanning, to an employee of Messrs. Beuttenmueller & Co., from whose report to the Baden Minister of Commerce we abstract the following:

The course of lessons given by Dr. Rein lasted 9 hours a day for 6 days. Dr. Rein filled up the intervals, while waiting for the work to dry, with theoretical instructions about the plants from which the varnishes are prepared, the method of preparing the different qualities, etc.

Japanese varnish is obtained from a tree, *rhus vernicifera*. This varnish tree, which is called *urushi naki* by the Japanese, reaches a height of 33 feet; and at the age of 40 years, the trunk is 40 inches in circumference, grows very slowly, about 13 inches per year in height. The wood is strong and heavy, has few branches, consequently very little foliage, and the tree is not very pleasing to the eye. The fruit resembles grapes, and grows in thick spikes on the branches. In October the fruit is ripe, and is collected in November to obtain from it a vegetable wax, known as Japanese wax. The tree is best propagated from the root shoots. It reaches its greatest perfection at its 18th year, and then produces the largest yield of lac or varnish. This is obtained by slitting the bark in a horizontal direction, and may be performed at any time between April and October; later in the year the lac is very thick and viscous, so that its collection is attended with much greater difficulty. The lac tapper carries his own peculiar bow-shaped knife, made for this purpose, with which he cuts a 2 millimeter ($\frac{1}{16}$ inch) cut in the trunk of the tree in a horizontal direction, and then draws the point of the knife through the cut again, to remove any chips formed by the first cut. This cut is made low down; on the opposite side of the trunk 15 or 20 cm. (6 or 8 inches) farther up, a second cut is made, then on this side again, and so on until the trunk has 6 or 10 such cuts. After he has cut 10 or 15 trees, he returns to the first tree and collects the sap oozing from the cuts, which sap is light gray, and thick; but by exposure to the air, it at once turns dark brown and afterwards quite black. The crude lac is called *ki-urushi*.

The tree is hacked in this way for 60 to 80 days, until it dies; it is then cut down, the wood chopped up and put in hot water, which extracts the last remnant of the sap. From the tree when cut down, $\frac{1}{2}$ liter at most of sap is obtained, and this forms the poorest kind of lac. The value of 100 lac trees is about \$30 to \$40.

The lac is purified in the following manner: It is first filtered through cotton stuff, ground on a paint stone like ordinary paints, mixed with water, and the water evaporated again by warming. The finer sorts are bleached in shallow dishes in the sun. The best kind is called *nashyi-urushi*, the poorer kind *henki-urushi*, the unbleached *jeshime-urushi*. The black varnish, *roiro-urushi*, is made from the crude lac, *ki-urushi*. There are about 20 different kinds in market, of which the above named are most used. The cost in Japan is: *Nashyi-urushi*, \$4.77 per lb.; *jeshime-urushi*, \$1.65 per lb.; *roiro-urushi*, \$3.70 per lb. The Japanese varnishes are as often adulterated in trade as wine in Germany (or milk with us)?

The operation of varnishing is conducted totally different from what it is in Europe. The Japanese apply their varnishes mostly to woodwork, less frequently to copper and unglazed stoneware and porcelain. When applied directly to tinware, the japan does not stick. The varnishes, when applied, are generally brilliant black, dark colored, impure vermilion, or impure dark green, or dark gray. Pure light colors and white cannot be produced with Japan varnish.

The Japanese varnishers prepare their woodenware with the utmost care, the surfaces are smoothed and the chinks filled with cement. The ground coat is a mixture of jeshime-urushi with paste; upon this is laid Japanese paper, rubbed smooth with a brush, and dried. Afterwards several very thin coats of the same varnish, now and then well dried, and, after every coat, polished with Japanese carbon.

The drying is performed in a moist atmosphere. For this purpose they take a box that will shut tightly, put the articles to be dried in it, close the box and wet it on all sides with water. After 24 hours one coat is dried. If the articles are to be black, it is now given a coat of black varnish, *roiro-urushi*, but if it is to be gray or gray-brown, *jeshime-urushi* is used instead, and if it is to be red, the latter varnish is mixed with vermilion. The appearances of gold and pearl are obtained by mixing real gold dust, or mother of pearl dust, with the varnish, whereby a beautiful effect is produced. It is then dried, rubbed down, and polished; and if there are gold, tortoiseshell, or mother of pearl decorations, another coat of azure varnish, *nashyi-urushi*, is applied. Dr. Rein communicated other methods of japanning, the introduction of which, in this place, would lead us too far.

In applying their varnishes, the Japanese use broad brushes, the bristles of which are very stiff, and inserted in wood, just as the graphite is in our lead pencils. After long use the bristles get worn short, and the wood is cut away as in sharpening a pencil, exposing more of the bristles. A very fine piece of work receives 18 coats; these never fade with time but rather improve, bear a high heat, and are totally unaffected by acids, spirits, and the like.

The Japanese method is not likely to be introduced into

Europe or this country, because of the want of the natural material, which, when imported from there, becomes extremely costly; and the process is indirect and tedious, and, with the high price of wages, would be impracticable.

The Great Wall of China.

The Great Wall of China was measured in many places by Mr. Unthank, an American engineer, lately engaged on a survey for a Chinese railway. His measurements give the height at eighteen feet, and a width on top of fifteen feet. Every few hundred yards there is a tower twenty-four feet square, and from twenty to twenty-five feet high. The foundation of the wall is of solid granite. Mr. Unthank brought with him a brick from the wall, which is supposed to have been made two hundred years before the time of Christ. In building this immense stone fence to keep out the Tartars, the builders never attempted to avoid mountains or chasms to save expense. For 1,300 miles the wall goes over plain and mountain, and every foot of the foundation is in solid granite, and the rest of the structure solid masonry. In some places the wall is built smooth up against the bank, or canons, or precipices, where there is a sheer descent of 1,000 feet. Small streams are arched over, but on the larger streams the wall runs to the water's edge, and a tower is built on each side. On the top of the wall there are breastworks, or defences, facing in and out, so the defending forces can pass from one tower to another without being exposed to any enemy from either side. To calculate the time of building, or cost of this wall, is beyond human skill. So far as the magnitude of the work is concerned, it surpasses everything in ancient or modern times of which there is any trace. The Pyramids of Egypt are nothing compared to it.—*London News*.

Recent American and Foreign Patents.**Notice to Patentees.**

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We shall be pleased to make estimates as to cost of engravings on receipt of photographs, sketches, or copies of patents. After publication, the cuts become the property of the person ordering them, and will be found of value for circulars and for publication in other papers.

NEW MECHANICAL AND ENGINEERING INVENTIONS.**IMPROVED MILLER'S PAINT STAFF.**

Jacob Austine, Huntsville, O.—This is an improved form of miller's paint staff, or device for applying a color in a true plane to the face of a millstone to detect and locate the high places when the stone is "in wind," or has uneven places, and then permit the same to be trued up. It consists in a staff made in the form of an equilateral triangle, the advantages being partly in the facility and accuracy of construction (the same measurement of bar serving for all three sides), but more especially in the corrections of its results, the equilateral triangle being best adapted to the circular area of a millstone.

IMPROVED CAR WHEEL.

William Y. Cruikshank, Shamokin, Pa., assignor to John Cruikshank, of same place.—This invention consists of an oil chamber arranged in the hub of the car wheel, and connected by radial holes to an annular recess in bore of wheel or groove of axle. Ribs or elevations of the oil chamber arrest the oil, and feed it to the supply holes to lubricate the bearings, and pass the surplus back again to the oil chamber. The centrifugal force distributes the oil during the running or revolving of the wheel by the aid of the outer elevations around the outer surface of the oil chamber, while the side elevations conduct the oil and cause it to flow through the holes to the axles. When the wheel ceases to revolve the oil above the axle is guided along the ribs to the holes, and along or around the axle or shaft in the recess or groove back to the holes below the axle, and thence into the oil chamber again, saving thus all the oil which is not used actually in lubricating the axle or shaft. Sufficient oil adheres to the axle to run the wheel in either direction and lubricate the bearings.

IMPROVED DRY WOOD GRINDER FOR PAPER-PULP.

Isaac W. Bowers and David A. Curtis, Petersburg, Mich.—This invention relates to an improved machine for making dry pulp from dry wood in a cheap and simple manner, which pulp has the advantage of being readily shipped, not liable to freeze, and being converted with less labor into paper. The invention consists of a machine for grinding up the wood by exposing it to the action of a cylinder covered with a grinding surface of glue, ground flint, quartz, and emery, and conveying the pulp by a hopper and an endless revolving belt to a reciprocating screen. The wood pulp produced by a dry process with this machine is, in many respects, superior to that obtained by the wet processes hitherto in use, as it does not mold or freeze, and may be more conveniently shipped. The machine is cheaper and simpler in construction than those used in wet processes, and may be run without skilled workmen. A number of machines may be arranged side by side, according to the quantities of pulp to be manufactured.

IMPROVED AUTOMATIC CYLINDER COCK.

Joseph M. Graham, Bloomfield, assignor to himself and George Elliott Bedford, Ind.—This invention relates to cocks for discharging the water of condensation from engine cylinders, and it consists in the arrangement at each end of the cylinder, of cups of sufficient capacity to contain water accumulating during one stroke, and in small valves placed in the said cups that open upward and are connected with a lever which is held by a spring, so that the valves are both open when the pressure is removed, but admits of the valves being alternately closed by the steam pressure as it acts in the cylinder. As steam is admitted to the cylinder it closes one of the valves while the other remains open, and when steam is admitted to the opposite end of the cylinder, the valve which before was open is closed by steam pressure, and by virtue of the connection of the two valves with the lever, the valve which was closed is now opened, permitting the escape of the water from the cavity. The valves are automatic in their action, and the water escapes when the pressure is removed, so that the noise of escaping steam common to other devices for relieving engine cylinders of water is by this improvement entirely avoided, and the valves need no attention.

IMPROVED TREADLE MOTION.

Henry B. Barber and Clark J. Barber, Scott, N. Y.—The object of this invention is to furnish an improved treadle motion for sewing machines, lathes, and other like machines, by which the working of the machines is

facilitated and produced with less effort of the foot; and the invention consists of the combination of the swinging treadle with a pitman of inverted V-shape, which is pivoted to the toe of the treadle and the supporting rod of the same, and at the apex or upper end of the crank rod of the flywheel. The elbow formed between the pitman and crank transmits the power in more effective manner to the flywheel, requiring less effort to run the machine, and rendering thereby the working of the same less fatiguing and trying.

IMPROVED FREIGHT CHUTE.

William C. Crompton, New York city, James Nicol, Newark, and Richard Hawley, Jr., Jersey City, N. J.—The object of this invention is to furnish a chute for lowering cheese and other freight in loading vessels, in warehouses, and in other places, in such a way that it will not be injured, and which shall be simple in construction and convenient and reliable in use. To the sides of the chute are attached guide bars which project inward and incline downward. The guide bars are made elastic, or have spiral or other springs placed between them and the sides of the chute, so that they may yield to allow the articles to pass, while at the same time they offer sufficient resistance to said articles to check or retard their descent, and prevent their acquiring too great a velocity and momentum.

IMPROVED ACCOMMODATING PULLEY FOR CABLES USED IN PROPELLING CARS, ETC.

Orlando H. Jadwin, Brooklyn, N. Y.—The object of this invention is to provide an effective means for the propulsion of cars, boats, or other bodies, and it consists, first, in the manner of connecting and disconnecting the car from the travelling cable; and, second, in the manner of supporting the cable on accommodating pulleys which allow a knot, swivel, or other bulky obstruction to ride over with ease. The connection between the car and traveling cable is so made that the cable is not pinched, but simply has its tension increased, so that neither car nor cable receives any sudden jar, as the motion of the cable slipping through imparts the motion gradually until the car has attained nearly the same speed as the cable, at which time the tension is made sufficiently tight to prevent slipping between the friction and tension rollers.

IMPROVED APPARATUS FOR OPERATING PUMPS.

John A. Hurley and Daniel J. Hurley, Oil City, Pa.—This invention relates to an improved pumping apparatus for oil and artesian wells, and consists of a rock beam operated by the pitman of an engine, and connected by ball joints with the ends of a cable or rope, passing over guide pulleys, and being attached by an adjusting device on the pump rod. The rock beam is connected at the lower end with the pitman of a steam or other engine, by which oscillating motion is imparted to the rock beam, which, by the cable and adjuster, gives vertical reciprocating motion to the pump rod, so as to work the well by a simple and reliable apparatus.

NEW MISCELLANEOUS INVENTIONS.**IMPROVED PANTOGRAPH.**

Elijah Ware, Omaha, Neb.—The object of this invention is to provide a simple and inexpensive pantograph which may be adapted to large or small work, as may be required; and it consists of a pantograph of rectangular form, made of four bars, so placed as to assume a parallelogram. To one end of this parallelogram are pivoted, or attached by means of screws, three supplementary bars, two of which continue the parallelogram form of the instrument, while the third bar makes the end piece. These last named bars are used for copying, enlarging, or reducing large work. The size of the copy is varied by shifting the last named end bar toward or away from the pivot of the instrument, and by moving the bar so as to change the position of the pencil or tracing point. When the instrument is used for smaller work the bars are disconnected, and it is used as a common pantograph.

IMPROVED POCKET RIFLE.

Marcus L. McCord, Nashville, Ill.—The object of this invention is to furnish an improved sight for pistols and other firearms, which shall be so constructed that it may be readily extended to the rearward to give a longer range to the sight and greater accuracy of aim. To the rear end of the barrel, or to a projection or support attached to the barrel, is hinged the end of a bar in such a way that the bar may be turned back into a position parallel with its former position. This bar, when turned back, rests upon a support attached to the stock, and which enters a guide socket formed in the bar. The bar is made of such a length that when turned down upon the barrel its forward end may abut against the forward sight, and may be secured in place by a spring catch attached to the bar, and which engages with the recessed rear side of the said sight. Thereafter sight, when the bar has been turned down upon the barrel, enters a transverse groove in the barrel. The bar may be pivoted to the rear end of the barrel, so that it may be swung around from one position to the other; or it may be slid into a dovetail groove in the upper side of the barrel.

IMPROVED COMPOSITION FOR DRESSING COTTON YARNS.

William H. Perkins, Fall River, Mass.—The dressing consists of unslacked lime, sal soda, soap, and water, and is prepared in the following manner and proportions: Two and one half pounds of unslacked lime, two and one half pounds of sal soda, one ounce of common soap, and one gallon of boiling water, which are thoroughly stirred together until the parts are mixed. Five gallons of salt water are then added, and the whole left standing for twenty-four hours, when the compound is ready for use. It is applied in the same manner as other dressing, but is considerably cheaper. It imparts a bright and glossy finish to the fabrics dressed therewith, and stands unchangeable in any weather or atmosphere.

IMPROVED HOSE COUPLING.

Frederick Stewart, St. Louis, Mo., assignor to himself and Oscar F. Scudder, of same place.—This invention relates to an improved hose coupling that is tightly connected with the hose ends, so as to resist a considerable pressure on the coupling parts with less liability to blow out or disconnect the hose ends, as the connection of coupling and hose will be drawn tighter the greater the pressure exerted thereon. The interior sleeve of the coupling is made with a slight taper. The hose end is placed in position on the same, and rigidly secured thereon by a diagonally split and tapering band, having a screw thread cut on the outside, and by an outer sleeve, with corresponding taper, having an interior screw thread. The screwing up of the outer sleeve on the split band closes the latter, and clamps the same and the hose tightly on the inner sleeve. The clamping or wedge connection of the inner sleeve, split band, and outer sleeve with the intermediate hose end produces a tight fastening of the hose, that gets tighter the greater the pressure, so as to remove any liability to blow out by the pressure of the water on the coupling.

IMPROVED BED PAN.

Clark S. Merriman, New York city.—In this invention the ordinary bed pan is used, to one side of which an air cushion is attached. The airspace in the annular part is separate from that in the cushion. When the device is used it is placed under the body, and one or both parts are inflated, as may be required. The cover is then placed in position with the pocket in the cavity of the bed pan. After use the cover may be removed and cleaned and replaced; or two may be used in alternation. The advantages claimed for this improvement are that the body is supported in an elevated position, so that the excrements, when ejected, will not flow down the back. It is more comfortable to use, and is easily cleaned.

IMPROVED COMBINED CANE AND UMBRELLA.

Thomas F. Darcy, New York city.—This invention consists in a combined umbrella and cane, formed of the ribs, the handle, the stretchers,