

Should the present rate of 22 per cent increase in production be kept through the year, which it now bids fair to do, and the present rate of 18 per cent increase in exports maintained, we will have at the close of 1879 an overwhelming amount of stock on hand, except new markets shall be found, which will increase the export demands; or new uses, which will increase the home trade.

The number of producing wells at the close of March, 1879, was 10,692. The number of drilling wells completed in March was 338. Total production in March, 1,476,065 barrels; the average daily production of the new wells in March was 21 1-10 barrels; the average daily production of all the wells for the month was 4 1-10 barrels.

The stock in the producing regions has been increased during the month, 502,186 barrels, making the total stock at the close of the month 6,294,849 barrels, and is held by pipe companies, tankers, and operators.

#### RECENT MECHANICAL INVENTIONS.

An improved washing machine, which does its work principally by pressure upon the clothes, has been patented by Mr. Charles P. Rood, of La Fargeville, N. Y. The machine consists of a tub having a number of deep transverse ribs in the bottom, and a fluted roller carried back and forth over the bottom by a carriage worked by a rack and pinion.

An improved clothes pounder, which acts by forcing air through the clothes, has been patented by Mr. C. F. K. Wilson, of Seymour, Iowa. It is designed to clean the clothes without rubbing.

An improved animal trap, which is designed to be set over a barrel set in the ground and partly filled with water, has been patented by Messrs. N. H. Williams and L. Chapman, of Murrayville, Ill. The trap readjusts itself after having caught an animal.

Mr. Peter H. Baker, of San Francisco, Cal., has patented an improved door latch, which may be used simply as a latch or it may be locked with a key, which will prevent the withdrawing of the latch.

An improved hand truck, in which the bearer bars, to which the axle is bolted, and the backguard are made in one piece and bolted to the inner flanges of angle iron side bars, has been patented by Mr. Thomas Hill, of Jersey City, N. J.

Mr. Frederick Hollick, of New York city, has patented an improved vehicle wheel, having a flanged tire and felloes provided with radial spokes, which are secured in the divided hub in a novel and substantial manner.

An improved guide for harness makers' sewing machines, which enables the machine to be used in sewing up seams in round lines, has been patented by Mr. James W. Hollingsworth, of Paoli, Ind.

An improved press, for baling cotton and other similar materials, has been patented by Mr. E. F. McGowen, of Houston, Texas. This invention consists in a novel arrangement of gearing for operating the press without changing the motion of the driving shaft.

Messrs. D. W. and H. Johns and Henry Embs, of New Albany, Ind., have patented an improved machine for making ox-polls. In this machine the ox-polls are made by the rolling process, the iron bar being first bent into a V-shape and the eye formed; the ends or flanges are then closed by stationary dies as the poll comes from the roll.

Messrs. C. H. Lane, W. A. Hutchins, and John McGrew, of Garnettsville, Ky., have devised an improved washing machine, which consists of two hollow cylinders provided with longitudinal ribs and arranged to rotate in contact with each other.

An improved machine for operating a clothes pounder or churn dasher has been patented by Mr. P. C. McCune, of Mount Etna. A revolving platform supports the tub or churn, and a reciprocating lever carries the pounder or churn dasher, as may be required.

An improved carriage wrench, which consists essentially of a socket wrench divided longitudinally, the two parts being jointed together and provided with adjusting screws, has been patented by Mr. E. A. Robbins, of Fairfield, Me.

Mr. Abner Hart, of Ogden, Ill., has devised an improved washing machine, which is provided with recessed pounders having air pumps attached, and with foot levers in connection with hand levers for operating the pounders.

An improved machine for operating a churn, turning a grindstone, sawing wood, and for other applications where a small power is required, has been patented by Mr. E. H. Drake, of Horseheads, N. Y. The invention consists in a novel arrangement of a weight and gearing.

Mr. Charles B. Hill, of Nashville, Tenn., has patented an improvement in middlings purifiers. This machine, which seems simple and effective, cannot be described without diagrams.

Mr. John B. Overmeyer, of New Lexington, O., has devised an improvement in time locks, which is so arranged that in case the watch movements which control the main bolt should stop the lock may still be opened from the outside at a certain fixed time.

An improvement in vehicle axles, patented by Messrs. Thomas Reichelderfer and Peter W. Wertz, of Longswamp (Mertztown P. O.), Pa., consists in a novel splice connection for securing the axle spindle to the axle.

An improved heat regulator, patented by Mr. E. S. Gary, of Baltimore, Md., is operated by the expansion and contraction of a fluid acting on a piston connected with the damper of a stove or furnace.

Mr. Henry Reese, of Baltimore, Md., has patented an improved wrought iron railway tie, having upturned lugs for

holding the rail and provided with an ingenious looking device for preventing the displacement of the rail.

A novel mechanical movement for converting motion either for an increase of power or speed has been patented by Mr. Theodore Scholze, of Angola, Ind.

#### Cast Steel Armor for Ships.

The material of which thick armor should be made, says Mr. Barnaby, is now the subject of anxious experiment in Germany and France, as well as in Italy and England. Steel and other alloys of iron are so little known or understood, that there is a large field for experiment open for the armor plate maker and for the artillery. Steel has been tried many times alone, and in combination with iron, but it never gave enough satisfaction to secure its adoption until experiments were made at Spezzia with plates 55 centimeters thick, manufactured by Schneider & Co., at Creuzot. With these the Italian Government were so well pleased that they are plating the Dandolo and Duilio with such plates. Those of us who visited the French Exhibition last year may have seen a steel armor plate produced by this firm, bent to the form of a turret, 32 inches thick, and weighing 65 tons. Those who went to the works at Creuzot, by favor of Mons. Schneider, may also have seen an ingot of cast steel, suitable for making an armor plate, and weighing 120 tons. The rival firm of Terre Noire exhibited armor plates of steel which had not been hammered, or rolled, or otherwise forged. They were simply cast plates, tempered in oil, and annealed. Judging from the admirable series of specimens and tests and analyses, the manufacture has already attained a large degree of precision, and is full of promise. I believe that the Italian Government will shortly test some of it with the big Elswick gun, and it may be that blocks of cast steel will revolutionize the manufacture of armor by making the rolling operations unnecessary, and bringing down the cost to that of ordinary large castings. The French Government have also made many experiments with steel armor at Havre, but have not yet satisfied themselves that they should give up wrought iron. Experiments with steel in England have shown that steel can be made of great hardness, so hard that it will break up all projectiles which strike it, and that will not suffer seriously in doing so. Sir Joseph Whitworth has obtained some most remarkable results in this direction, and he is still pursuing the inquiry.

#### NATURAL HISTORY NOTES.

*Winter Habits of the Eel.*—It is well known that the eel will, of its own accord, leave a pond or stream and wander overland to another locality. This occurs, says Dr. C. C. Abbott, in the *Science News*, usually when the hot summer's sun has evaporated the water of the pond in which the fish happens to be, or so lessened its bulk that the eel finds the locality no longer suited to its wants. In such a case the animals leave the stagnating waters of a land-locked pond, and, with a serpent-like motion, pass through grass well wetted with dews or showers. They seem to exhibit a sense of direction in their movements, and always head for the nearest stream. These land migrations are more frequent during evenings, when a heavy dew is deposited, than at other times. In watching the progress of the work in clearing a piece of meadow land on March 8th, Dr. Abbott was surprised to find, in a mossy mass of earth and roots, through which water from a neighboringspring circulated (though not in sufficient quantity to enable any fish to swim in it), a group of eels, seventeen in number. They were not in a tangled mass, so intermingled as to suggest that they sought contact for mutual warmth, but each was coiled in a snake-like manner by itself. On taking them up they seemed sluggish, and made no effort to escape until revived by the warmth of the writer's hand, when they struggled to get free. When given their liberty they wriggled in a very direct line for the nearest point at which they could reach the ditch hard by. Two of the fishes were dissected, and the amount of matter in their stomach was so small that Dr. Abbott believes that they had been fasting during their semi-aquatic sojourn in the place where they were detected. Subsequent close examination of the spot showed that the spring water did not, and had not, run as a stream through it. There was every indication that these eels had voluntarily left the ditch, fifty feet distant, and sought out this spring hole, which from its southern exposure and constant supply from the spring was a comfortable spot. The question arises: is this a common occurrence, and do eels hibernate habitually, choosing the soft, muddy bottoms of our deeper ponds and the tidal portions of our rivers?

*A Green Spored Toadstool.*—As well known to botanists the *Agaricini*, or toadstool, tribe is primarily divided into five series, according to the color of the spores. These series are: the white spored (*Leucospori*), pink spored (*Hyporhodii*), brown spored (*Dermini*), purple spored (*Pratelle*), and black spored (*Coprinarii*). Hitherto no species of toadstool belonging to the several genera into which the order is divided has been known to occur with mature spores of any other color than some shade of those above noted. Recently Mr. C. H. Peck has detected a species of *Agaric* with green spores. Until some other species shall occur with spores of this color he is disposed to assign this anomalous specimen to a place among the white spored species, to which in structure it appears to be related.

*Self-Fertilization of Plants.*—The Rev. Geo. Henslow, after a thorough study of the subject, claims that Mr. Darwin's works have gone too far to strengthen the belief that intercrossing is absolutely necessary for plants, and that if self-

fertilization be continued for lengthened periods the plants tend to degenerate and thence to ultimate extinction. This he believes to be absolutely false. In an article in the *Popular Science Review* he gives the following conclusions: 1. The majority of plants can, and possibly do, fertilize themselves. 2. Very few plants are known to be physiologically self-sterile when the pollen of a flower is placed on the stigma of the same flower. 3. Several plants are known to be morphologically self-sterile, in that the pollen cannot, without aid, reach the stigma, but is effective on that of the same flower. 4. Self-sterile plants from both the above causes can become self-fertile. 5. Highly self-fertile forms may arise under cultivation. 6. Special adaptations occur for self-fertilization.

*The "Digger" Mollusk and its Parasite.*—The pretty little shellfish, the "digger" (*Donax fossor*), not uncommon on our New York coast, represents a countless mass of life off Cape May, New Jersey, large areas looking like barley grains lying on a malting floor when the tide retires. The mollusk gets uncovered by the breaking surf and immediately reburies itself with its powerful foot when the waves retire. The siphons are long and active, looking like so many wriggling worms. Although the prey of shore birds and fishes, and beset with parasites, they lie so thickly as even to interfere with one another in burying themselves. The liver of these bivalves is always found beset by flukes, from half a dozen to several dozen, and a bell-shaped trichodina crowds the branchial cavity.

*The May-bug in Europe.*—The grub of the May-bug or May beetle (common to Europe and America) is perhaps, with the exception of the phylloxera, the most destructive pest the French husbandman has to contend against. At a recent sitting of the Central Horticultural Society, of Paris, it was stated by the head gardener at Chantilly that they were destroying the roses. One hundred and eighty-seven days' labor were expended upon about an acre of ground, each man disabling 5,000 of these insidious grubs daily, the total amounting to close upon a million. Another member stated that he had had upward of half a million collected on every hectare of his estate.

These beetles, according to old accounts, were at one time as great a plague in England as the locust is in America. A writer in the *Philosophical Transactions* states that on February 24, 1574, there fell such a multitude of these insects into the river Severn that they clogged and stopped the water wheels. Further, we are told in the *Transactions of the Dublin Society*, that the country people in one part of the kingdom suffered so greatly by the devastations made by these insects that they set fire to a wood some miles in length, which parted two adjacent counties, to prevent them dispersing themselves any further that way.

*The Age of Seeds and the Sex of Flowers.*—At a meeting of the Botanical Society of France, M. Duchartre called attention to a statement of M. F. Cazzuola in the *Bulletin of the Tusculan Horticultural Society*, in 1877, to the effect that melons raised from fresh seed bear a large proportion of male flowers and very few female flowers; while, on the other hand, seedlings raised from old seed bear many more female flowers than male. The statement was confirmed by M. Millet, a French grower; and, it may be added, by the experience and practice of gardeners in England (on the authority of the *Gardeners' Chronicle*).

*Should the English Sparrow be Protected?*—These birds, which have now proved such a nuisance in America, seem to have no friends at present except those few persons who were instrumental in introducing them. The English themselves warned us against the pest. Not long ago a great outcry was raised against them by the farmers in Algeria, and now we have the same evil report of them from the kingdom of Saxony. A recent English paper says that "the Council of Agriculture of the latter country has decided to petition the government to repeal the law which makes it an offence to destroy them. Indeed the feeling against sparrows has become so strong in some parts that the inhabitants have decided to destroy them in defiance of the law. It is asserted that a microscopical examination of their crops proves that sparrows live upon grain during eight or nine months of the year, and are only insectivorous when reduced to it by necessity. It is the same cry from far and near, from America and Australia, where the 'dissolute, unmusical rover' has been introduced and protected by stringent enactments, in return for which he was expected to eat a great many insects and very little else."

*The Effect of a Sea Voyage on Animals.*—Most of the wild animals procured for the menageries and zoological gardens of Europe and America are brought from Africa via North Germany by Mr. Reiche, the proprietor of the New York Aquarium. They are brought from Africa (mainly as cubs) to Trieste and thence to North Germany, and from there they are distributed to countries where they are wanted. These animals are usually brought to the United States by the North German steamers, and it is interesting to learn about their habits on shipboard. Charles Reade, the novelist, always inaccurate when he goes out of his way as a writer of fiction to dip into science, has stated that the sagacious elephant in storms at sea saves himself from being washed off the deck by throwing himself flat upon his belly, with extended legs and trunk outspread with suction power upon the planks. Captain Nevaber, however, says that no shipmaster would undertake to carry a loose elephant on deck, because tumbling about in a gale he would be a more dangerous object than the loose gun told of by Victor Hugo.

The elephant, of all other wild animals transported by steamer, are confined in the strongest kind of boxes, and the boxes themselves are secured in the firmest manner. In a storm the lions, tigers, and hyenas prove the greatest cowards. They also suffer a great deal from seasickness, and whine about it. The elephant utters few sounds when he is seasick, but he sways his great head from side to side, and looks "unutterable things." The horse is the most nervous and sensitive animal that goes to sea, and a hen shows the most utter disgust with life when seasick, by vomiting and eccentric movements.

**THE CALAMAR.**

Besides the different varieties of sepia the calamar, *Loligo vulgaris*, is the most remarkable member of the family of Decapoda. The fleshy, naked cylindrical body is somewhat elongated and conically pointed toward the back. The two fins are united on the back and impart to the animal the form of the point of an arrow. In the back is contained a flexible horny shield. The first pair of arms is shortest, next follows the fourth, then the second and third pairs. The additional two grasping arms, peculiar to all decapoda, are nearly twice as long as the body; and their thickened ends are lined with four rows of sucking disks. The predominating color of the calamar is a brilliant carmine red.

The calamar is very common throughout the Mediterranean and on the coasts of the Atlantic, and especially during the fall numerous swarms are met with, counting many thousand individuals. Sometimes large numbers are caught in the nets prepared for catching large fish.

The wanderings of the calamar depend upon those of swarms of numerous small fish which form its nourishment.

The weight of the calamar frequently reaches twenty pounds; individuals weighing more are occasionally found, sometimes reaching a length of two feet and a half. The mean length is about eight inches.

During his sojourn at Naples Brehm had ample opportunity to study the habits of the calamar in the aquarium as well as in the sea, and states that the animal's habits are quite unlike those of the sepia.

On several occasions from ten to sixteen individuals were placed in the tanks of the aquarium, but they invariably died in a short time, having spent their few days of imprisonment in continuous monotonous motion.

While the octopus and sepia are easily acclimatized in the aquarium and propagate themselves, the calamar seldom lives over two days in imprisonment.

Like the octopus and sepia, the calamar forms one of the principal articles of diet of the inhabitants of Italian seaports. In Naples, and in fact all the cities and villages situated on the coast, they are offered for sale in the public markets. The animals of medium size are preferred, as their meat generally has the most agreeable taste. When injured or excited, the calamar changes its beautiful red color and turns successively violet, green, and yellow, which gradually changes again into crimson. This behavior the Naples fishermen make use of to demonstrate the freshness of their fish to their customers. The calamar is not killed, but left to die gradually while being exposed for sale. When a customer calls, a small incision is made in one of the arms; the animal changes its color immediately, and the customer is satisfied.

**Notes on the Apple Worm.**

Mr. J. Savage, of Lawrence, Kansas, in a recent number of Colman's "Rural World," remarks upon the freedom of Michigan apples from the work of the apple worm (*Carpocapsa pomonella*). This same freedom was generally noticed in 1878, not only in Michigan, but in many parts of New York, and it doubtless obtained elsewhere. It will be well for us to endeavor to arrive at the reasons. To my mind the following, first stated by me in the New York Tribune, may very properly be urged: 1. The very general failure of the apple crop in 1877, as exemplified in the report for that year which we find both in the Proceedings of the Michigan Pomological Society and in those of the American Pomological Society. This failure was in many localities so nearly total that scarcely any apples were grown, and it follows, as a consequence, that very few codlingmoths were produced to perpetuate the species the following year. A

second reason, so far as Michigan is concerned, may be found in the fact that in no State in the Union have more intelligent and persevering efforts been made to prevent its ravages. Through the columns of the agricultural and horticultural journals, as well as in the pages of their Pomological Transactions, the simple methods of fighting this pest, that have been reported and recommended in the Missouri Reports, have been persistently kept before the people, while Professor Beal, of the Agricultural College, has, perhaps, done more good than any one else by showing that it cost him no more than 4 cents per tree to keep the bands around the trunks, changing them every nine days in the warm months, from the first appearance of the worm until the end of August, in an orchard of 250 trees. I agree with him when he asserts that "if a man will not take the trouble to keep his fruit from the worms he deserves to eat wormy apples."

Missouri apple growers should take courage from these facts. Since my connection with the Department of Agri-

**The Cotton Worm.**  
One of the most valuable papers read before the recent session of the National Academy of Sciences was that by Prof. C. V. Riley on the hibernations and migrations of *Aletia argillacea*, the parent of the cotton worm which has for years devastated the cotton fields of our Southern States. Professor Riley says that this foe to agriculture has received but little intelligent study, and that this is somewhat surprising considering the great losses suffered from its ravages. A careful examination of these losses, which he has lately been making from the most reliable published statements and from the returns of numerous correspondents, shows that this one insect alone, during a year when it is generally prevalent, may injure the crop to the amount of \$30,000,000, and that the average actual annual loss during the fourteen years since the war has been about \$15,000,000. There is good evidence, also, to show that its injuries were equally severe before the war.

The use of Paris green, recommended by Professor Riley in 1873, has, he says, partially protected the crop, but the use of arsenical preparations is too expensive and unsafe to afford general protection.

Among the other difficulties in the way of efficient protection is the lack of sufficient knowledge of the habits of the foe to be encountered. Regarding the hibernation of the species three theories are worthy of consideration. (1) That it hibernates in the chrysalis state; (2) that it hibernates as a moth; (3) that it hibernates only exceptionally in any of our cotton growing States, but comes into them on the wing from warmer climates where the cotton plant is perennial.

At first blush it would seem easy enough to dispel whichever of these theories is erroneous, and settle the question under consideration by a few simple facts of observation. The trouble, however, is to get at the facts.

After detailing the observations relied on to support the various theories enumerated, Professor Riley rejects the first, and is unable to choose between the last two. He says:

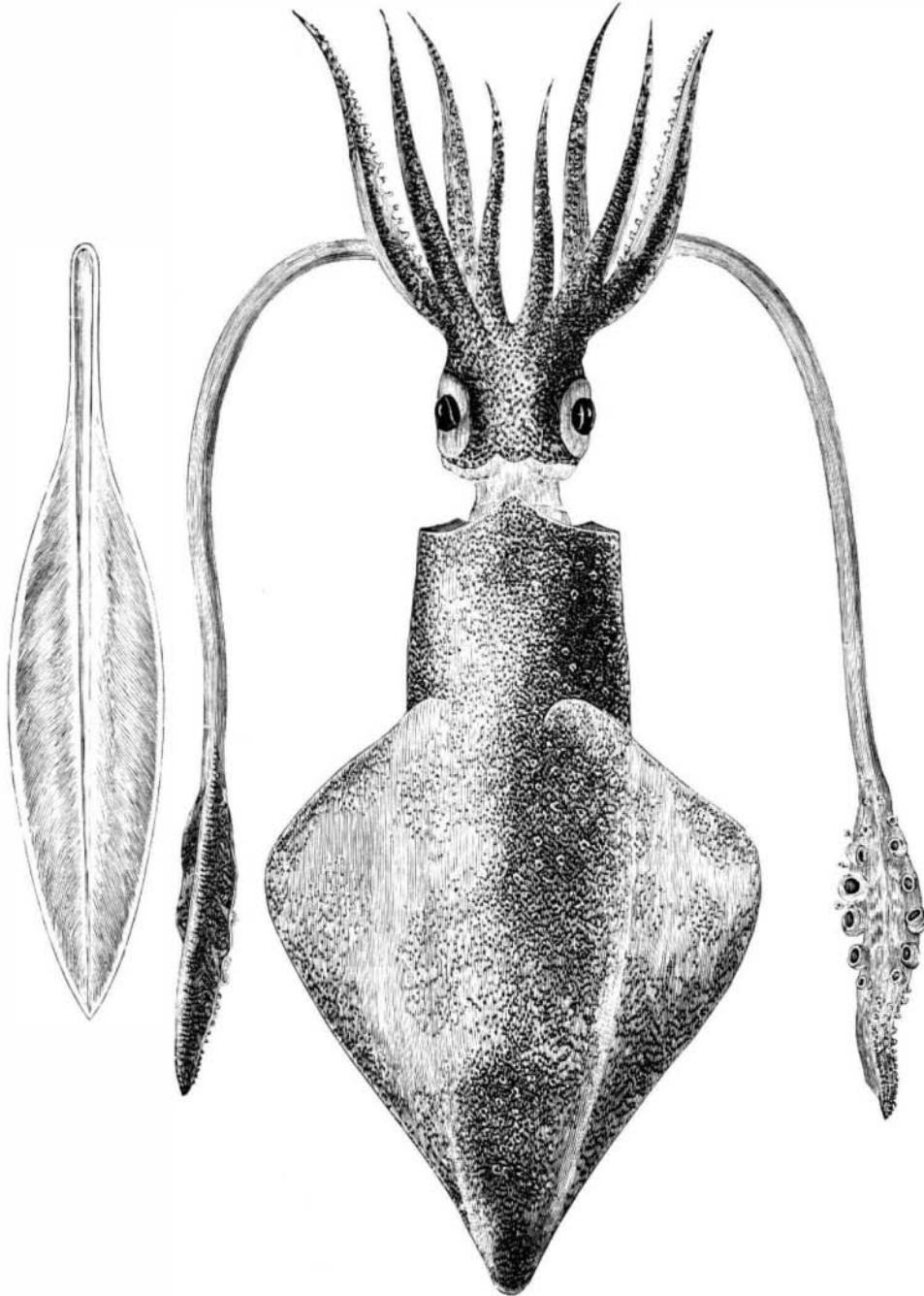
"Regarding the migrating powers of the moth there is abundant and satisfactory evidence. The last brood of moths, appearing late in autumn, are especially apt to migrate beyond the cotton belt, and consequently far beyond the region where they can perpetuate their species, if, as all the facts indicate, it can live upon no other plant than *gossypium*. I have received the moths taken as far north as Racine, Wis., where they occurred in such numbers as to ruin acres of cantelopes by puncturing them with the proboscis and sucking the juices. Similarly the moth has been found on the Atlantic coast, hundreds of miles away from the nearest cotton plant. This power of extended migration being therefore proved and admitted, it is but natural to conclude that the insect comes each year from some country where the cotton plant is perennial, as, for in-

stance, the Bahamas; and there are other facts which lead to this view.

"To sum up our present knowledge bearing upon the subject, it is safe to conclude that the insect does not hibernate in the chrysalis state. The evidence would also seem to militate against the possibility of hibernation even in the moth state. Yet there are so many well attested cases of the moth being seen flying during mild winter weather that the question cannot by any means be considered as settled."

**English Saddle Horses.**

The requisite qualifications of an English lady's saddle horse, according to the *Agricultural Gazette*, London, are as follows: Here all the caprice of fashion and the weight of the breeder's intelligence are concentrated. The great aim being to secure an animal light in the hand, springy in his paces, with that due proportion of bone and sinew which will bear wear and tear, because ladies, once up, unless thorough horsewomen, think, "Oh, he is a horse, and he must go!" I can almost challenge the seller on the point whether the horse has carried a lady by observing the unequal wear of the forelegs. The near leg in cantering bearing all the concussion, is often very looped, if not archy, in comparison. In this class of horse length of limb and pastern joint is desirable—long pasterns, good knees, deep shoulders, deep, blood like quarters, the feet sound, hoof dark colored.



**THE CALAMAR.**

culture there have been sent to me four different kinds of patent bandages to be used as traps for this apple worm, but I can find no advantage in any of them over the simple paper bandages, first recommended by me in 1872 and since very generally employed.—Professor C. V. Riley, before the late annual meeting of the Missouri State Hort. Soc.

**Powder Barrel Boring Insects.**

Captain McGinnis, U. S. A., has recently communicated to the editors of the *American Naturalist* specimens of an insect (probably *Callidium variabile*) which have been found to injure the hickory hoops of the powder barrels in the St. Louis Powder Depot. So injurious has this gnat proved that no inconsiderable sum is now annually spent by the Government in re-coopering barrels in order to make good the damage thus done. Means have been taken to prevent the further ravages of the insect.

**Tucker and Avery's Anti-friction Journal Bearing.**

This invention was erroneously described in our issue of May 3 as Avery's anti-friction journal bearing, whereas it should have received the above title.

Mr. Avery states that it was the suggestion in the SCIENTIFIC AMERICAN of the necessity of such an invention that led him to invest in it, and that it was not invented at the suggestion of the SCIENTIFIC AMERICAN, as stated in the article referred to.