### Catechu for Dissolving Boiler Incrustations.

Berlin is in possession of a pneumatic postal system, whereby letters can be sent through tubes by compressing the air behind or exhausting it in front of the package. Power is, of course, required, and is furnished as usual by steam.

In the selection of tubular boilers, says the *Deutsche Industrie Zeitung*, it was assumed that the water supplied by the Berlin water works was as free as possible from salts that produce incrustations, for the tubes lie so close together that it is almost impossible to clean the boilers.

After the boilers had been running a few months, however, it was found that a very hard incrustation was forming, that had already reached a thickness of 1½ inches. In consequence the boilers had to be cleaned every two months during the first two years that they were in use, and this was no small difficulty, for it had to be cut out. This induced them in the third year to try the experiment of adding *pure catechu* to the feed water. Eleven pounds of catechu were put in a boiler that had been well cleaned, and spread out over all the plates exposed to the fire, and each boiler was run eight weeks. At the end of that time there was no trace of any hard incrustation, but merely a slime that was easily removed.

This process has now been in use for four years in all the steam boilers used by the pneumatic dispatch, so that if the catechu has any injurious effect on the boiler or the machinery, it would have shown some trace of it before this time. This is by no means the case, nor can it be, for the quantity added is extremely small in proportion to the amount of water evaporated. The boilers in question evaporate, on an average, in the thirteen working hours, four cubic meters (about 140 cubic feet) daily, and only receive 11 pounds of catechu every two months, so that there is only 1 gramme of catechu to 48 kilos of water, or 1 to 48,000.

The catechu forms a paste or dough in the boiling water and rests on the plates over the fire; but as the stream of feed water is also directed to that place, it always comes in contact with fresh feed water.

It is true that catechu had been used with other chemicals years ago under the name of "incrustation powder" (*Kesselsteinpulver*), but this mixture exhibited the action of pure catechu only to a slight extent, and besides this it was added every day and required special feeding apparatus, so that it was very expensive.

### SACRED EGYPTIAN SCARABÆUS.

The sacred Egyptian scarabæus (*Ateuchus sacer*) is in a biological as well as in an archæological sense the most interesting beetle which inhabits the countries of the Mediterranean It has been made famous by the honors paid to it by the ancient Egyptians; it played an important in their animal worsbip. It is represented in their hieroglyphics, and displayed upon their monuments, and, hewn from stone in colossal proportions, was placed in their temples. Adrian speaks of it, and Pliny says, "This beetle makes monstrous pills of manure, rolls them backward with its feet, lays small eggs in these balls, from which beetles emerge, the ball serving as a protection to the young."

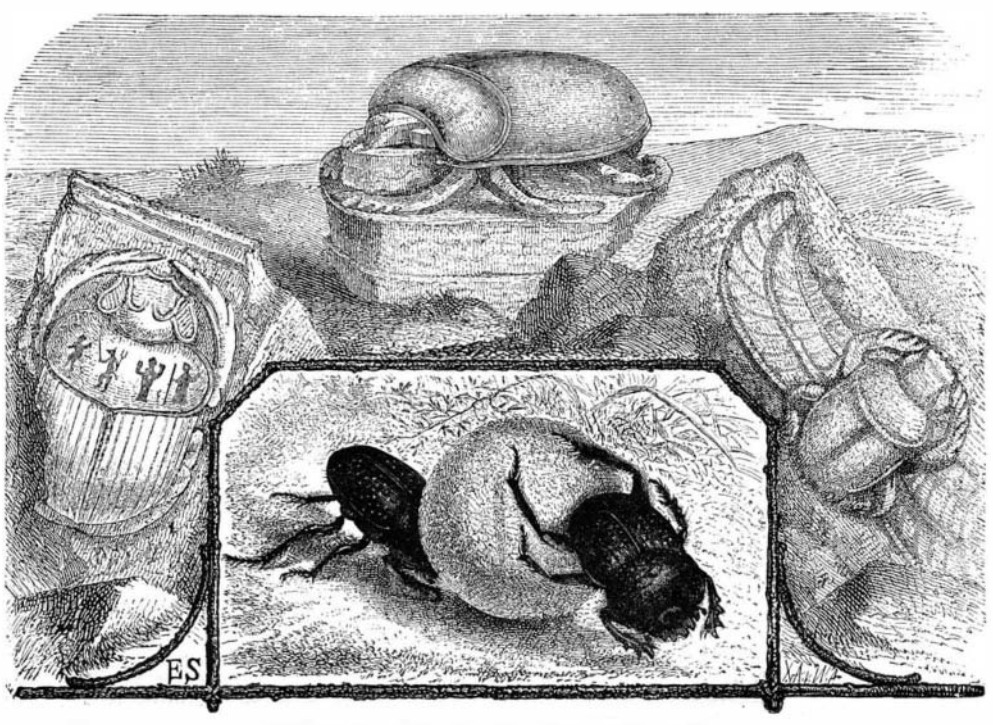
In cases of fever, besides the means employed by medical science, it was thought to be efficacious to bind on one of these beetles.

The head is semicircular with six deep indentations. These beetles fix upon a piece of manure, preferably cow dung, bear it away from the heap, and knead it into an irregular ball, in which the female deposits an egg. After they have made the ball, which is often larger than themselves, they roll it to a convenient spot, using their hind legs to direct the ball, and the other four legs for locomotion, so they seem to be standing on their heads, as the hind legs are elevated to guide the ball. Often one of the beetles pushes the ball with its head. This ball, which at first was uneven and soft, becomes, by much rolling, firm and smooth. They then dig a deep hole, in which they bury the completed ball. The filling up of the hole with earth finishes their wearisome labor, which was necessary to prepare a place for their young.

A second and a third egg require the same labor. At last, enfeebled by their labors, the beetles remain near the place where they have buried the balls and die. New life is developed in the buried balls, and the larva, as it emerges from the egg, finds a rich supply of provisions, by means of which it attains its full growth. It takes several months for the development of the larva. The next spring the beetles come forth from their birthplace, and the young, following the example of the parents, roll up balls in their turn.

A German artist in one of his excursions into Italy observed a beetle employed in rolling a ball upon uneven ground. Unfortunately the ball rolled into a hollow, and the beetle exerted itself to the utmost to roll it out again; but finding its efforts in vain it went to a neighboring manure heap and disappeared in it, but soon came forth again accompanied by three beetles. All four labored with their united strength, and at length succeeded in rolling the ball from the hollow. Scarcely were their efforts crowned with success than the three assistant beetles left the place and returned to their dwelling place.

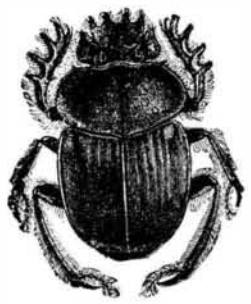
Beetles possessing similar habits are found in almost every part of the globe, but they are not all equally skillful in the construction of the balls for containing their eggs.—*From Brehm's Animal Life.*



SACRED EGYPTIAN SCARABÆUS.

### NATURAL HISTORY NOTES.

*The Constancy with which Insects Visit Flowers* has recently been the subject of an investigation by Messrs. A. W. Bennett and R. W. Christy, and the results of their observations



SACRED EGYPTIAN SCARABÆUS.

are printed in the *Journal* of the Linnæan Society for August 14. Although very interesting the subject is not new, Aristotle having made the assertion that "during each flight the bee does not settle upon flowers of different kinds, but flies, as it were, from violet to violet, and touches no other species till it reaches the hive." Messrs. Bennett and Christy, however, did not confine their studies to the bee family, but extended them to various species of Lepidoptera and Diptera, and have placed on record a large number of interesting details. With respect to butterflies, Mr. Bennett thinks that, upon the whole, they exhibit but a small degree of constancy in visiting flowers, though the majority of those upon which they were observed to settle were either yellow or pink; and, after settling upon one of these colors, they appeared to show a marked tendency to adhere to it. Two species of Syrphidæ, or "hover flies," also showed little constancy, though this may be accounted for by the fact that these insects are rather consumers than carriers of pollen. But the Apidæ, or bee family, exhibited much greater constancy. Thirty-three observations were made upon different species of *Bombus*, or "humble bee." In four instances the bee visited the flowers of three distinct species, irrespective of color; in six instances the flowers of two species were visited, the color of which was nearly the same; and, in twenty-three instances, the bee confined itself to a single species, though the plants chosen by the different bees were of the most various kinds and colors—some shade of pink, however, largely predominating. There could be no doubt as to this constancy being intentional, the bee frequently traversing a considerable distance, without alighting, so as not to mix its pollen. But it would appear as if color were not the sole guide, since both observers found that the same bee would visit white and purple foxgloves indifferently, while passing by flowers of any other species. The common hive bee was observed six times, and only upon one occasion was it seen to visit the flowers of more than one species, and then it made one visit to the blue scabious (*Scabiosa succisa*), followed by nine in succession to the pink centaury (*Centaurea scabiosa*). Another bee paid twenty-four consecutive visits to the flowers of the saw-wort (*Serratula tinctoria*), obviously rejecting those of the knapweed (*Centaurea nigra*), which are not unlike them in general appearance, and which are of nearly the same color. It is an interesting circumstance, to which Mr. Bennett calls attention, that the constancy of the insect appears to be in proportion to the part performed by it in carrying pollen from flower to flower. Mr. Christy's observations are confirmatory of those of Mr. Bennett. He considers the hive bee to be perfectly methodic in its habits, at any rate while there is a fair supply of flowers, though when these are scarce it may not be quite so scrupulous. He also thinks that humble bees show a fairly high degree of constancy. The Lepidoptera observed by him were not so numerous as those watched by Mr. Bennett, but they seemed to exhibit more constancy.

"A much larger number of observations," says Mr. Bennett, "is, however, needed in order to determine with certainty any general law; and especially a careful microscopic examination of the pollen attached to the probosces, mandibles, legs, and under side of the abdomen and thorax. As regards preference for particular colors, the Lepidoptera paid, while under observation, 70 visits to red or pink flowers, 5 to blue, 15 to yellow, 5 to white; the Diptera, 9 to red or pink, 8 to yellow, 20 to white; the Hymenoptera, 203 to red or pink, 126 to blue, 11 to yellow, 17 to white."

*Influence of Position upon Seeds.*—A paper with this title was read by Dr. E. L. Sturtevant at the recent meeting of the American Association. The "position" referred to in the title is that of the individual seeds grown on a spike. The object of the experiment was to ascertain the difference in germinating power between seeds from the middle and from the ends of the spike. In experiments conducted at the New York Agricultural Experimental Station last winter it was found that, on an average, 91 per cent of butt-kernels, 88 per cent of central kernels, and 98 per cent of tip-kernels of flint corn germinated. Other experiments gave the following results: Of the butt-kernels planted, 79 per cent germinated; of the centers, 84 per cent; and of the tip-kernels, 86 per cent. For flint corn, the tip-kernels have the strongest vegetative power.

*The Gardener Bird of New Guinea.*—The gardener bird (*Amblyornis inornata*), a native of the Arfak Mountains in New Guinea, and the first report of the existence of which was brought to M. Bruijn by Malaysians, appears from the studies of M. Beccari to excel the Australian bower birds (to which it is allied) in the erection of a pleasure bower. The center of its edifice is formed by a small shrub in an open spot in the forest. Moss is piled up around this, and then a number of branches plucked from an epiphyte are planted in the soil in an inclined position, so as to form the walls of a conical hut, which is entered through a small aperture. These branches continue to vegetate for some time. In front of the entrance the bird makes a lawn of tufts of moss carefully separated from adhering pebbles, particles of wood, or other plants. Upon this green carpet he strews the violet fruits of *Garcinia* and the flowers of a species of *Vaccinium* growing near, renewing these as they wither.

*Selenotropism of Plants.*—Mr. Ch. Mussat (*Comptes Rendus*, xcvi., page 663), struck by the heliotropic movements of plants, has made some experiments on the influence of the moon. He sowed seeds of plants noted for their sensitive properties, such as *Lens esculenta, Ervum lens*, and *Vicia sativa*. When the plants were a few centimeters in length they were placed in the dark. The branches thereupon became delicate, long, and white, while the leaves were tinged with yellow. On the 22d, 23d, and 24th of February, when the sky was exceptionally clear, they were exposed to the direct light of the moon from 9 P. M. to 3 A. M. Almost immediately the branches became curved, and presented their concavity and terminal bud toward the moon. The bud seemed to follow the moon, and, when the plants were placed at a window with a western aspect, a fresh movement was observed, and this continued until the moon disappeared behind the hills. M. Mussat proposes to call such movements *selenotropic.*

### The Oregon.

The Guion fleet of steamships has been enlarged by the addition of the Oregon, a steamer which is 520 feet long, 54 feet wide, 40 feet 9 inches deep, and has a tonnage of about 5,000 tons. As accommodation is provided for 542 passengers, the arrangements for ventilation must be proportionally effective. The cabins, staterooms, dining rooms, and steerages are ventilated by means of twenty-six patent air pump extracting ventilators and twenty patent down casts. They are all of 24-inch diameter, with 12-inch pipes. By means of these appliances there can be no doubt that the traveling public will have all the sanitary comforts at sea that they can have in a well arranged hotel on shore, and this is the principle which the owners of the fleet have in view.

### A Gigantic Flour Mill in California.

The competition of India and Russia in the western European wheat markets is causing the merchants of California to use every effort to maintain their footing, and among other devices, says *Engineering*, for lessening the cost of transport there is arising the practice of reducing the grain to flour before it is shipped, thereby effecting a saving of 20 per cent in freight. This carries with it the additional advantage of employing a large amount of local labor, and of turning the wheat to the best advantage, as by aid of new machinery and the best systems of milling a far greater and better yield can be obtained than by the more antiquated methods which still to a great extent prevail here. Messrs. Starr & Co. are now building an immense flour mill and wheat elevator on the south shore of the Straits of Carquinez, about two miles below Porta Costa, and fronting the town of Crockett, to carry out this plan, the spot they have chosen being available for the largest ocean steamships, while it is sufficiently sheltered for the river barges from the interior to approach it with safety.

At the site of the mill the shore curves inward, leaving a flat rock reef mostly bare at low water, but sloping off abruptly on the northern and western edges. Upon this reef there is being erected an eight story mill and elevator building, about 150 feet by 300 feet, reared upon a superstructure of artificial stone piers and arches. The piers, of which there will be 209, averaging from 5 feet to 8 feet square at the base, and standing 13 feet apart from center to center, are built upon the rock, and are connected by groined arches, standing some 4 feet clear above high water level, which has an open passage under them, between the piers. The artificial stone floor of the mill and elevator is laid over the arches and forms a monolithic platform of nearly 50,000 square feet area. There will be 140,000 cubic feet in the piers, arches, and floors, the greater part being already in position, and heavy wire cables are being laid transversely through and through the concrete above the arches to serve as earthquake ties. This portion of the work, which will cost $50,000, is being done by Mr. Ernest L. Ransome, who has long been occupied in California, bringing into extensive and successful use the artificial stone invented by his father, Mr. Frederick Ransome, a number of years ago.

The mill building will be 143 feet by 158 feet, with seven stories, aggregating 100 feet in height, while the elevator, 82 feet by 178 feet, is to be capable of storing 10,000 tons of wheat. The outside walls of the great building will be formed of heavy buttresses, rising over the artificial stone piers, and connected with curtain walls. The floors above the first story will be carried by clusters of five wooden pillars, 13 feet apart. The engines and boilers are in a separate structure, the power provided for milling purposes being 2,400 horse power, and for the elevator 300 horse power. The ultimate capacity of the mill will be 6,000 barrels of flour per day, but it will be started with machinery for turning out 2,500 barrels per day. Agents of the company are now in Europe inspecting all the best milling machinery and processes.

The docks, to be covered by two-story warehouses, are in two sections, having an open slip 104 feet in width between them. The eastern dock section will have an area of 115,000 square feet, and the western section one of 256,800 square feet, and both are to be traversed by railway lines in connection with the railroad system of the State.

From this account an idea will be gained of the extent of the enterprise which Messrs. Starr & Co. are inaugurating, and the magnitude of the trade in which they are engaged, and which they are making such great exertions to keep.

### The New Time Standards.

The proposed new standards of time for the railways of the country, which are to be established by the General Time Convention of Railroad Managers, has received the approval of the Harvard Observatory, and its co-operation is promised. The railroads centering here acquiesced in the plan on the condition that the time given from the observatory should be correspondingly changed. The consent of Professor E. C. Pickering, the director of the observatory, being necessary, he was met in New York promptly on his arrival from Europe on Sunday by Mr. J. Rayner Edmonds, of the observatory, and his hearty approval of the scheme was readily given. Accordingly, a note has been sent to the Secretary of the Chicago Convention, W. F. Allen, to this effect, and assurance given that if the convention adopts the system the observatory will be ready to furnish telegraphic signals conforming to the minute and second of the proposed standards.

Under the new system, instead of running the various systems and divisions of systems by as many local standards of time, the continent is to be divided into five broad belts, running north and south, the time for each of which will be one hour slower than that of the next division to the eastward and one hour faster than that of the next division to the westward. By this plan the minute hand of a traveler's watch will not have to be changed, however far he may have to travel or in what direction; but his watch will be just one hour slow when he crosses the imaginary line into the next division to the east, or an hour fast when he crosses the line into the next division to the west. The time now furnished by the Harvard Observatory is the mean solar time for the Boston State House. The new time will be 15 minutes 44·5 seconds—practically 15¾ minutes—slower, and will be the average time for this division, which includes the New England States, New York and Pennsylvania, and the greater part of Canada. North of Lake Erie the division extends west to Detroit, while south of Lake Erie Pittsburg is practically on the western boundary of this division. Thus in the region north of the lake the standard time will be five hours slow by Greenwich, and south of Lake Erie and west of Pittsburg it will be six hours slow by Greenwich. The new standard, if adopted, will go into effect on a Sunday noon, and from that hour all the railroads will be run by the new time.

The new time standard was adopted October 11, by 78,000 miles of railway.

### IMPROVED TRICYCLE.

The guide wheel standard passes through a sleeve, and has at its upper end a short right angle bar, to the end of which is a rod reaching to the crank operated by the right hand piece. The tricycle is propelled by the feet of the rider working upon jointed pitmen, whose forward ends are pivoted to the ends of a crossbar, and whose rear ends are attached to the crank of the bent axle. The body iron is U-shaped, and is formed with sets of plates by which it is

ASBURY'S IMPROVED TRICYCLE.

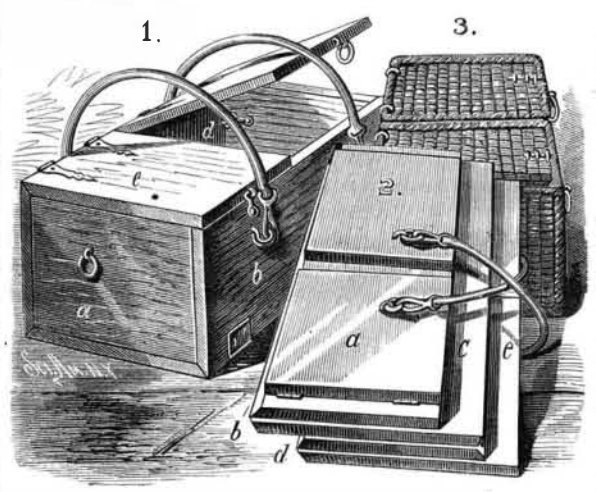
secured to the axle, the plates serving as boxes to receive the journaled blocks. To the upper ends of the body iron is secured, in a horizontal position, a second U-shaped iron, in the center of which is a third U-shaped iron vertically arranged for supporting the seat. To the forward ends of the horizontal piece are attached the hand pieces, one of which is rigid while the other may be turned, and so change the front wheel from left to right to guide the tricycle.

This invention has been patented by Mr. William Asbury, of Boston, Mass.

### FOLDING BASKET.

This basket may be folded very rapidly, so as to occupy but little space, and can be erected readily for use. It may be made of either sheet metal, wood, wicker-work, or other material specially adapted for the service to which it is to be put. In the accompanying engravings, Fig. 1 represents the erected basket made of wood, Fig. 2 the same folded, and Fig. 3 shows it erected and made of wicker-work. In the first two figures like letters represent like parts. To the opposite edges of the bottom the front and back are hinged; the front being hinged so that it swings out and folds under the bottom, while the back is hinged upon the inside so that it will rest upon the bottom. The cover, which is halved, is hinged so that it folds over upon the outer surface of the back. The ends are hinged to the front side and fold down upon its inner surface.

From this it will be seen that all the parts of the basket lie flat upon each other, and take but little room. The covers are provided with hasps or loops through which hooks on the front can be passed. The sides of the ends opposite the hinges are furnished with hooks to be passed through




DAUL'S FOLDING BASKET.

eyes or rings projecting from the inner surface of the back, so as to keep these parts in place. On the inner lower edge of the ends is a sliding bolt, which enters a hole in the bottom. On the outer part of the front and back and at a short distance from the top are staples or rings, and on the two ends and under side of the cover are similar staples. When the basket is erected the handles are hooked to the back and front staples, and when folded are hooked to the end and cover staples. The basket may be made strong and light, and at small cost.

The invention has been patented by Mr. Anton Daul, of Jamaica, Long Island, N. Y.

### Labor Saving Cranes.

At a recent meeting of the American Society of Civil Engineers, in this city, a paper by Mr. C. J. Appleby, on the subject of cranes as labor saving machines, was read by the author, who remarked that a well constructed crane or other similar power machine requiring only one man to drive it would do as much work as could be done by the manual power of ten men, but in one-tenth of the time they would require. It seems singular that railroad and waterside depots and workshops should so rarely be laid out with reference to the employment of such labor saving machines. The most economical working result is obtained from machines so arranged that when they take hold of the load, it is not released until final deposit. The author considered the following systems for transmitting or applying power:

1. The well known hydraulic system, with pressure pumps, accumulator, and distributing pipes.
2. Compressed air distributed through pipes.
3. Steam distributed as above.
4. High speed rope or "endless cotton cord," which runs at a speed of 5,000 to 6,000 feet per minute.
5. Low speed rope running 1,500 to 2,000 feet per minute.
6. Square shaft supported on tumbler bearings.
7. Steam from a boiler delivered on the top of a piston with multiplying chains similar to the hydraulic system.
8. Boiler and engine fixed on the crane, and driving gear for the several motions required.

The first, second, and third can only be applied to cranes fixed or moving over very limited areas. The fourth, fifth, and sixth will transmit power over large areas, which, however, should be nearly rectangular. The other two can be used generally wherever there is a railway track. The hydraulic system possesses great advantages over compressed air or steam, but experience tends to the conclusion that its common use will be attended with considerable inconvenience where the winters are cold. The use of compressed air has not been applied with great success in many cases.

Steam is largely used, and frequently carried through 1,000 feet of pipe without much inconvenience. The high speed cotton cord runs at a speed of 5,000 to 6,000 feet per minute. The cord works in grooved pulleys, is carried on rollers or other supports at intervals of ten to twenty-five feet, and is kept in tension by a weighted pulley. Low speed rope transmission is generally effected by a hemp rope running from 1,500 to 2,000 feet per minute. The square shaft has been used for many years, the only special difficulty experienced being that of supporting the long main line of driving shaft. The author exhibited recent designs whereby this difficulty has been very successfully overcome. The relative advantage of rope or shaft transmission is largely influenced by local circumstances. As a general rule the rope system costs less and is better where the distance for transmitting exceeds 200 feet. Below that distance the shaft is probably the best and cheapest. But the rope possesses advantages when machinery has to be on different levels, or at an angle with the point from which the power is transmitted.

The steam crane, employed under many differing conditions, perhaps performs more functions than any other mechanical arrangement for lifting and placing loads. All such cranes should lift and turn around by steam power. One, specially illustrated, has additional motions for altering the radius of the jib for hauling materials, so as to bring them within the reach of the machine, and also for moving empty or loaded cars. Fixed cranes are often seen so placed that one-third or even one-half of the number erected at a particular point are idle. It would, therefore, seem that for the same outlay, the best duty will be obtained from movable cranes. Where two or more railroad tracks are parallel with the water front, it will often be desirable to make the crane span the two lines of tracks, allowing head room for the vehicles to pass under it. Cranes fixed on floating vessels were also illustrated up to 60 tons power. Locomotive cranes up to 25 tons were described, and also cranes specially adapted to terminal freight stations. One of these has lifted 80 tons per hour a height of 20 to 30 feet, and deposited the loads of 1½ to 2 tons each 60 feet from the point where taken up. A similar crane commonly delivers 240 barrels of oil per hour the same height of lift and length of deposit.

The cost, per day, is one driver's wages and the necessary fuel, oil, etc. Five per cent. per annum is ample allowance for depreciation. The cost of this system of working is easily ascertained, but a great gain also arises from the increased speed of passing large quantities of merchandise.

The paper was discussed by Messrs. Cartwright, Cooper, Emery, Farney, Geo. S. Greene, Jr., Hamilton, R. L. Harris, James Platt, and the author.

### A Shower of Grasshoppers.

According to a local paper, a shower of grasshoppers fell in Louisville during the evening of September 30. They made their appearance about nine o'clock, and soon scattered over the streets, filling every place to which they could gain access. Many gathered about the lights, but the cold had so benumbed them that they displayed little activity. They were of all sizes, but the large ones outnumbered the little ones. It is supposed they were blown to the city by a strong breeze which prevailed during the afternoon, but that theory will hardly account for their great numbers, for they were thicker than is generally the case on their native heath.