

**ARMY TRANSPORT SERVICE IN THE PHILIPPINES—II.**

In the SCIENTIFIC AMERICAN of March 23 we gave some account of the Quartermaster's Department of the United States Army, and illustrated the fine fleet of transports which is engaged in carrying troops and supplies to the Philippines and our West Indian possessions. The United States Army transport service is under the direction of General Charles Bird, with headquarters at Washington, D. C., with two General Superintendents, Major C. A. Devol at New York, and Major O. F. Long at San Francisco. By the courtesy of Major Devol, we are enabled to present a second series of illustrations, dealing with the headquarters of the Quartermaster's Department in Manila, and the system employed in distributing troops and supplies from that center throughout the Philippine Islands.

When the transports conveying the United States troops that were to cooperate with Admiral Dewey's fleet arrived in Manila Bay, the shoalness of the water necessitated their anchoring some two miles from the Pasig River, which flows between the towns of old and new Manila, and along whose banks are located the only wharves and dockage facilities of which the city can boast. Having brought the troops to Manila, the immediate and pressing question to be solved was how to land the army with its baggage and general impedimenta. In times of peace lighterage at Manila has been carried on by means of a native scow or barge, known as the casco; but the thunder of the United States guns had scared away the native watermen, who had fled to hide themselves and their craft up the river Pasig, and in the creeks and inlets of Manila Bay. There was nothing for it but to search out the owners of these craft and by suasion or force bring them into service. As fast as the cascos were discovered, a soldier was placed upon each, and they were utilized as lighters. It was not long before the rumors of good treatment and good pay by the Americans brought the natives from their hiding places, and within a few weeks the Quartermaster's Department had over a hundred of these boats, duly numbered and registered, employed in the lighterage service. The casco is a broad, shallow barge, with a bamboo deck-house at each end, in which the owner and his family live and sleep, very much in the same manner as the canal boat population on our own Erie Canal. Along the side of the casco, from stem to stern, there is rigged out a platform of bamboo poles. By means of this runway and a long pole the boatman propels his craft. One end of the pole is placed upon the river or harbor bottom and with the other end against his shoulder he walks from bow to stern of the boat, pushing the craft forward and away from him with his feet. Each casco is capable of accommodating 100 men and 25 tons of freight.

The native system of poling the boats was altogether too slow for army transport work, and accordingly Major C. A. Devol, to whom fell the difficult work of organizing a system of unloading, storing and redistributing the army supplies at Manila, purchased for towing purposes a fleet of eleven Chinese-designed and Chinese-built launches of the kind which are illustrated on the front page of this issue. These launches, which are 75 and 80 feet in length, and can make 10 knots an hour, are built at Hong Kong by Chinese firms for general transport service in Hong Kong Harbor and on the Canton River. The plans and workmanship of the hulls, boilers and engines are entirely Chinese, and in view of the competition in all lines of manufacture to which Europe is certain to be subjected as soon as China is more thoroughly awakened to the sense of her own potentialities, these launches are extremely interesting. We are informed that they have proved to be staunch and seaworthy, and that the engines and boilers have given satisfactory service. The finish, both of the boats and their machinery, is very rough, the Chinaman evidently having an eye to profits and not putting any more work upon them than is absolutely necessary. The 75-foot launches cost \$7,500 and the 80-foot launches \$8,000 apiece. These launches are assisted

in the work of towing by several smaller launches, of the regular navy type. In addition to the 116 cascos, the department works 15 lorchas, the latter being a native lighter of some 60 tons capacity, which is decked over and carries a deck-house in which perishable freight can be shut in from the weather and locked up. One of the 80-foot launches is capable of towing five or six cascos at a time, and as about 100 men can be accommodated on the launch itself at every trip, some 700 men, together with two days' rations and camp equipment, could be carried from the transport to the docks by each tow. As there were sometimes as many as fifteen transports in Manila Bay at once, all landing horses, troops and supplies, it can be understood that there was ample work to keep the fleet of launches and cascos busily employed. Coal-

and grain stores.) These little vessels, which are of a type which has been developed by the necessities of the inter-island trade, can steam from 9 to 10 knots an hour, and have proved to be just the thing for the needs of the department. The Dagupan Railway, which runs from Manila northward to the coast, forms, of course, the main line of distribution for the island of Luzon. From the various points on the railroad, supplies are carried to the many stations and commands in army wagons, drawn either by mule teams or by the water-buffalo, a native animal which has proved itself invaluable during the rainy season in this campaign. Give the buffalo his time, and he will cover about 1½ miles an hour. He is not so rapid as the mule team, but he has the advantage that he will push his way steadily through swampy districts, going for hours with water up to his belly. The mule, on the other hand, has small feet, and knows it, refusing to haul in ground where the footing is insecure. The buffaloes are used with the native cart and native drivers, and they cost the department about \$3.25 a day Mexican money, \$1.62½ gold. Where the country is suitable the regulation army wagon with four mules is used, and where roads are not available the supplies are carried by mule pack-trains.

One of the first things to be done in making Manila the distributing center for troops and supplies was to provide suitable storage and barracks. Our large front-page engraving shows the Quartermaster's depot on the left, and further down the wharf is seen the depot of the Commissary Department, which is responsible for providing all the food supplies for the troops. Another of our engravings shows the method of storing at Manila the hay and grain, of which enormous quantities have to be carried to the Philippines, the islands not furnishing either sufficient or suitable supplies of this kind. As the stores are unloaded from the lighters, they are placed on trucks and run into the shed by means of temporary tracks which have been laid down by the department. Another view shows a group of barracks buildings sufficient for the accommodation of 1,200 officers and men, which was erected by a Chinese contractor, employing native and Chinese labor. The barracks consist of six buildings, 35 feet wide by 250 feet long, seven smaller buildings for officers' quarters and six lavatories and bathroom buildings. The woodwork or framing, which is built entirely of bamboo, was constructed by Chinese carpenters, and the thatching was done by the native Filipinos. The Chinese contractor engaged to put up these buildings for \$32,000 in thirty days. The morning after signing the contract he had 500 laborers at work, and the whole barracks were ready for occupation in twenty-three working days. We are indebted for our illustrations and particulars to Major C. A. Devol, Superintendent of the Army Transport Service at New York.

**Gases Produced by Bacteria.**

W. C. C. Pakes and W. H. Jollyman have described before the Chemical Society a new apparatus for the collection of the gases produced by bacteria when grown either under aerobic or anaerobic conditions. Experimenting with the *Bacillus pyocyaneus*, which is supposed to be a strictly aerobic organism, they found that it grew in media containing 1 per cent of potassium or ammonium nitrate under the strictest anaerobic conditions, as the term is at present understood (that is, in the presence of hydrogen, or in the absence of any gas). They concluded, therefore, that the terms aerobic and anaerobic must be extended to include the presence of oxygen in the form of nitrates. Upon analyzing the gases produced by the organism from media containing nitrates, they found that both free oxygen and free nitrogen were evolved, the former in small quantities, but constantly.

At the collieries of the John Cockerill Company, in Belgium, concrete has been used instead of brickwork for lining circular shafts, drifts and other passages with great success.



Launch Towing Loaded Cascoes from the Transports to the Docks at Manila.



Bamboo and Thatch Barracks for 1,200 Men Built by Chinese Contractor in 23 Days.



Terminus of the Manila and Dagupan Railway at Manila.

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ing the transports was carried on also from the same cascos, each of which would take out 20 tons of coal to the ships, the transfer of the coal from the cascos to the bunkers being accomplished by Chinese "coal coolies," who carried the coal in baskets slung from poles, there being two men to each basket.

As there is an army of from 63,000 to 64,000 men in the Philippines scattered among 400 separate stations, of which over a hundred are located on the coast lines of the various islands, it can be understood that the work of redistributing the supplies is a task of a very formidable nature. The redistribution to coast stations throughout the islands was accomplished by means of a fleet of eleven steamships of about 350 tons burden. One of these ships will be noticed anchored in the Pasig River. (See front page illustration showing the Quartermaster's hay

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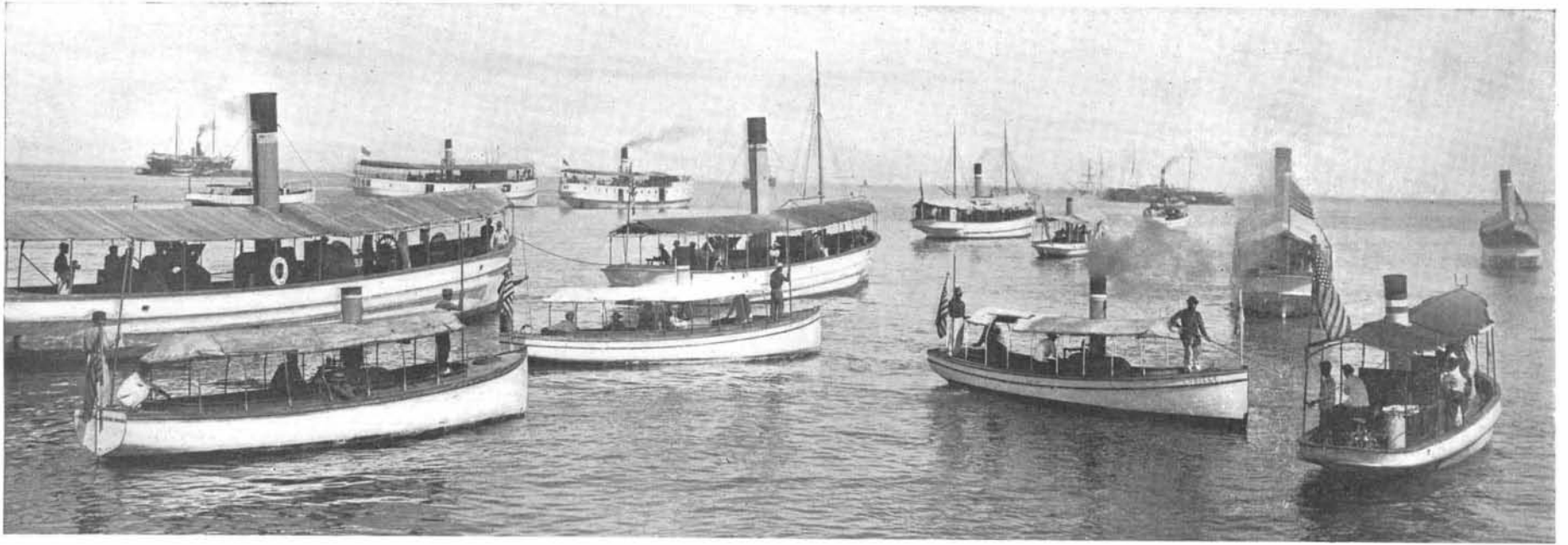
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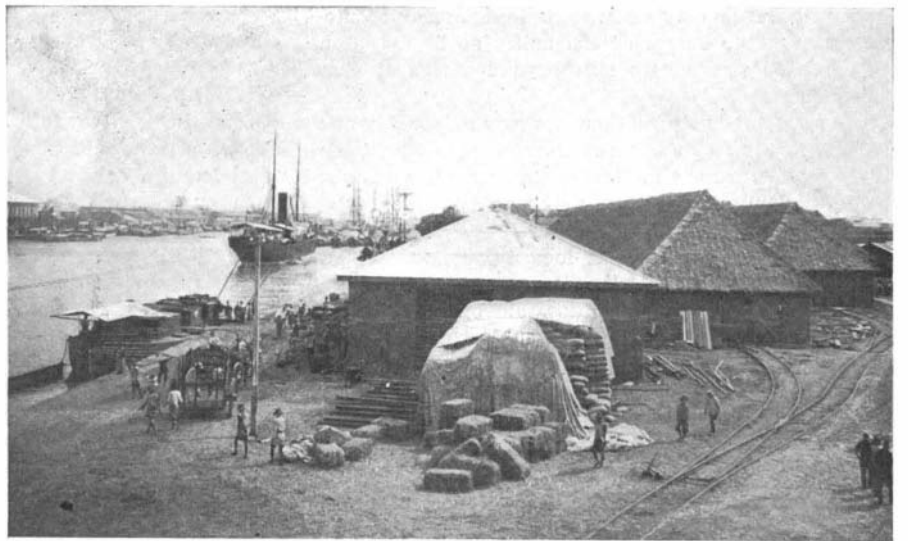
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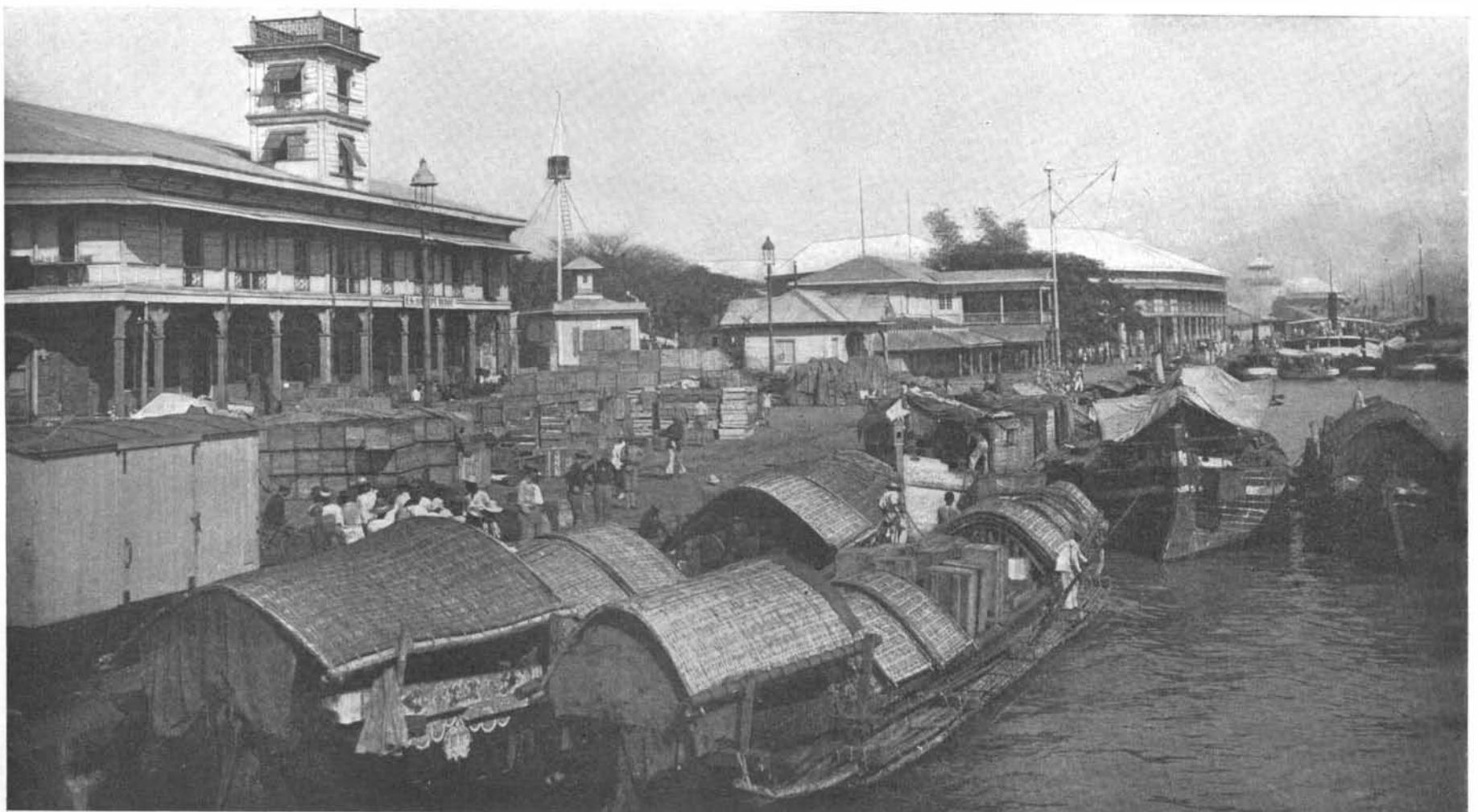
Fleet of Launches and Chinese-Built Tugboats Employed in Towing Lighters at Manila.



Unloading Supplies on the Beach, Manila Bay.



Quartermaster's Hay and Grain Stores on the Pasig River Front.



Native Cascoes and Lorchas Lightering Supplies at the Quartermaster's Depot, Pasig River, Manila.

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**Composition and Nature of the Red Rain.**

BY DR. T. L. PHIPSON.

The newspapers of various countries of Europe have recently called attention to a red rain which fell between the 11th and 13th of March, 1901, in Sicily, Naples, Leghorn, Venice, Coburg, Hamburg, Schleswig-Holstein, and at Malvern, in Worcestershire.

The deposit left by this rain in the form of an exceedingly fine dust is described as reddish or fawn-colored, and greasy to the touch. At Leghorn  $4\frac{1}{2}$  grammes were swept from the marble table in front of a café, and it was calculated from this that many thousands of tons of this fawn-colored dust must have fallen throughout Italy between the dates above-mentioned.

I am indebted to Capt. C. J. Gray, F.R.G.S., for a small quantity of a precisely similar product that fell with the rain at Melbourne, Australia, on the 12th of December, 1896, and I have submitted it to as full an examination as the very minute quantity would allow.

In my recently published work, "Researches on the Earth's Atmosphere," I have alluded to salt rain, and to colored rain produced by volcanic ash, or desert sand uplifted by the wind and suspended in the air; there have been also blood-red deposits found upon the ground, which consist of cells of the *Protococcus nivalis*, or *Palmella sanguinea*, and similar microscopic plants that have shown themselves after a fall of rain or snow. I have invariably found abundance of unicellular algæ in the first fall of snow in early winter, and the red rain deposit examined formerly by the French chemist Cahours (in 1852) was found to consist of organic cells, and burnt away entirely, leaving little or no residue.

The fawn-colored dust left by red rain is, on the contrary, of a mineral nature; it is always similar in color, fineness, and microscopic appearance. I have made a careful examination of this reddish deposit, and the result has been rather unexpected and interesting.

When dry it is of a fawn-color, rather paler than oxide of cerium, but becomes darker when wet. Under the microscope it is seen to consist of exceedingly minute grains, *mostly flat*, and of various colors; they are also of various shapes and sizes. The largest are about 2-100 of a millimeter; the greater number are about 5-1,000, and the smallest 5-100,000 of a millimeter in diameter. The irregularity of their forms gradually disappears as they get smaller, so that to the eye the smallest appear circular. Many are white, and more or less transparent, gray, greenish-gray, slate-colored; others are yellow, and brown, and translucent; a few are ruby-red, and others are dark and opaque.

When calcined at a red heat this dust darkens, and loses 14.3 per cent of water and organic matter (this is exactly the amount of water and organic matter found in the Orgueil meteorite). On cooling after calcination it becomes fawn-colored again, and the colors of the grains seen under the microscope have not been much altered by calcination.

When boiled in hydrochloric acid (finally adding a few drops of nitric acid), a notable portion is dissolved, and yields a solution containing iron, and other substances, among which is nickel.

After this boiling in acid the fawn-color becomes much darker, similar to the dark crust seen on meteorites where it is very thin. Having placed the existence of nickel in this substance beyond doubt, I am of opinion that it is partly, if not wholly, of cosmic origin, and not merely desert sand uplifted by the wind, nor volcanic dust; it would appear to be the mineral dust left in the higher regions of the air by the explosion of meteors, or shooting stars.

The only thing that makes me hesitate to assert this absolutely is the fact that oxide of nickel has once been said to have been found in the *rapilli* of the Kölerberg, in Silesia, to the extent of 0.1 per cent (the analysis by Zulkowski is given in my work on "Meteorites, Aërolites, and Falling Stars," p. 118). In the fawn-colored products of the red rain I estimate that there is considerably more nickel than that, more than ten times as much; and in the ash or cinders of Etna and Hecla no nickel has ever been found, nor in those of Vesuvius.

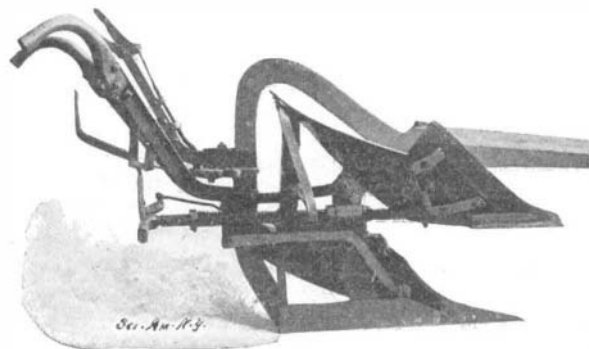
I may add to this that both March and December are known to be meteoric "periods."—Chemical News, London.

The forestry division of the Department of Agriculture is engaged in drafting a working-plan looking to the conservation of timber on a tract of 300,000 acres in the neighborhood of Millinocket, Me., belonging to a private paper corporation, says The New York Tribune. It is a part of the general policy to be inaugurated by the department for the conservation of timber land throughout the United States to secure a perpetual crop of timber in the areas under consideration. The private concern will pay all the expense of the work, except the salaries of the government experts, who are directed by Prof. Pinchot.

**AN IMPROVED PLOW.**

Plows provided with two shares and moldboards located at opposite sides of the beam and with mechanism for bringing either share and its moldboard into operative connection with a common landside have proven highly efficient. But the construction has not always been of the simplest. To secure this simplicity of construction is the primary object of an invention for which John N. Hanna, of Moline, Ill., has taken out a patent.

The arched beam of the plow has guided movement horizontally in a slotted plate provided with teeth which are to be engaged by a spring-controlled thumb-latch on the handles of the plow. By this arrangement, the beam can be swung from side to side on

**AN IMPROVED DOUBLE-SHARE PLOW.**

the plate and locked in place by the thumb-latch. Friction-rollers both facilitate and guide the movement of the beam.

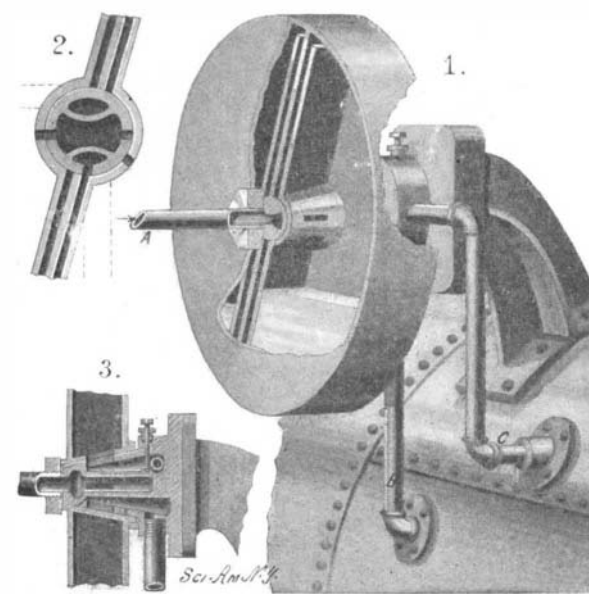
The plate referred to is supported on a standard, which in common with a second standard at the front is secured at its lower end to the landside. In these standards above the landside a tubular shaft is mounted to revolve, to the rear end of which a lever is pivoted connected with a guide beneath the handles. A slotted projection is formed on the upper surface of the landside near its forward end. Through this slotted projection an arm passes, which, together with a slotted bar sliding on the standards, constitutes a locking device to lock the moldboards to the landside, the slotted bar being operated from the lever previously mentioned by means of a link. A spring on the shaft acts to force the slotted bar forward. The combined moldboards and plowshares are located one at each side of the shaft. The moldboards are connected by straps and are provided with eyes adapted to enter the space between the members of the slotted projection on the landside and receive the arm carried by the slotted bar of the locking device.

The beam can be directed at its forward end to the right or to the left without interfering with the position of the supports for the beam and the position of the moldboards and shares. By moving the lever to the right or to the left either one or the other of the combined moldboards and shares can be brought to the ground. When one moldboard and share are in working position, the other moldboard and share will be held out of the ground. The arch of the beam permits the use of a large moldboard.

The characteristic features of the invention are the ease and rapidity of operation and the convenient reach of the lever.

**AN AUTOMATIC BOILER-FEEDER.**

The boiler-feeder shown in the illustration automatically maintains the water in the boiler at a certain

**THE RICE AUTOMATIC BOILER-FEED.**

level by employing the steam-pressure as a means of forcing water into the boiler. The invention has been patented by Jasper N. Rice, of Bethany, Mo.

The boiler-feeder comprises a shell having three superposed compartments, the central one of which com-

municates with a water-supply pipe, the uppermost of which is connected with a steam-pipe leading from the boiler, and the lowermost of which conducts the water from the shell to the boiler.

On this shell a drum is mounted to rock, which drum is divided into two compartments by a diametrical partition adjacent to which are false partitions forming passages from the outer part of the drum to the shell. The hub of the drum has ports communicating with the passage and with ports in the steam and water compartments of the shell.

When the ports of the central shell-compartment and of the drum-hub are in register, the water from the supply pipe flows into the drum. Steam enters the drum by way of the upper shell-compartment and passes through the upper drum-passage (formed by the true and false partitions) when one of the ports of the upper shell-compartment registers with the corresponding drum-passage. The pressure of the steam forces the water in the drum up through the lower drum-passage into the lowermost shell-compartment and thence into the boiler.

The various ports of the drum-hub and shell are arranged to move into and out of registry, such movement being brought about by the regular rocking of the drum, which in turn is due to the preponderance of water in one of its two compartments. The central compartment of the shell, as we have already remarked, communicates with the water-supply. As the water is sprayed into the compartments of the drum, the steam in the corresponding drum-compartment is condensed, thereby producing a partial vacuum and insuring the passage of the water into the drum. The operation once started continues automatically until the rising water in the boiler closes the steam-pipe and thus temporarily arrests the action of the feeder.

**Automobile News.**

Consul-General Guenther, of Frankfort, February 23, 1901, reports the appearance at Nuremberg of the first automobile sleigh. The vehicle glides along with great speed and a perfectly easy motion. It was constructed by the Nuremberg Motor Vehicle Factory Union.

The Automobile Club of France has organized its second competitive test of accumulators, which will commence the 1st of June and last one year. It will be held at the laboratory of the club in the suburbs of Paris. These tests will be carried out upon somewhat the same lines as last year's tests, which were held in the club building. In one of the rooms on the ground floor was mounted a four-wheeled wagon truck with rubber tired wheels, and below the floor was a motor-driven device by which a wheel carrying a series of projections was rotated rapidly underneath the tire, giving the whole truck a series of jolts resembling the shaking which an automobile would receive upon the road. The truck had a platform upon which the batteries were mounted, each in its appropriate box. The batteries were charged and discharged at intervals, and a series of measurements taken. The rules of the contest, which have lately been published, may be briefly stated as follows: The tests will have reference to the industrial efficiency of the battery, or the relation between the output and the energy of charge; the frequency, importance and nature of the operations of keeping in order and of repairs; the energy furnished compared with the weight of the battery; the cost per kilowatt-hour of output, taking into account interest and repairs. The number of batteries is not limited; each competitor must present two batteries of the same type of plate, also a complete descriptive notice with the necessary drawings and samples, stating the price of the battery and parts. An extra cell, without liquid, is to be kept under seal. Each battery, composed of an appropriate number of cells and contained in a suitable box, must furnish 120 ampere hours' discharge and its potential must not fall below 8.5 volts upon a régime of 20 amperes. The batteries will be ranged in two classes; first, those of great specific capacity and slow discharge, maximum weight 132 pounds; second, those of small capacity and rapid discharge, up to 208 pounds. The tests will be carried out in periods of 6 days; during each day they will undergo a 5 hours' shaking upon the machine, while discharging at a variable rate which is previously laid out. The load is varied by a revolving commutator turning once every half hour and throwing on a greater or less number of lamps. Each turn corresponds to a quantity equal to 12 ampere-hours. The load varies from 20 to 100 amperes, but the latter current is applied for only half a minute. The sixth day the batteries will have a constant discharge of 24 amperes for 5 hours. The charging will be carried out at 12.5 volts. The energy, voltage, and current will be accurately measured by a series of instruments, and the efficiency of each battery, its capacity, potential, etc., will be recorded. The club will award diplomas or medals to the successful competitors. For each group of two batteries the entry fee is \$100 to the 1st of May, and \$200 to the 25th, the limiting date. A complete list of the rules will be furnished upon application to the club.