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NEW YORK, SATURDAY, JANUARY 30, 1897.

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(Illustrated articles are marked with an asterisk.)

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Scientific American Supplement

No. 1100.

For the Week Ending January 30, 1897.

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PRESENT STATUS OF THE APPRENTICESHIP SYSTEM.

Since the date of our last reference to the apprenticeship system of the United States, the question has experienced one of its periodical revivals, and its pros and cons have received a very thorough discussion. The technical press, almost without exception, has opened its columns for correspondence and given the matter extensive editorial notice. It has also formed the subject of debate in trades unions, labor societies and the conventions of master workmen, and furthermore, it has lately been made the subject of carefully detailed report after examination by a committee specially appointed for the work.

After carefully following the discussion and gleaning the actual facts, as they have appeared from time to time, one is carried to the conclusion that the apprenticeship system is not so generally moribund as the state of affairs in some particular districts and trades would lead one to infer. This conclusion is borne out by the effort recently made by a committee of the Master Mechanics' Association to ascertain by circular letter the present status of apprenticeship in the railroad shops and in those devoted to the manufacture of machinery. The committee received over three hundred replies, which indicate that in some form or other all the leading railroads maintain a modified form of apprenticeship. Some of them go so far as to require the signing of articles binding the apprentice for a number of years, while others are in the habit of taking on boys at a small remuneration, the understanding to exist so long as it is mutually acceptable.

In general, it would seem that the arrangement which is most in favor in the United States is similar to that which was communicated to us by the Brown & Sharpe Manufacturing Company, of Providence, R. I., and commented upon editorially at the time. This, as our readers may remember, consists in giving the boys a probationary trial before they are bound by any articles, in order to determine whether they have any natural aptitude for the trade; and then binding them in an apprenticeship of three years' duration, in which the firm, in consideration of one hundred dollars, pledges itself to instruct the apprentice in the machinist's art and trade. If the boy complies with the provisions of the contract for the time specified, the one hundred dollars is returned; he is also paid at the rate of four cents an hour for the first year, seven cents for the second, and ten cents for the third year.

This plan, which we think is, on the whole, as good as any that have recently come under our notice, may be taken as fairly representative of American practice to-day. The chief modification has been in the direction of strengthening the inducement for the apprentice to serve the full time of his contract. This is being done in some cases by withholding a small percentage of his wages, instead of requiring a cash deposit in advance. The advantage of the former method is obvious, for, whereas the forfeiture of the deposit would probably affect only the boy's parents or guardians, the loss of his wages would tell upon his own pocket, and, as boys generally go, would be a proportionately stronger deterrent.

In all the discussion, verbal or written, of the past few months there are two encouraging facts which are clearly established and are full of promise for the future of the apprenticeship system. In the first place it is clearly recognized that while the root idea of the old apprenticeship was good, the system must be entirely revised in order to adjust itself to modern conditions, both mechanical and social. This is self-evident. Specialization in the machine shop on the one hand, and broader, more liberal views of the relation of master and man on the other, have rendered the seven years' "service" of the "bound" apprentice of former years neither desirable nor possible. We may regret the passing of the all round ability of the finished machinist of other days; but gone it is, and for the good reason that there is no call for such superfluous versatility. The modern methods of shop and factory management call for superior excellence in special lines of work, and the result has been that the length of the term of apprenticeship has been cut down fully one-half. At the same time the relations between employer and employed have been made more elastic, and they conform more fully to modern ideas. Moreover, the earning of a small wage has given a certain independence to a position in which the occupant was formerly too often treated with scant regard, if not with positive indignity.

The other fact in which we find much promise for the future is that, after carefully going through most of what has been said or written on this vital question since we last had it under review, and as the result of our own independent inquiries, it is abundantly evident that the modified form of apprenticeship which is now in vogue is a practical success.

As regards the trade and night schools and their relation to the system, we think, as before, that their work should be considered as both preparatory and supplementary to apprenticeship. If the tendency of modern apprenticeship is toward a too rigid specialization, the trade school will act as an effective corrective, giving the boys an opportunity to acquire knowledge, if not dexterity, in lines of work to which they do not have access in the shops.

A NATIONAL DEPARTMENT OF SCIENCE.

In a few days a formal recommendation will be submitted to Congress in favor of the establishment of one great scientific department of science in place of the several existing separate government bureaus, which are maintained at great expense for the promotion of science and the development of the resources of the country. Charles W. Dabney, Jr., Assistant Secretary of Agriculture, has prepared an argument favoring the consolidation of all the bureaus into one department. He shows that, aside from the government schools and the testing laboratories of the War and Navy Departments, the United States maintains no less than twenty-eight scientific bureaus for the development and advancement of industrial resources. These bureaus employ over 5,000 persons and are maintained at an expense of $8,000,000. As all of the bureaus have a common purpose, and considerable money and time is wasted by the duplication of work, it is urged that they be placed nnder the direction of a single head. The statistical records of the national resources and products of the country are collected and kept by eight different agencies connected with six different government department bureaus, not counting the Census Bureau. The proposal which is to be submitted to Congress is to consolidate all the statistical bureaus and establish a permanent census, which shall do in a systematic way what is now done once in ten years at great expense. Congress will be asked to decide upon the general programme, and as opportunity offers, transfer the different bureaus to some one of the departments.

THE HEAVENS FOR FEBRUARY.

BY WILLIAM R. BROOKS, M.A., F.R.A.S.

THE SUN.

On the first day of February there will be an annular eclipse of the sun. It will be visible as a partial eclipse in the United States, and as such only south of a line drawn from Boston in a southwesterly direction through the Middle and Southern States to the southern point of lower California. To all places north of this line the eclipse will not be visible. In the vicinity of the Atlantic coast from Charleston to Boston a small phase of the eclipse will be visible shortly before sunset. The path of annulus, from thirty-five to forty miles in width, extends from a point about 10 deg. east of the northeastern coast of Australia, across the South Pacific Ocean and the northern part of South America, ending on the northeastern coast of the last named country.

Along this path the moon will appear to pass centrally across the disk of the sun; but the relative distances of these two bodies from the earth are such at the period of this eclipse that the moon does not quite hide the entire face of the sun. At the moment of greatest obscuration there will be seen a narrow ring of sunlight surrounding the moon on all sides. Hence the designation annular eclipse.

An enormous sunspot has been visible on the sun's face during January, and it is quite likely to appear by rotation early in February, although it may be very much changed in both size and form. During its passage in January this spot was easily visible to the naked eye through a smoked glass. In the telescope it was, indeed, a fine object. The apparition of this great disturbance is remarkable, coming as it does at what is regarded as the minimum stage of the sunspot periodicity. All having telescopes properly arranged for solar observation should keep a watch on the sun at the present time.

The sun's right ascension on February 1 is 21 h. 2 m. 33 s.; and its declination south, 16 deg. 52 m. 33 s. On the last day of the month its right ascension is 22 h. 47 m. 41 s.; declination south 7 deg. 39 m. 56 s.

MERCURY.

Mercury is morning star, reaching its greatest elongation west of the sun, 26 deg. 23 m., on January 15. This will be the best time to look for Mercury as morning star, although its southern declination is unfavorable. The position of Mercury at that time will be, right ascension 20 h. 16 m. 30 s.; declination south 19 deg. 35 m. 16 s.

Mercury is stationary on the second, and in aphelion on the twenty-seventh day of the month.

VENUS.

Venus is evening star, and shines with regal splendor in the southwestern sky long after sunset. It reaches its greatest elongation, 46 deg. 39 m. east of the sun, on February 16.

Venus is in conjunction with the moon on the fifth of the month at 5 h. 43 m. in the afternoon, when Venus will be 3 deg. 48 m. south of the moon. This will form a most enchanting celestial picture, the moon being in the crescent phase at that time.

On the first day of the month Venus crosses the meridian at 3 h. 8 m. in the afternoon and sets at 9 h. 10 m.

P. M. On the last day of the month Venus crosses the meridian at 2 h. 58 m. and sets at 9 h. 45 m. P. M.

The right ascension of Venus on the fifteenth of the month is 0 h. 49 m. 27 s.; and its declination north 6 deg. 59 m. 22 s.

MARS.

Mars is evening star, and, being at a high altitude in the early evening hours, is well placed for telescopic study. Mars is yet in the confines of the constellation Taurus, through which it is moving slowly eastward.

On February 11, at 2 h. 43 m. in the afternoon, Mars is in conjunction with the moon, when the planet will be 1 deg. 51 m. south of the moon. On the 19th of the month there will be a conjunction of Mars and Neptune, when the latter planet will be 4 deg. 2 m. south of Mars. This will be a favorable time to pick up Neptune with a moderate size telescope. A magnifying power of 200 to 300 diameters will show a perceptible disk to the planet, which stars of about the same magnitude will not give. Thus by its different appearance among the stars Neptune may, with care, be identified.

On February 1 Mars crosses the meridian at 7 h. 56 m. P. M., and sets at half past three A. M.

On the last day of the month it crosses the meridian at 6 h. 44 m. P. M., and sets at 2 h. 25 m. A. M.

The right ascension of Mars on February 15 is 5 h. 0 m. 53 s.; and its declination north 25 deg. 26 m. 17 s.

JUPITER.

Jupiter is morning star until February 23, when it comes into opposition with the sun, or 180 deg. therefrom, after which date it is evening star.

It is in excellent position for observation, and many interesting details of its belts and satellites may be seen with even small telescopes. In the great telescopes Jupiter is a magnificent object.

The planet is in the constellation Leo.

On February 17, at 7 h. 3 m. P. M., Jupiter is in conjunction with the moon, when the planet will be 3 deg. 33 m. north of the moon.

On the first of the month Jupiter rises at 7 h. 15 m. P. M. On the last of the month it rises shortly before sunset.

The right ascension of Jupiter on February 15 is 10 h. 33 m. 57 s.; and its declination north 10 deg. 27 m. 24 s.

SATURN.

Saturn is morning star. It comes into quadrature with the sun on February 18, when it will be 90 deg. west of the sun. Saturn rises on the first of the month at 2 h. 10 m. A. M. and at the last of the month at 12 h. 30 m. A. M.

URANUS AND NEPTUNE.

Uranus is in the morning sky, and is in quadrature with the sun on February 17, when its position will be in right ascension 15 h. 47 m. 10 s.; declination south, 19 deg. 42 m. 41 s.

Neptune is in the evening sky, and its place is indicated in the section on Mars, with which planet it is in conjunction on February 19.

Smith Observatory, Geneva, N. Y., January 20, 1897.

The Plague in Bombay.

The eyes of the whole world are now turned toward India. Each day's news from the stricken land makes it apparent that another great tragedy is being enacted in the East. The heart of Europe has now been touched, and supplies are being hurried forward, though in many thousands of cases they will arrive too late. The famine in India has been caused by the failure of the crops owing to the small amount of rainfall. A very large proportion of the population of India is miserably poor, and the struggle for daily existence is hard enough ordinarily, so that when famine or any increased scarcity of food occurs, it is usually followed by an astonishingly increased amount of sickness and mortality.

Crowding close on the heels of famine came the bubonic plague, and to-day half the population of Bombay have fled from the city, and, unfortunately, they have nothing to support themselves on in the country, so that many must fall victims to the slower death by starvation. The death rate from the bubonic plague has risen to about one hundred and fifty per day in Bombay. In spite of the panic, many victims of the plague refuse to accept medical aid, regarding the disease as a visitation of God.

The difficulties of sanitary administration arise from the rapidity of decomposition of organic matter, the density of population, and the primitive habits of the people, which have never been brought in line with the necessities of a closely inhabited town having in certain wards a density of 760 per acre. In addition to the fixed population there is a constant current of immigrants coming from the mainland, mostly of the laboring class, who remain for a time to benefit by the well paid labor of the city and who return to agricultural occupations. These people know nothing of sewers, latrines, waterworks, or conservancy regulations. They seek lodgings in the densely crowded parts of the town, and the men will often join, eight together, in the hire of a single room, ten feet square and eight feet high, in which they will sleep together with door and window shutter closed during the rainy season. In a city with the climatic conditions of Bombay, and with such a dense population, the sanitary rules should be stricter and the individual compliance with them more complete than is the case in Europe if the death rate is to be kept within reasonable limits. The reverse, however, is the case, and the city appears always to exist on the verge of an epidemic of some sort.

The customs of the natives add to the hideousness of the plague. The Mohammedan cemeteries are overcrowded, and it is impossible to find men enough to dig graves and bury the dead. The sound of dirges is incessant in and around the places where the Hindoos burn their dead, in accordance with their time honored custom, and the funeral music has a most depressing influence on all who hear it, natives and foreigners alike. It is stated that numbers of dead bodies of Parsees, the religious sect who expose their dead to be eaten by the vultures, are slowly decomposing in the open air in the places in which they are left. They have not been eaten by the vultures, the birds having been overgorged by the great abundance of corpses furnished to them.

Everywhere the greatest difficulty is experienced in obtaining men to carry the dead to the cemeteries, the Dokhornas or "Towers of Silence," and the "Burning Ghats."

The point which most interests Europeans is whether the awful disease is likely to flourish in northern latitudes if the infection is introduced there; but no evidence is forthcoming as yet. It is argued by medical men, however, that if the plague is dangerous in Hong-Kong, it would find an equally prolific field in London and Paris as far as climate is concerned. It is generally admitted that the plague is a filth disease, but there are certain peculiarities connected with its spread. Dr. Haffkine, the well known bacteriologist, who is investigating the subject in Bombay, fastens the responsibility for carrying the infection upon rats, ants and other vermin and insects with which houses are infested. Rats have the plague. They die and are eaten by ants, which carry the germs into the crevices of buildings and to watertaps and sinks. Thus the poison is diffused and cannot be eradicated except by fire. This explains the efficacy of the old method of cleansing by conflagration, and, at the same time, the futility of isolating the sick as in other infectious diseases. The only thing to do is to remove the healthy. Dr. Haffkine has, it is said, proved the efficiency of attenuated plague virus as an antidote for the disease.

Dr. Yersin, a French physician, claims also to have discovered an antidote for the bubonic plague. In the course of an interview with a writer of the Monde Illustré Dr. Yersin said: "This plague is really the cleanest of all diseases. The patient has a little fever, feels a slight fatigue, a boil makes its appearance and after a few hours of suffering he dies without any of those repugnant complications peculiar to other epidemic diseases."

The doctor has also studied the bacilli of the plague. "The pulp of the buboes," he said, "is in every case filled with a veritable mass of short and stout bacilli, with rounded heads. Sometimes the bacilli appear as if surrounded by a capsule. They are found in large quantities in the buboes and ganglions of the patients."

Dr. Yersin concluded that inoculation of a more virulent variety of the specific bacillus would give immunity against the plague, and after first experimenting on animals he was equally successful later with human beings. These experiments, as stated in the New York Herald's dispatch from Bombay, are in the same direction as those made by Prof. Haffkine.

The conclusions drawn from a study of the spread of plague are as follows, says the London Lancet: I. Varieties: 1. The varieties of plague known under the names of (a) fulminant, (b) typical, and (c) pestis minor are allied. 2. The cause of fulminant and typical plague is a diplobacterium in the blood and tissues. The cause of pestis minor may be allied diplobacterium, but with a lesser toxic power. 3. An appropriate name for the fulminant and typical plague is "malignant polyadenitis." An appropriate name for the mild variety (pestis minor) is "benign polyadenitis." II. Infection and contagion: 1. Plague is infectious chiefly by the dust arising during the cleansing of dwelling houses which plague patients have occupied. 2. Plague is contagious by prolonged and intimate contact with the plague stricken, as in the case of a nurse carrying a child ill of the disease. III. Distribution: 1. Plague is met with in a definite area of Asia which may be termed the "plague belt." 2. That the home of plague at the present day is Mesopotamia and the countries adjacent. 3. From Mesopotamia as a focus the plague may spread northward to the Caspian Sea, westward to the Red Sea, southward as far as Bombay, and eastward as far as (Formosa) the China Sea. 4. During the present century plague has shown a western retrocession and an eastern accession of virulence. IV. The bacillus: 1. Typical plague (malignant polyadenitis) is associated with pestis minor (benign polyadenitis). 2. A bacillus of somewhat similar appearance microscopically is reputed to be found in both. 3. The bacilli differ in their toxic powers only (?). 4. A benign polyadenitis may run its course without being preceded or followed by the malignant variety. 5. Malignant polyadenitis may run its course without being preceded or followed by the benign variety. 6. The bacillus of the benign variety attains malignancy by passing through some intermediate host, possibly, but not probably, the rat.

It would not be surprising if within a month a genuine plague panic should spread through Europe, and Italy has already summoned an International Conference to meet at Rome to consider measures for dealing with the danger. The Indian mail arriving in New York has been fumigated before being assorted.

Recent Patent and Trademark Decisions.

American Cereal Company v. Eli Pettijohn Cereal Company (U. S. C. C. A., 7th Cir.), 76 Fed., 372.

Preliminary Injunction.—A preliminary injunction is somewhat in the nature of a judgment, and execution before trial, and, therefore, should not be granted except in cases of pressing necessity, and then the right to do it must be clear and the injury must be grievous. Generally, where the injury may be measured in money, the infringer or wrong doer should be shown to be pecuniarily unable to respond in damages. Hence, the trade name "Pettijohn," used in connection with certain prepared cereal foods, where the complainant's exclusive right to the name seems, upon the evidence, doubtful, will not be prohibited by a preliminary injunction.

Dickinson v. A. Plamondon Manufacturing Company (U. S. C. C., Ill.), 76 Fed., 456.

Brick Machines.—The Thomas patents, No. 315,855 and No. 375,660, and the Brewis patents, No. 324,453 and No. 395,871, must be limited strictly to the particular mechanism set forth. In them the machines operate by filling and compressing pulverized clay in plungers that approach each other by varied relative motions; hence they are not infringed by a device which, while accomplishing the same result in much the same way, is, however, mechanically different and in point of strength and durability very superior.

Seaberry v. Johnson (U. S. C. C., N. J.), 76 Fed., 456.

Construction and Limitation of Claims.—Courts are bound by the language chosen by the inventor in the statement of his claims of invention, and they do not have either the right or the power to enlarge them, even where the patentee had been really entitled to more than the terms of the claims would include. For example, in this case the patent is for an improvement in disinfectants consisting of a particular form of sulphur candle, and while in the description he speaks of a certain band as "preferably of metal," in the claim he mentions only "a surrounding band of metal." Hence he must be limited to his statement in his claim, and his patent was not infringed by a candle provided with a paper band so treated as to be incombustible.

Improvement in Disinfectants.—The Shaw patent, No. 390,314, has been construed and limited to the specific terms of the claim.

Foster v. Bent (Comr.'s Dec.), 77 O. G., 1781.

Amendment of Preliminary Statement.—In order to amend a preliminary statement, the party must present facts furnishing the same grounds for amendment as is required in modern court practice in amending pleadings. It is never proper to allow a preliminary statement to be amended as a matter of course without first showing the facts to justify it, and in considering the amendment it should not be disposed of on affidavits alone, but upon the entire record. An amendment should be permitted where undisputable facts show, beyond doubt, that a mistake had been made that would defeat justice, and where such facts, by the exercise of reasonable diligence, could not have been found and were not found earlier. Where the party did not give the preliminary statement adequate study or follow back the details in his own mind, but confused the article which he afterward made with the one he then invented, are not sufficient grounds for an amendment.

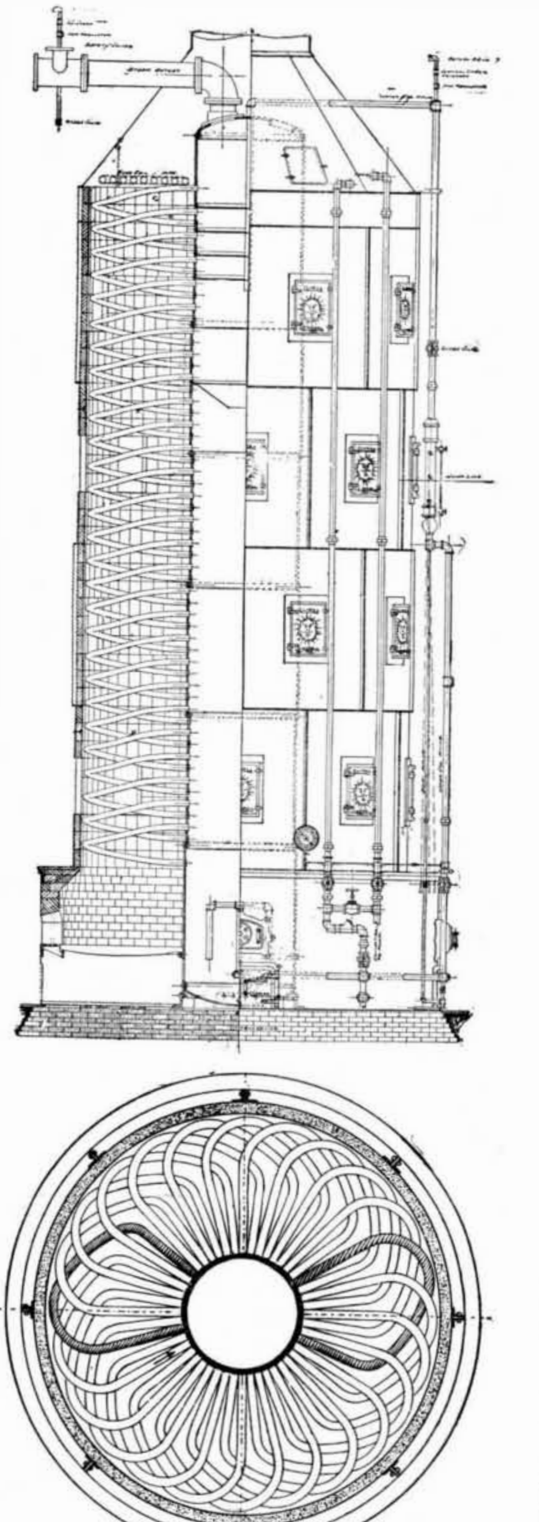
A Vegetable Pumping Engine.

This is the title bestowed upon the ordinary tree by Sir Benjamin Ward Richardson. In a recent address, quoted in Cassier's Magazine, he says: "Hydraulic engineers would be sorely puzzled to explain how the large quantity of water required to supply the evaporation from the extended leaf surface is raised to heights up to 400 feet and above. We know that the source of energy must be the sun's rays, and we know further that, in the production of starch, the leaf stores up less than one per cent of the available energy, so that plenty remains for raising water. Experiments have shown that transpiration at the leaf establishes a draught upon the sap, and there is reason to believe that this pull is transmitted to the root by tensile stress. The idea of a rope of water sustaining a pull of perhaps 150 pounds per square inch may be repugnant to many engineers, but the tensile strength and extensibility of water and other fluids have been proved experimentally by Prof. Osborne Reynolds and by Prof. Worthington and others."

A TRIO OF ONE THOUSAND HORSE POWER BOILERS.

(Continued from first page.)

cular and sixteen feet in diameter, the firebox having an outside diameter of eighteen feet. The firebox and boiler are completely inclosed in a plate steel casing which rests upon the outer edge of the concrete foundation. In the case of the Climax boilers the shell is lined with 3 inches of firebrick, and in the Columbia boiler the radiation of the heat is to be prevented by an air space inclosed within a double shell. The total height of the casing is 40 feet; and the smokestacks, which are 5½ feet in diameter, rise to a height of 80 feet above the hoods, or about 125 feet from the ground. Within the hood is located a feed water heater consisting of a coil of 3 inch pipe, with a heating surface of 150 square feet.



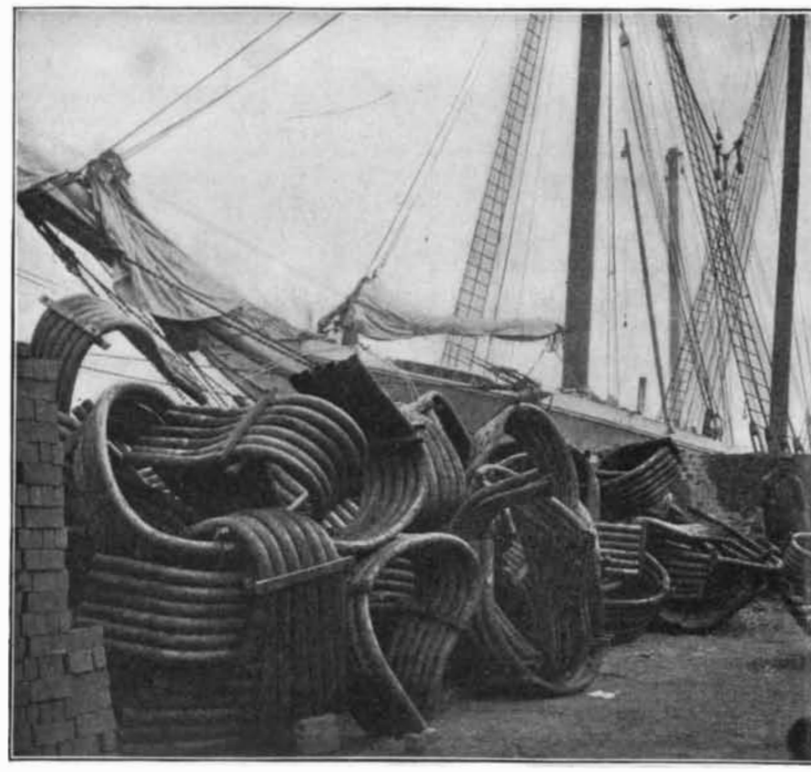
SECTIONAL VIEWS OF ONE THOUSAND HORSE POWER CLIMAX BOILER.

From the above description it will be understood that the grate is annular in plan, extending from the outside casing to the central standpipe. The total grate surface is 160 square feet and the total heating surface for the whole boiler reaches the enormous figure of 10,000 square feet. The inner ends of the grate bars are carried on a ring riveted to the standpipe, and the outer ends are carried by the outer casing. Boiler No. 2 is fitted with St. John's wire screen shaking grate, which is the invention of Mr. St. John, the vice president of the New York Steam Company. As its name implies, this grate is of the rocking type; but instead of the customary cast iron bars which form the surface of the ordinary grate, the separate units of the St. John grate consist of an outer cast iron frame which is filled in with a wire screen. The screens are of No. 8 wire, with a ⅜ inch mesh. It will readily be understood that by the substitution of wire for cast iron the total air space has been greatly increased, the average for a cast iron grate being 35 to 40 per cent, whereas it is claimed that this grate presents as high as 65 per cent of air space. The wire screen was adopted as the result of a series of experiments in which it was found that the tendency of the cast iron bars to burn out was lessened as their thickness was reduced. When the minimum thickness of cast iron had been reached the wire screen was tried experimentally and proved to be a great success. The small section of the metal and the abundant rush of cold air effectively prevent any burning of the wires. The grates burn about 26 pounds of No. 1 Buckwheat coal per square foot per hour. There are six fire doors and six ash pit doors to each boiler, and the doors which will be seen in the casing give access for cleaning the tubes.

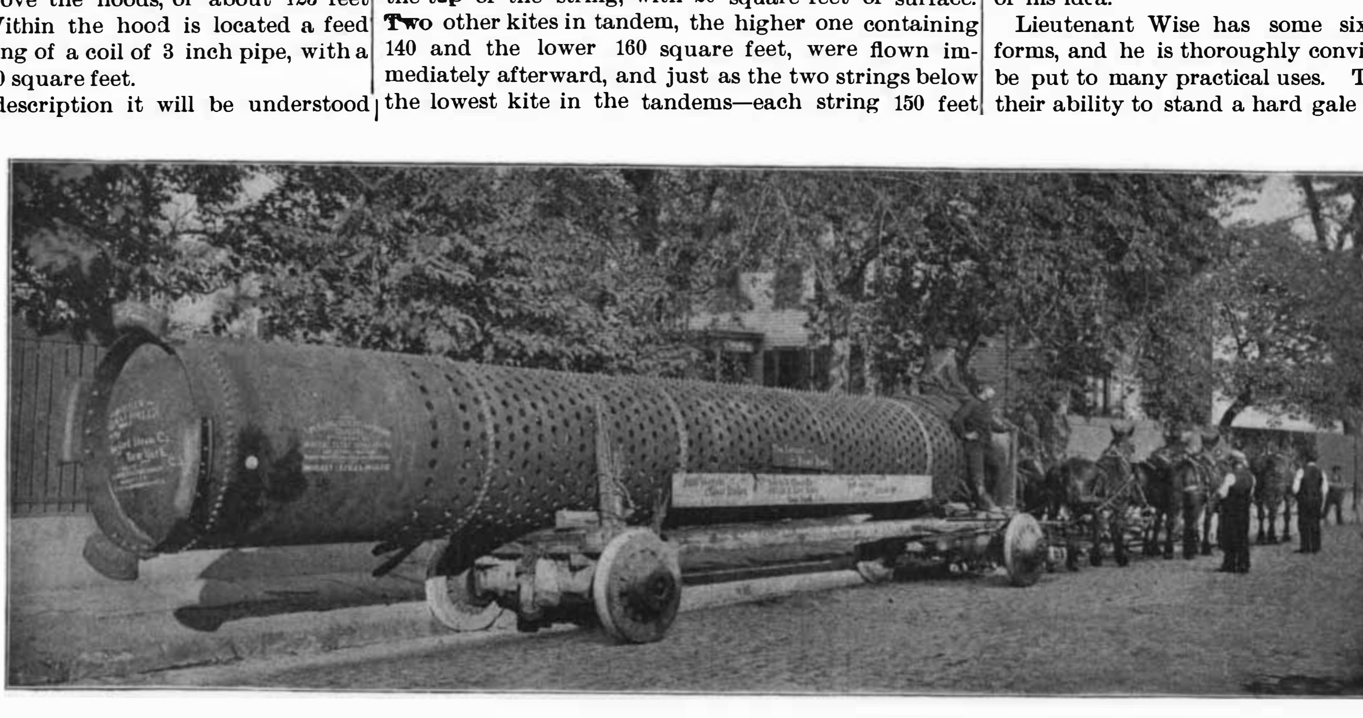
Subjoined are the results of a test of a similar boiler—Morrin Climax—recently made by Mr. G. C. St. John at the Dey Street station of the company in New York:

Length of test	5¼ hours
Amount of water consumed	193.562 pounds
Coal burned	21,280 "
Average temperature of feed water.....	139 degrees
Kind of coal used....	Shamokin No. 1 Buck
Evaporation per lb. of coal actual....	9 pounds
Horse power developed.	1,229
Evaporation from and at 212 degrees	10 pounds

For the purposes of the test the boiler was connected up to a meter, which was carefully corrected by running the water through the meter into a tank on scales. The coal was weighed to the boiler from scales which weigh all the coal that goes to the station. The quality of coal was what is known as Shamokin No. 1 "buck." On another occasion 1,000 horse power was developed on the boiler with a fire burning "rice" coal.



A SHIPMENT OF CLIMAX BOILER TUBES.



CENTRAL STANDPIPE FOR ONE THOUSAND HORSE POWER BOILER.

An Ascension with Tandem Kites.

Lieut. Hugh D. Wise, Ninth Infantry, stationed at Governor's Island, New York Harbor, made an ascension with tandem kites on January 21. This is the first ascension by kites in this country. Lieut. Wise's kite experiments have been referred to before in the columns of the SCIENTIFIC AMERICAN. The lieutenant flew four modified Hargraves kites and had no parachute, so that a fall would, without doubt, have been fatal.

The lieutenant, assisted by Corporal Lewis and five privates, put up early in the afternoon two kites, one with 90 square feet of cotton surface and the other, at the top of the string, with 20 square feet of surface. Two other kites in tandem, the higher one containing 140 and the lower 160 square feet, were flown immediately afterward, and just as the two strings below the lowest kite in the tandems—each string 150 feet long—were about to be fastened together, the spine of the 90 foot kite broke and the kite was torn to bits in the high southeasterly wind. The lieutenant had another 90 foot kite at hand and had it floated in a moment. To hold the four kites the services of four more soldiers were enlisted, making nine men in all.

A half-inch manila cord running from a massive iron windlass, made fast to a tree, was bent on to the kite lines, where they had been joined with the aid of an iron ring. To this ring was made fast a block, through which was rove 100 feet of manila rope, to one end of which a boatswain's chair was swung. The lieutenant got into the chair on what he calls the hoisting line, and two soldiers held the other end of the line, ready to send him aloft when he made the signal. The line on the windlass was let out until the block on the kite strings was about fifty feet above the earth. At that time the wind was blowing about fifteen miles an hour, but it diminished rapidly, and for five minutes the lieutenant was just barely lifted and lowered alternately by the sagging of the lines. At about four o'clock the wind became quite brisk from the southeast and lifted the lieutenant about five feet clear of the ground. He gave the signal to the soldiers to hoist away, and they did so with a will, carrying him up to the block.

The wind died down again at this time, and the line sagged so much that the lieutenant came down to within about twenty feet of the ground. He ordered the soldiers to lower away again, and he came to earth once more. The wind was acquiring a good deal more force, and the lieutenant remained in the chair and again signaled the men to haul on the hoisting rope. This time the kite strings were taut; they sagged only a foot or so even after the lieutenant had been hauled up to the block. He was then forty-two feet from the ground. The oscillation of the swing was slight, and he did not feel uncomfortable. He was a little above the eaves of the officers' quarters near by. He might have gone higher, but he did not think it essential, as he had demonstrated the practicability of his idea.

Lieutenant Wise has some sixty kites of various forms, and he is thoroughly convinced that kites may be put to many practical uses. Their portability and their ability to stand a hard gale which would destroy a balloon are all in their favor. Lieutenant Wise now enjoys the distinction of being the third man to be raised to a considerable distance in the air by kites, the others being Lawrence Hargraves, of Australia, who ascended forty feet, and Captain H. Baden Powell, who ascended one hundred feet in England.