

## Correspondence.

## The Aurora.

To the Editor of the Scientific American:

There was a bright aurora on the night of Saturday, April 23. This display is of special interest, because it is the sixth successive recurrence at the precise interval of twenty-seven days, the dates being as follows: December 9, January 5, February 2, February 29, March 27, and April 23. This period corresponds to the time of a revolution of the sun as viewed from the earth, or, in other words, a synodic revolution. Upon each of these dates, also, there was at the sun's eastern limb a disturbed area located south of the equator appearing by rotation. In like manner a record now before me shows that disturbed areas in the sun's northern hemisphere are attended by the appearance of the aurora when coming into view by rotation, but that this is the case in the autumn months instead of in the spring. Now, in the autumn the north pole of the sun is inclined toward the earth and in the spring the south pole is thus inclined, and the sun spots are invariably located within the limits of a narrow belt on each side of the sun's equator and at comparatively a short distance from it. Thus it appears that, in order that a solar disturbance may have its full effect upon the magnetism of the earth and produce an aurora, it must be in a particular location, namely, at the eastern limb, and as near as possible to the plane of the earth's orbit.

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## Patent Office Examinations.

To the Editor of the Scientific American:

Referring to your suggestions under the head of "A Proposed Congressional Resolution Relating to Patents," v. 66, p. 256, I would suggest that, as it does not appear to me that "examinations may readily be made by any skilled person" outside of Washington, or even of the examining force of the Patent Office, it being difficult to make exhaustive examinations even inside of the office, it would not be well to dispense with official examinations; but that the injury to the public resulting from delays in deciding interferences would be obviated by a law providing that, when interfering applications were ready for issue, a patent for the invention involved should be deposited in court, to date from day of deposit, and the rival claimants should prosecute their claims in court, as in the case of dispute over the ownership of money paid for condemned land or any other property deposited in court. The interests of the contestants would then be in the direction of a speedy settlement, while the public could not in any event be made to suffer by delays.

B. PICKMAN MANN.

1918 Sunderland Place, Washington, D. C.,  
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[Our correspondent thinks it would be wise, in the case of interfering applications for patents, to issue the patent and have the question of priority settled by the court. In this we agree with our correspondent. Our suggestion goes a step further. We proposed the issue of patents to all applicants, leaving the question of novelty and validity to be settled by the courts, and removing it altogether from the Patent Office. If it is desirable to do this in interfering applications, it is equally so for all applications.—Editor SCIENTIFIC AMERICAN.]

## The Fair to be Dedicated October 12.

A Congressional investigating committee visited Chicago the first week in April, and it is said its members were astonished to see the vast amount that has been done during the last few months. All but three or four of the fifteen largest buildings are under roof, and even the vast manufactures building, which covers over thirty acres of ground, is rapidly advancing toward completion. The much discussed subject of the nature of the dedicatory ceremonies next October has at last been settled, and the general features of the ceremonies, as now decided upon, are as follows:

On October 12 there will be a national salute, and, in the early part of the forenoon, the troops, both of the regular army and the national guard, will be assembled under the command of Gen. Nelson A. Miles, U. S. A., and will be reviewed by the President of the United States at 11 A. M. Immediately after the review the ceremonies proper will be held in the great manufacturers' building. They will consist of (1) a march for the orchestra, composed especially for the occasion by John K. Payne; (2) a prayer by the Methodist Bishop, Charles H. Fowler, of California; (3) presentation by the chief of construction, Mr. Burnham, of the master artists of the exposition and their completed work; (4) report by the director-general of the exposition, Col. George R. Davis; (5) presentation of the buildings to the president of the national commission by the president of the local directory; (6) vocal chorus, "The Heavens Are Telling," Haydn; (7) presentation of the buildings to the President of the United States by the president of the national commission; (8) march and chorus from "The Ruins of Athens," Beethoven; (9)

dedication of the buildings by the President of the United States; (10) hallelujah chorus from "The Messiah," Handel; (11) dedicatory oration, by Hon. W. C. P. Breckinridge of Kentucky; (12) dedicatory ode, words by Miss Harriet Monroe, music by Prof. Chadwick; (13) "The Star Spangled Banner," and "America," with grand chorus and full orchestral accompaniment; (14) national salute. In the evening there will be a magnificent display of fireworks, and the grand allegoric parade, the "Procession of the Centuries." The next day, October 13, will be devoted to receptions, military maneuvers and a grand dress parade of all the troops, with more pyrotechnics and a repetition of the allegoric "Procession of the Centuries." The foregoing programme has been approved by the national commission and concurred in by the local directors. Director-General Davis will be master of ceremonies, and Gen. Miles chief marshal. Seats in the manufactures building will be provided for all invited guests. No admission fee will be charged to the grounds on October 12, the first day of the ceremonies, until 5 P. M., after which, and during the next day, fees will be charged.

## Collecting and Recovering Waste Rubber.

BY I. A. SHERMAN.

The business of securing waste rubber and recovering it obtained its impetus soon after the expiration of the Goodyear patents. Before that time the scrap, particularly that which was vulcanized, had been burned under the boilers or thrown away. The old Hayward company made a road through a swamp of heel trimmings and other vulcanized scrap. A quantity which would now be worth many hundreds of thousands of dollars has been dumped over the docks or buried in the ground to get it out of the way. As the manufacture of rubber increased in importance, and natural competition became more severe, the price of crude rubber constantly appreciated. The inventive faculty of the manufacturer was exercised, therefore, to find various ingredients and adulterants that would make the goods cheaper. Of all the materials used in rubber compounding, none was found to be as effective as recovered rubber, and this for the simple reason that when carefully prepared it is rubber. There are those who think, in buying rubber goods, that any percentage of "shoddy" in the compound is a disadvantage. If these people were aware that mould work of the lower grades is often made of shoddy with no addition of pure rubber, they would perhaps awaken to the fact that a certain percentage of this same shoddy would be far better in good goods than would an equal or perhaps larger amount of whiting or lampblack. It is true, however, that while the amalgamation of waste rubber with pure gum is an advantage, it can reach a point where it becomes a positive injury to the goods and to the trade, and a permanent source of annoyance for both manufacturer and retailer.

The purchaser of a pair of rubber shoes apparently can see little difference between that which costs twenty-five cents and that which may cost \$1.25 a pair, and the most eloquent salesman finds it difficult to point out the difference. On the other hand, if goods were made entirely of pure gum, they would be too elastic and would draw the feet, besides being so costly that the ordinary consumer could not afford them. It is by the most careful working of waste with "live" material that the best goods are obtained at a price that any one can reach. The abuse comes in when the maker, forced by competition, allows his cupidity or embarrassment to obtain the better of his judgment and to so load the goods with shoddy that they have little or no wear. The career of the rubber car spring business is a good illustration of this sort of folly. It is acknowledged that there is no better material in the world for car springs than rubber, and to-day the railroads would be using little else had the manufacturers kept up the quality of the goods. In an evil hour, however, they began to cut prices, and to do this without loss they were forced to lower the quality of the goods. This was kept up until the railroad men became disgusted, and, as a whole, gave up the rubber spring. To-day its use is chiefly among electric men, and those who made a specialty of rubber car springs have turned their attention to other specialties.

Waste rubber is gathered in all sections of this country and also in Europe, although more is gathered in the United States than abroad. This is perhaps because the people in this country are far better shod than those in other countries. The familiar Italian in New York City, with hook and bag, who prowls around the morning ash barrel, is the pioneer in this collection of bits of waste rubber. He selects the old shoes and occasional water bottles, and sometimes a rubber waterproof, and takes them all to a junk dealer, who in turn delivers them to the dealers of higher degree. Many of the rubber mills also have quantities of vulcanized scrap that they sell to those who make the business of grinding and recovering. The wholesaler of rubber scrap classifies his goods as follows: Pure, two qualities of white, boots and shoes, springs, packing, hose, red rubber, and unvulcanized rubber. Of the scrap that is thus gathered by far a large proportion of it is

old boots and shoes. These are sorted roughly, put up in bales, and shipped to the companies who make a business of reclaiming.

Briefly described, the process of reclaiming old rubber boots and shoes is as follows: By the mechanical process the boots and shoes are thrown into a machine known as a "cracker," and are roughly torn to pieces, the workman picking out any pieces of brass that he may see. From this they go to a grinding mill with a very decided friction motion which grinds the product to a fine powder. It is then passed through an air blast to remove the fiber, and the black powder is then run over a machine fitted with a series of magnets, which removes the iron. It has been found that grinding waste rubber in water greatly increases its life, which opens up a field for interesting experiment on the part of rubber men. The black powder is next put in iron pans, run into a vulcanizer and exposed to live steam for a number of hours at a temperature varying from 400° to 600° F. The steam heat volatilizes the sulphur, whence the term "devulcanization." When the shoddy is taken out of the vulcanizer it may be put on a grinder, when it will readily form in sheets, and has very much the appearance of compounded stock that is unvulcanized. A more modern process and one that gives excellent results is what is known as the acid process. In this, instead of removing fiber by the air blast, it is destroyed by a weak acid solution in which the shoddy is boiled. Of course, for various kinds of rubber work there would be other shoddies than the boot and shoe shoddy; for example, hard rubber sawdust and turnings are used largely in hard rubber work, and pure gum is often ground to a fine powder and used in stock that is to be very springy. Pure rubber, however, cannot be easily devulcanized. There are also those who make a business of purchasing the unvulcanized scrap from rubber clothing manufacturers, soaking the cloth in benzine, peeling off the rubber, and selling it back to the manufacturers.

The business of gathering shoddy is a large one, and the transactions involve contracts of two and three hundred tons a season for a single manufacturer. Shipments are often made as large as fifty and sixty tons at a time. It will hardly be just to say that all rubber manufacturers use shoddy, for they do not. There are, however, few lines of goods in which recovered rubber cannot be used, and that, too, with a certain advantage. In no line of business is there more system than in the recovered rubber business. Practically the waste out of an ash barrel is as free as the water in the river. At the same time it costs even to collect it. After the rough work of gathering is over the steps in manufacturing are most carefully planned, and until it reaches the factory where it is to be used there is no chance for exorbitant profit in any of the processes of manufacture. So close is the competition that oftentimes the rate of freight will spoil the trade of certain factories. Taken as a whole, the business is a peculiar and not particularly pleasant but exceedingly important one.—*Rubber World.*

## Friction of Lubricated Bearings.

At the meeting of the Leeds Association of Engineers on February 25, Mr. J. H. Wicksteed read a paper on the "Friction of Lubricated Bearings," founded on the researches of the Institute of Mechanical Engineers. After describing the apparatus used, the author began the discussion of the results arrived at, which he stated confirmed the deductions drawn from ordinary practice. With careful lubrication steel shafts running in gun metal bearings at from 50 to 300 revolutions per minute would seize with the below mentioned loads: Collar bearings, 100 pounds per square inch; footstep bearings, 200 pounds per square inch; cylindrical bearings, at 600 pounds per square inch; while a pin working intermittently will stand about ten times the above pressure without seizing. In all the experiments the surface was taken as being the diameter by the length. The lecturer pointed out that in the friction of solids, the friction is directly proportionate to the load, while with liquid friction, *i. e.*, with a perfect lubrication where a film of liquid intervenes between the metallic surfaces, the friction is independent of load. The experiments showed that in a bearing with the load applied above, as in rolling stock, there was an upward pressure of more than 500 pounds, a hole being bored in the crown of the journal, and a pressure gauge inserted showing as much as 600 pounds pressure per square inch in a bearing 4 inches in diameter by 6 inches long. Thus a total pressure of upward of 6 tons was supported by fluid pressure of the lubricant, which pressure did not fall appreciably for half an hour after the experiments ceased. This film of oil would not exceed one ten-thousandth of an inch in thickness.

PROF. CHANDLER, of Harvard, has suggested that the variable star Algol—alpha Persei—owes its variability to the fact that, together with a dark satellite, it revolves round a third and central body, which is also dark, in one hundred and thirty years. The orbit of the shining star Mr. Chandler calculates to be two thousand five hundred times as large as that of the satellite.