Correspondence.

The Relative Efficiency of Engines and Boilers.

To the Editor of the Scientific American:

I am somewhat surprised at seeing the matter of the relative efficiency of engines and boilers presented for discussion by a "Consulting Engineer," as if it were an open question. The late Professor Rankine, in his "Treatise on the Steam Engine," has gone into this subject thoroughly and fully, showing clearly the immense losses that occur in the use of steam, in the most perfect engines that have yet been built, and showing, too, the requirements that must be fulfilled if greater efficiency is desired. I suppose it is generally known to engineers that the greatest losses in the use of steam do occur, and must occur, in the engine. If you will allow me the space in your valuable paper, I will endeavor to illustrate this fact by two simple examples.

In 1871 an unusually careful and interesting test of boilers was made at the American Institute, by a committee of judges. In order to determine the efficiency of the boilers, all the steam that was generated was condensed and measured, together with its temperature, and the quantity and temperature of the condensing water, in order to determine the total amount of heat imparted to the feed water by the combustion of the coal. An analysis of the coal showed the amount of heat it would have imparted to the water if it had been burned without waste, and in this manner the efficiency of one of the boilers was shown to be between 70 and 71 per cent of the total heating power of the fuel. The other boilers gave results differing from this but little. While it is probable that this efficiency was greater than would be realized in ordinary practice, owing to the skillful firing and the excellent quality of coal used on that occasion, it is not unlikely that these results have been equaled, if not exceeded, in other cases. So much for the boiler.

In 1869 there was a competitive trial of steam engines at the American Institute Exhibition. An account of this trial will be found in the Annual Report of the American Institute for 1869. It appears from this record that one of the engines developed an indicated horse power by the evaporation of 20·25 pounds of water per hour, using steam at a pressure of 81·69 pounds per square inch by gage. This performance, though occasionally surpassed, is far better than generally occurs in practice, and it may be interesting to determine what per cent of the steam furnished by the boiler produced useful effect in the engine. The feed water entered the boiler at a temperature of 47° Fah., and was converted into steam having a pressure of 81·69 pounds per square inch, so that each pound of water received 1213·1 — 47=1166·1 units of heat from the coal. The amount of water used per indicated horse power per minute was 23·25 ÷60=0·3375 pounds, so that 0·3375×1166·1=393·56 units of heat were furnished by the boiler for each indicated horse power of the engine. If all this heat had been converted by the engine into work, it would have produced 393·56×772= 303,828·32 foot pounds, or 303,828·32÷33,000=9·21 horse power. As actually used in the engine, however, it only produced one horse power, so that the efficiency of the steam in the engine was (1×100)÷9·21=10·86 per cent of the efficiency of the steam furnished by the boiler.

I have not gone into the theory of the subject, because it would occupy too much space, and the matter has already received far abler treatment than I could hope to give it, in the work by Professor Rankine, referred to above. If I might venture to make a suggestion, in conclusion, it would be that probably more profit would be derived from the discussion of improvements in the use of steam, than from arguments on a question which is only too well understood by those who are familiar with the theory of the steam engine. RICHARD H. BUEL.

80 Broadway, New York.

Administrative Reform in the Patent Office.

To the Editor of the Scientific American:

While every competent person will probably admit the immense benefit to the American people and to mankind of the enlightened and liberal principles which have always guided Congress in its relations to inventors, it is nevertheless obvious that considerable dissatisfaction now exists with respect to the administration of the patent law. For proof of this, it is only necessary to refer to the general and scientific press. In reply to these strictures and complaints, it is not a sufficient answer to say that the United States patent law is superior to that of European communities, the practical question being whether it is so administered as to carry out in the right spirit the patriotic and noble objects of its founders, such as the encouragement of genius, the promotion of arts and manufactures, the development of the national resources, and the utilization of those great natural reservoirs of power surrounding man on every side and only awaiting the vivifying force of his intellect to become the fruitful sources of prosperity. In the following remarks my only object is to offer a few suggestions for the improvement of the system of administration, and I have not the slightest wish to impute blame to any individual.

The first evil presenting itself is the temporary organization of the Patent Office. It is apparently considered as merely part of the ordinary executive machinery of government rather than as national and neutral ground from which all political considerations should be excluded. Why should not the *personnel* of the Patent Office be placed on the same footing as that of the Supreme Court of the United States? Is it not evident that the incessant changes resulting from its subserviency to the Executive of the day tend in the highest degree to impair the efficiency of Patent Office administration? It is always found that men appointed for a lengthened period, independently of party or political considerations, will get through more work and do it infinitely better than those who feel insecure in their official position. For such highly qualified officers the present salaries appear to me inadequate.

The first point, then, in Patent Office reform would be to reduce the number of employees, and to substitute a few highly qualified, well paid, permanent officials for a crowd of temporary, half paid, half satisfied, and half competent men and women, selected chiefly through political influence, and seldom having had any suitable previous training for the duties which they are called on to discharge.

In connection with the permanency of the officers should be the permanency, as far as practicable, of the rules guiding the transaction of business in the Patent Office. As it is at present, there seems to be an utter absence of any permanent principles regulating the granting or refusal of patents. The rules of this year may be quite at variance with those of last year or next year, and inventors on applying for patents, after expensive and laborious investigations, may find themselves ousted by some recent edict of the temporary head of the Patent Office. To revert again to the analogy of the Supreme Court of the United States, how could its business be satisfactorily carried on, if, instead of well considered, well understood rules, founded on reason and experience and principle, its suitors from all parts of the Union had to encounter a mere chaos of personal caprice, reflecting the ephemeral fancies of an amateur *pro tempore* dispenser of justice?

Then, with respect to the rejection of applications for patents, what can be more unjust and burdensome to inventors than to cast on them the *onus* and costs of appealing to the superior officers of the Patent Office against the possibly erroneous, ignorant, or inequitable decisions of the inferior examiners, when all these officers are already paid out of the fees of inventors? As a general rule, it will always be found that the needless multiplication of tribunals of appeal is practically a denial of justice to the mass of the community, for it tends to make length of the purse and not goodness of the case the all important consideration. And in a rejected application, to constitute that expensive series of successive tribunals out of the various grades of the bureaucracy of one and the same office is certainly a most curious mode of encouraging invention. A single crotchety or incompetent primary examiner may thus at present really obstruct the progress of a whole range of industries, and so directly defeat the objects of Congressional legislation on this subject. Such a man may see in the most recent steam engine simply a reproduction of the principle of the æolipile as it existed 2,000 years ago; or may find in the most improved lamp or stove only the same process of combustion known of old to the vestal virgins. The fact is that, in considering an application for a patent, something more than mere expertism, as it may be termed, is required in the examiner. He should not only be acquainted with the laws of science, but also be capable of discriminating between the relative claims of individuals and the essential features of their respective plans. But the records of the Patent Office show clearly that many of the primary examiners and some of the examiners in chief have given decisions subsequently pronounced by their superior officers erroneous and unjust. Why then is there not, in the regular machinery of the Patent Office itself, suitable provision for the equitable settlement of such cases, instead of casting the burden of appeal on individual inventors?

It is evident from these facts alone that one of two results ought to follow: Either all applications for patents complying with certain simple conditions should be granted (a course advocated by so high an authority as the SCIENTIFIC AMERICAN), or before any application is rejected the adverse decision of the primary examiner should be revised and confirmed by the judgment of the superior officers, and that revision should be, not as at present on technical points indicated by the examiner appealed from, but on the substantial merits of the invention.

As it is at present, no sensible man who could possibly avoid doing so would apply for a patent for his invention; he would rather be disposed to try to secretly manufacture the article or carry on the process. Many improved chemical processes are indeed already kept secret in consequence of the inadequate protection afforded by patent laws. For in making his application, the inventor discloses all that he may have learnt from his studies and trials; the information is henceforth no longer his own exclusive property, and possibly all that he would now receive from the Patent Office in return would be a permission to institute a series of appeals to the consecutive officials constituting it, at an expenditure of time, trouble, and money, which might be more usefully employed. The appealing part of the patent law, as it now exists, is therefore obviously a source of injury rather than of benefit to the inventors, and should either be changed or abolished. I believe that these principles of Patent Office reform, fairly and fully carried out, would conduce to the interest of the best officers of that important national institution, while they would at the same time benefit inventors and harmonize, more intimately than the present practice, with the known intentions and desires of every American statesman from the time of Washington.

A PATENTEE.

An Accidental Discovery.

To the Editor of the Scientific American:

About two years ago, I heard that phosphide of calcium, thrown upon water, would take fire instantly but not being able to procure it, I postponed the experiment. I afterwards found that I could make it by distilling phosphrous over red hot chalk in a covered crucible; as I had no earthen cover for the crucible, I substituted a copper dish, which contained red lead. When the chalk was heated to almost a white heat, I dropped the phosphorus in by degrees until I had used half an ounce, to 3½ ounces chalk, keeping the fumes in the crucible and letting the whole stand till cold I then tried to produce a light by throwing some on water, but it would not ignite. I put the remainder of my phosphide of calcium(?) in a phial, and forgot all about it till a few weeks ago. I went to my chest, and, on closing it, I heard a sweet ringing tone within. I opened it again and searched for a bell. I was certain I had no bell in that chest, but I looked until I got the old crucible lid: and as I threw it aside, it gave another clear ring, and I discovered that, instead of making phosphide of calcium, I really produced a new phosphor bronze without fusing the copper. It is of a dark bluish cobalt color.

Reading, Pa. W. H. RODGERS.

Curious Instance of Atmospheric Refraction.

To the Editor of the Scientific American:

I witnessed, in the month of May, 1852, at Crystal River Bay, West Florida, a phenomenon of which I will give you the best description I can.

Being in the habit of taking observations whenever opportunity offered to obtain correct time, and thereby (having the latitude and longitude of the place) ascertaining chronometer error rate, etc., I took observations, every thing being clear in the west, and with good results. The sun's altitude was 10° or 15°. As the sun approached the horizon, I used my spy glass; and when the sun's lower limb was a little more than one of his diameters above the horizon, his reflected image appeared in the water. When within a little less than a diameter, both the sun and reflected image commenced to elongate towards each other; and when within a semidiameter, they joined together. When the sun's lower limb reached the horizon (as near as could be seen), a perfect conglomeration took place and spread out at least two diameters, looking like molten iron, too dazzlingly bright to look on for any length of time with the naked eye or a common spy glass. Then, as the sun descended below the horizon, the size and brightness diminished until it finally disappeared, which did not seem to be until the upper limb was considerably below the line of horizon. At the last, occurred the change of color from pale red to purple, blue and bluish green. These observations continued from May 8 to May 28, 1852, covering twenty days, with like results, with one exception, which was when sunset followed a tremendous thunder shower which occurred about the middle of the afternoon. At sunset the line of horizon was as well defined as I ever saw it, and the sun's contact as readily discovered.

This clearing up of the air by the thunder shower satisfied me that the cause of this phenomenon was, in a great degree, density of the atmosphere, but not wholly, or the same would often occur in other localities. I do not remember ever seeing the same elsewhere, though I have often taken sundown observations in various places.

Stratford, Conn. TRUMAN HOTCHKISS.

The Utilization of Coal Dust.

To the Editor of the Scientific American:

I notice several articles in your journal on the preparation of slack or waste coal for fuel, and would suggest a plan for its preparation, especially applicable to this great North west, where coal is dear and corn cheap:

Grind very fine one half bushel of corn, boil it in one barrel of water until it is like prepared starch. Mix it with one tun of fine coal dust in a mortar bed; as soon as it is stiff, cut it out, and pile under cover to season. As a fuel, this cannot be beaten.

Stellapolis, Iowa. RICHARD LONG.

The Canal Navigation Problem.

To the Editor of the Scientific American:

I should suggest that the New York Legislature grant the right of way, on both sides of the canal, to a company for building and operating a railroad which shall, during the season of canal navigation, tow all canal boats at the prices now charged by horse towing companies. During the suspension of navigation, the company should be allowed to carry freight, making it wholly a freight route during the year. I think there should be a company formed as soon as the Legislature grants it the right of way. The railroad could be built very cheaply, as there would be no grading, at least upon the tow path, and very little on the heel path.

I think that steam power in a vessel cannot be made to compete with the horse power on the tow path. A strong man on the tow path, with tow line over his shoulder can move a heavily loaded boat at a good speed; but put the man in the water to swim with the tow line, and how much will he move? The same principle holds good in the horse and steam power. Two horses on the tow path will move a loaded boat, carrying 200 tuns of freight, 2½ miles per hour; to accomplish the same speed by power acting in the water, you have to use about 20 horse power. The difference between the power to propel a boat acting on the land or upon the water is too great to allow steam power in the boat to compete with horse power used upon the tow path.

Geneva, N. Y. W. B. D.

Friction Gears.

To the Editor of the Scientific American:

I once wanted to run two lathes from a drum on the water wheel shaft, which was 8 feet in diameter and 10 inches on face, lagged up and turned off in the ordinary way. There was no space to use a belt to any advantage, and cog gearing would have been very expensive, as well as making a disagreeable noise; so I built a wooden pulley by taking scraps of plank, 6 inches wide and 10 inches long; I cut them diagonally, making each piece full width at one end, the other being brought to a sharp point. I formed a circle in this way, by putting all the sharp points to the center. The pulley was 20 inches in diameter, and 12 of the pieces formed a circle, allowing for jointing. The first section can be laid down on a face board, such as pattern makers use; the second course can be put on by halving the joints, using nails or glue; but glue is best. The joints should be broken alternately. Building pulleys in this way takes much less plank than in the usual way; besides, it brings all the wear on the end grain of the wood; it wears equally; there is no side grain to cut out as is the case with a pulley built in the ordinary way, and you can use up small scraps of wood. Now for the result. I built such a pulley 20 inches diameter by 10 inches face, turned it off smooth and hung it on a line shaft. I arranged it so that I could attach it to or detach from the drum at pleasure. The drum made 10 revolutions a minute. I ran one of my lathes up to 1,760 revolutions a minute, without a belt or cog wheel, and with no noise.

B. N. C.

REMARKS BY THE EDITOR.—This is a good, practical method of constructing friction wheels, not novel but probably not generally known.

Preventing Collisions of Ships at Sea.

To the Editor of the Scientific American:

It seems to be more dangerous now than ever to go to sea, as vessels are so much more numerous, and sailing so much faster causes a great increase of danger. Is there not a remedy? I think there is. I believe the Ville du Havre and Loch Earn might still have been afloat if they had been provided thus:

Put a chain of the same weight as the anchor chain round the ship outside, supported by iron brackets with rings in the ends of them to pass the chain through and keep it in place. These brackets or chain supporters should be 18 inches long and from 1 to 4 feet below the main deck, according to size of ship, and about 8 feet apart. Large passenger steamers might have two such chains, one 1 foot below the main deck and the other 4 feet below it. Such ships, in colliding, would have to break or pass through the chains before making holes in each other's sides. Level with main deck, have two beams, running out from 8 to 15 feet beyond the cutwater, one on each side of cutwater, 8 to 12 inches in diameter, so constructed that, when they come against a vessel or any outside object, they would yield and spring back slowly to within a foot of cutwater.

F. JAMES.

A New Theory About Comets.

At a recent meeting of the Lawrence, Kansas, Academy of Science, a paper entitled "Speculations on the Nature of Comets' Tails" was read by Professor F. W. Bardwell, who took the ground that a comet's tail is no more a part of the comet than is a shadow a part of the object which gives it form. He supposes that the resisting medium surrounding the sun for a great distance is itself self-luminous in a degree, as indicated by the zodiacal light; that the nucleus of a comet is merely a large meteorite; that in its rapid motion through the resisting medium near the sun, great heat is thereby developed, increased by the heat of the sun, causing some of the elements of the nucleus to become volatilized, and thus to present the phenomena of the coma with its glowing gas; and, finally, that the bright train called the tail is merely an effect of an increased luminosity of the portion of the resisting medium behind the comet, caused by the action of the sunlight and passing through the glowing gas of the coma, and projected beyond in a form usually approaching that of a conical surface. He predicts that, on the appearance of a comet with a bright train, the tests of spectrum analysis will show that this train is not nebulous, as Bessel and others have supposed, and not of a meteoric character like that of the nucleus, as Schiaparelli and Le Verrier suppose, but chiefly of a zodiacal nature, and probably, in a slight degree, reflecting sunlight.

Car Coupling Dangers.

T. W. H. says: I know by experience that the danger of coupling cars can be almost entirely avoided by care on the part of the engineer. I have seen engineers (or rather men who had charge of engines) "get mad", as the expression goes, in coupling cars, and send the cars together with such fury that no man living could attempt to make the connection with any kind of safety; herein lies the danger. Many brakemen pride themselves on coupling cars when they are sent back too quick for any safety to life and limb, to say nothing of the injury to the cars and drawheads. Yet they make the attempt, though warned by the conductor that they could not make the coupling. Once, when I remonstrated with an engineer for his reckless backing up, he replied: "I am in a hurry." Note how he succeeded in gaining time. He drew ahead and backed three times before the connection was made; whereas, if he had come back first time as a sensible man should have done, the connection would have been made with time to spare. Whenever you see a large number of broken drawheads round the car repair shops, you can be assured that somebody has been in a hurry.

I. P. W. says: "I have in my possession a live fish which has the body and tail of a dog fish and the head of a cat fish. Its habits are those of a cat fish, sleeping in the day time and waking at night. I presume that it gets this habit from the head. It is clearly a hybrid of the two kinds. Here is something for the development theory."

Probable Cause of the Destruction of Boiler Tubes.

Dr. J. S. Kidder, U. S. N., communicates to *Van Nostrand's Eclectic Engineering Magazine* a paper pointing out the probable cause of the destruction of boiler tubes, and describing experiments which show the deterioration or pitted condition, of those portions of the generator which are immersed in the water, to be due to the action of oleate of copper. The presence of this substance is accounted for by the decomposition of the olive oil, used in lubricating the piston, into oleic acid and glycerin, a sufficient frictional heat being raised to thus act upon the thin film of oil between the surfaces. In the condenser, the brass tubes are exposed to the powerful comminuting impact of steam at a high temperature and pressure, and this substance is thus finely divided and placed under the most favorable circumstances for union with the free oleic acid which the steam brings with it. Oleate of copper is then formed in the condenser, and appears in bright green, greasy masses which are carried from condenser to boiler. A quantity of this substance, settling upon one of the iron boiler tubes and adhering thereto, causes both a deposition of copper and absorption of iron. Being insoluble, its action is confined to the surface of contact, hence the small holes characteristic of this kind of injury. Copper, however, it is found, will adhere only to perfectly smooth iron, and since boiler tubes are never in this condition, each deposit is quickly removed and a fresh iron surface continually exposed.

Selden's apparatus, mentioned in the report of the Engineer of the Navy as a preventive of this difficulty, consists in a long iron box fitted with a steamtight cover and placed between condenser and boilers. The box is divided into compartments by diaphragms of felting, pervious to water, and the compartments themselves are filled with coke. In referring to the placing of alkalies in this filter, Dr. Kidder remarks that soda is of questionable advantage, and that lime is theoretically the best, but then only when used in connection with a fresh water boiler.

At Hecker's mills, the condensed water, after leaving the filter, is treated with atmospheric air forced through it from below. The resulting water is perfectly free from taste or odor, and quite palatable. It seems possible that the hitherto insuperable difficulties in the way of freeing condensed water on shipboard from a certain unpleasant empyreumatic odor, may be overcome by similar treatment.

A New Mode of Marine Propulsion.

Mr. John T. Bowman, of Dallas, Texas, favors us with sketches and description of an ingenious and quite novel mode of propelling vessels, which he has lately contrived but does not propose to patent. An opening is made through the cutwater of the ship under the water line, whence, by a suitable conduit, a large stream is allowed to pass to two athwartship revolving blades, which are modeled in form and arrangement after those constructed inside the Root blower, and which are situated in a suitable inclosure in the forward portion of the hold. From this casing, and leading aft, are three passages, one extending downwards, at an incline, to the keel, and the others leading to each side of the ship. Suitable valves are arranged, whereby the water drawn in by the blower may be diverted into either passage, so that by this means the vessel may be drawn ahead or steered in either direction at will.

The Emerson Stone Saw.

We are informed that one of Messrs. Emerson, Ford, & Co.'s stone saws, 28 inches in diameter, carrying 14 steel chisels, making 22 revolutions per minute, recently cut lengthwise through 9 blocks stone each measuring 4 feet $6\times10\times10$ inches. The saw cut 1 inch ahead at each revolution = 1 foot per minute. The 9 blocks were cut in 87 minutes, being 28 feet of linear cutting and 56 feet of surface. The machine was driven by a four inch belt from a 12 inch pulley. A fresh set of chisels was inserted for each block, the time occupied in changing being two minutes for each shift. The chisels weigh 200 to the pound, and cost half a cent each. The cost of splitting the 9 stones was $1.50, power included. The stone was a hard, sharp gritted sandstone, much used in Pittsburgh for building purposes; and 45 cents per superficial foot is paid for hand dressing the same stone.

Much Butter from Little Milk.

The recipe for making a pound of butter from a pint of milk, says the *Inter Ocean*, is as follows: Take four ounces pulverized alum, ½ ounce pulverized gum arabic, and 50 grains of pepsin; place it in a bottle for use as wanted. A teaspoonful of this mixture, added to the pint of milk, will, upon churning, make a pound of butter. It is true that the butter will seem to be a near relation to pot cheese, but call it butter and that will make it so. This recipe is selling through the country for from $1 to $5; and as we give it without charge, it may considered as equivalent to the chromos of our religious contemporaries.

The Hours of Labor.

"One who is not afraid of work" writes to say that men who are idle during a day of eight hours will be equally so if the nominal time be ten hours, and that a compulsory lengthening of a day's work will not cure the dilatory or indolent workman. We believe this to be true; and we desire for every man the right to work as long as he likes. If he is healthy and sober, and has a family to support, ten or even twelve hours may not be more than he can do. At all events, he should be allowed to do it if he chooses, without fear of unions or other forms of petty tyranny.

PROFESSOR DANA states that, during the Helderberg era, the Connecticut valley was a wide coral growing sea, separating eastern from western New England.

Burning Bricks with Non-Explosive Oil.

An old subscriber states that the saving in burning by this method is not less than 33 per cent. One hundred dollars worth of oil will burn 60,000 hard burnt, beautiful, facing bricks, and 40,000 hard burnt ordinary bricks, giving a brick equally burnt from top to bottom. End, side and heart of the whole pile all present the same hard burnt, beautiful looking bricks. There is no smoke, neither is there any soot or dirt arising from the fuel during the process of burning by this method: but one continual heat from the beginning until the bricks are sufficiently burnt. After the "water smoke" has passed off the bricks, the heat is regularly increased to any pitch which may be required; and in 48 or 50 hours, a regular, equalized, high pitch of heat is obtained, sufficient to melt cast or wrought iron if required, with little or no loss in burning, producing a hard unshaken brick, imperishable in water or atmosphere, and proof against change of temperature.

But in order to make a brick of this character, it must be borne in mind that all does not depend on the manner in which the bricks are burnt, whether with wood, coal, gas or oil. To make a brick proof against the changes of temperature, the first thing to be done, after it is ascertained that the material of which the brick is to be made is of the right quality, is to dig and cast up loose, in the fall of the year, as much stuff as it is intended to make into bricks in the following season, in order that the rain, snow, frost, thaw, and atmospheric air may decompose and mature every particle possible, and prepare it, ready for the tempering machine in the forthcoming spring.

Bricks, whether of clay or clay loam, prepared in this manner and burnt with non-explosive oil, are vastly superior, as to quality, beauty, and durability, to bricks made of immature raw material. There being neither smoke dust, nor soot entering the kiln during the process of burning, the bricks, when taken from the kiln, have the appearance of newly planed small blocks of wood.

This method of burning bricks and other clay articles is most certainly destined to revolutionize the whole system of burning clay, throughout the whole of the United States.

Fletcher's New Low Temperature Burner and Foot Blower.

We have previously had occasion to notice some of Mr. Fletcher's improved appliances for the production and application of heat from gas. The "new low temperature burner," by the same inventor, seems likely to be not less widely appreciated. It gives a range of temperature varying, at the will of the operator, from a mere current of warm air to bright redness, and so perfectly under control that it may be advantageously used for drying, for prolonged digestion and evaporation, and a variety of other operations. It is considered likely to supersede to a great extent hot air baths, water ovens, sand, oil, water, steam, and solution baths—apparatus which are all, from well known reasons, more or less objectionable. We learn, in proof of the regular and equable character of the heat, that a common glass bottle may be placed on the tripod above the wire gauze at the top of the apparatus, and heated to any temperature that may be desired without the risk of breakage. When very low temperatures are required, below or not much exceeding the boiling point of water, the gas is lighted through the aperture in the side of the furnace, and burns below the wire gauze. If a red heat is wanted, the light is applied above the wire, where the gas burns with a clear blue flame. By means of a specially adapted "blast tube," the temperature can be raised to a bright yellow heat, bordering upon full whiteness, being regulated by the respective quantities of air and gas supplied. The "foot blower" is an improved bellows which may be used with any kind of table blowpipe or laboratory blast furnace; it appears convenient for working, well arranged, and not likely to get out of order.—*Chemical News.*

The Proposed Great Telescope.

J. T., of Jersey City, writes to suggest that the great telescope should be a reflector. "I believe it to be possible to construct a reflector, of from 10 to 15 feet diameter, of the regular speculum metal, or to silver and polish a speculum of that size after the manner of Foucault. It should have a focal distance of not less than 150 feet, and be mounted without a tube. I have myself successfully tried this way of mounting a reflector. It was first suggested by the celebrated Dr. Dick, who made many different kinds of reflectors. The speculum could be worked at one end by clock movement, and the eye piece at the other by separate clock work, each end being kept as steady as possible and without either tube or any connection between them. The eye piece should be fixed right opposite the speculum, on what is called the front view system. There would thus be very little light lost. I should be glad for such a gigantic reflector to be attempted; and although of small means, I will give $25 towards it."

The Detection of Blood Spots.

M. Sonnenschein employs, for this purpose, tungstate of soda, strongly acidulated with acetic or phosphoric acid, which throws down albuminoid matters from very dilute solutions. These precipitates, insoluble in a large excess of water, dissolve in alkalies, especially if hot. If defibrinated blood is treated with this salt, a red brown precipitate is formed, which becomes clotty on boiling. All the coloring matter is thrown down. To detect blood spots by this means, on clothing, etc., the suspected portion is cut off, and, after having been treated with distilled water, the filtered solution is precipitated with the above reagent. The precipitate, washed and treated with ammonia, takes a reddish green coloration. If phosphoric acid is present, it must be carefully washed away before treating the precipitate with ammonia.