

IMPROVED CIRCULATING GENERATOR FOR STEAM BOILERS.

The principal advantages claimed for the invention here-with illustrated are a large saving of fuel, the rapid generation of steam, and increased durability of the boiler. The engraving shows the brick wall on one side of the setting broken away so as to give a clear view of the circulating apparatus and other parts underneath, and attached to, an ordinary horizontal boiler. D is a riveted steel drum placed on a brick bridge wall, which is lowered so as to allow the top of the drum to be of proper height in relation to the grate and opening for the products of combustion. Through pipe, N, the water passes from the bottom of the boiler into this drum, where it is converted into steam and superheated water to a temperature higher than that in the boiler, to which it returns with great velocity through pipe, H. A constant circulation is maintained and the formation of scale over the furnace thus prevented. Besides the gain in evaporation, which is a very important feature, there is also another advantage in having lime and other impurities in the water pass into the drum.

The peculiar arrangement of pipes, G and H, is such that impurities cannot return to the boiler, but can be blown out through pipe, F, or if necessary, altogether removed by means of the hand hole, E, which is placed at end or back of drum as may be necessary. In the rear of the drum, and extending to the back connection wall, is placed a coil of heavy lapwelded pipes, A A, which rests on bearers let into side walls; this coil is connected with the boiler at back end by pipe, P, and at the top by pipe, J; it is also connected with the feed pump by pipes, M O, and their branches. A deflecting wall resting on a heavy iron bearer is also built under and close to the boiler at the back end, as shown in the engraving. The combustion of gases ignited in the furnace is maintained the entire length of the boiler in the coil chamber. When the flame strikes the deflecting wall it passes through the openings between the coil pipes and returns backward through the tubes in the boiler. The feed water for the boiler enters this coil from the heater in use or in a cold state, by pipe, M, and in its passage to the boiler, which is very rapid, it becomes heated to a temperature ranging from 250° to 300°.

To preserve the coil from any liability to burn, as well as to secure circulation from the back of boiler, a connection is made by pipe, P, with a pipe leading to coil, and an ingeniously constructed swing check valve, invented by the patentee of this circulating generator, is attached to this pipe. This valve is partially open when the feed pump is operating, and the water from the boiler unites with the feed water, raising the temperature of the latter to nearly boiling point before it enters the coil. When the feed water is stopped the check valve opens wide, giving unobstructed passage of the water from boiler to coil, through which, by its increasing temperature, a rapid circulation to the boiler is maintained. By opening valve, K, the coil can be cleaned. (We are informed, however, that there is no liability to clog even where this precaution is neglected, so rapid and continuous is the circulation.)

The manufacturers state that the device causes a greatly increased power of boiler, "a gain of over fifty per cent being shown in some cases, due to the perfect consumption of fuel and the utilization of heat, by which an evaporation of twelve pounds of water to one pound of coal is frequently attained." The circulation is claimed to be continuous, giving equalized temperature, even expansion, and contraction and freedom from scale deposit; also rapid loosening of scale if formed in a boiler previous to the generator being attached. It is further claimed that there is additional security against explosion, inasmuch as the feed water can never enter the boiler when fired, except at a temperature almost equal to that of the water already in the boiler. It has been found, we are told, that the temperature of the feed water sometimes exceeds that of the water in the boiler. Patented in 1876 and 1877. For further information address the Ironclad Manufacturing Company, of 52 Greenpoint avenue, Greenpoint, L. I.

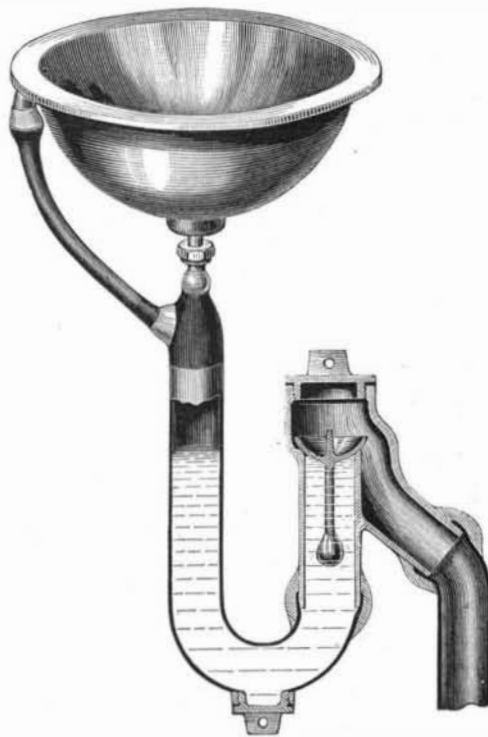
The Star Finder.

Under this name a handy astronomical chart, or planisphere, with a movable horizon, has been published by Van Nostrand, of New York city. It exhibits the stars of the first three magnitudes which are visible on the parallel of 40° north latitude, and shows the boundaries of the principal

constellations. The chart furnishes beginners with a means of approximately solving a number of problems without calculation, it being simply necessary to adjust the movable horizon according to the date and hour, to determine the right ascension, declination, rising, meridian passage, or setting of any of the principal stars. To locate the planets, their positions are found by reference to an almanac.

IMPROVED SEWER GAS CHECK VALVE FOR STATIONARY WASH BASINS, ETC.

Sanitary engineers seem to be recognizing a fact which is becoming more and more apparent, that very much of the ill health and disease prevalent in cities and towns is attri-



WARING'S SEWER GAS CHECK VALVE.

butable to defective drainage and imperfect sewerage. Physicians, also, testify now far more frequently than formerly that small pox, typhoid fever, and diphtheria are the consequences of uncleanness, breathing air rendered impure by the emanations of sewer gas, and the presence of effluvia from sinks, garbage, and decomposing refuse. There is no theory or mere imagination about such statements. The evil is at our very doors, in our homes, and all around us. No matter how many "modern improvements" are introduced or what attention is given to insuring warmth and comfort, in public buildings, business offices, and private residences, if provision is not made to prevent the admission of sewer gas, the air in that building is rendered impure and poisonous; it becomes injurious to health, and will steadily undermine the vitality and vigor of the strongest constitution. This evil, which is by far too common, can be remedied by property owners, landlords, and builders

gas, siphoning, the transmission of sewer gas through the water, and all obnoxiousness. The engraving shows a wash basin, with the ordinary outlet and overflow pipes. The valve and water seal are drawn in section. The valve is convex on its exterior seat, concave on the surface exposed to the gas that may issue from the waste pipe leading to the sewer. The interior area exposed to the back pressure of gas is larger than the area in contact with the water seal, therefore, the valve is kept well down to its seat and prevents all possibility of gas escaping through the water to the apartment. The bulb steadies the valve, tends to maintain it in a vertical position, and weights it down on its seat. By removing the cap directly over the valve, the latter can be examined at any moment with the least possible trouble. This invention makes it absolutely safe to have any and all basins, baths, etc., that may be desired in any part of a public or private building. The check valve is water tight and steam tight; always stands tight shut except when escaping water opens it. It would be a protection against the escape of foul air into an apartment even if there was no water in the pipes, and it may be very properly considered a self closing door of a soil pipe, opening as it does at the least touch to let out, and permanently and hermetically closing against all admission of, foul air and sewer gas. This excellent contrivance may be seen at the Jennings Sanitary Depot, the address of which is given above.

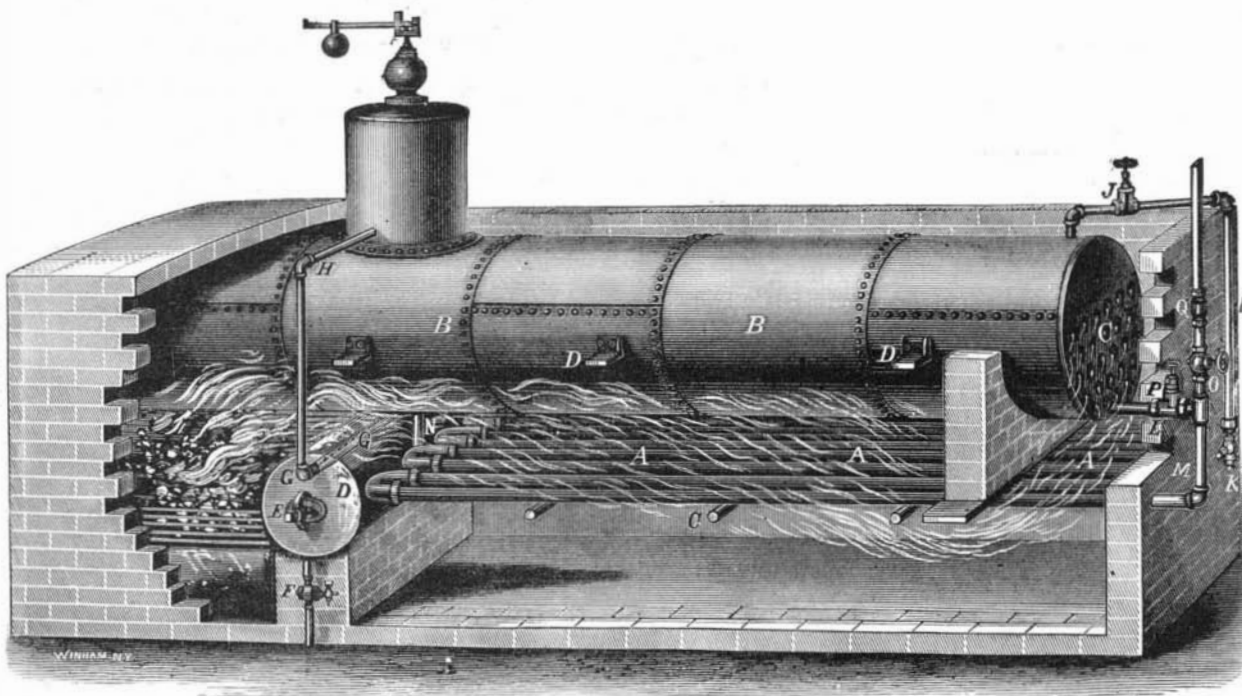
Elias Magnus Fries.

By the death of this eminent scientist has been extinguished one more bright star from the galaxy of botanists that have shed such a luster on Sweden.

Fries was born at Smaland, Sweden, August 15, 1794, and was consequently, at the time of his death, which occurred on the 8th ult., eighty-four years of age. His father, a clergyman, was an ardent and accomplished botanist. As there were no boys of his own age whom young Fries could make his companions, he became the constant companion of his father on his botanical excursions, and hence at an early age acquired a fondness for the study of botany, and soon made himself master of the diversified flora of his native place. At about the age of twelve he came across a large and exceedingly brilliant toadstool—a species of *Hydnum*—and was then first incited to the study of the *Agarics* and their allies, that abound in Sweden more than in any other region of Europe. Before he had left school at Wexio he knew, and had given temporary names to, nearly 400 species. Entering the University of Lund, in 1811, he had for his preceptors the celebrated botanists Schwartz and Agardh. In 1814 he was made Docent of Botany, and shortly after published his "*Novitia Florae Suecicae*," first part, the second following in 1823. The first important result of his researches in fungology appeared in 1815, under the title of "*Observationes Mycologicae*." Dissatisfied with the method of Persoon, he began, the following year, to construct a system of his own, which, developed in his great work—the "*Systema Mycologicum*," 1821–1829—has been universally adopted by cryptogamic botanists, and remains in use to the present day. His other great works on the fungi are "*Systema Orbis Vegetabilis*" (1825), and "*Epicrisis Systematis Mycologici*," which appeared in 1838, and was supplemented in 1874 by a second edition. In 1831 was issued his large work on

another order of cryptogams—the lichens. In 1834 he was made Professor of Practical Economy at Upsala; in 1847 he became a member of the Swedish Royal Academy, and in 1851 succeeded to the Chair of Botany at Upsala, which he resigned only a few years ago to his son.

The works of Fries are written, as all like works should be, in Latin, and are thus made available to students of every nationality. Fries displayed most wonderful tact in the discrimination of genera and species, and based all his descriptions on external characters. He displayed a singular prejudice against the use of the perfected microscope, and refused to avail himself of its use up to the time of

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adopting sanitary measures, and availing themselves of suitable and reliable contrivances for its prevention. One of the most recent inventions, which is neither complicated nor costly, but effective and valuable, is that invented by Colonel George E. Waring, Jr., of Newport, R. I., sanitary engineer, and is manufactured at the Jennings Sanitary Depot, A. G. Myers, Manager, 94 Beekman street, New York. Of this we give a representation by the annexed engraving, on reference to which it will be seen that the contrivance is a perfect safeguard against pressure of sewer

his death. Corda, Kunth, and other German fungologists, having, on this account, criticised some of his work, his annoyance manifested itself in a refusal to publish the manuscript of a "*Synopsis Ascomycetum*," in which he had included some 600 new species.

All the latter years of his life he lived at Upsala, in good health and in constant correspondence with botanists of this and other countries. It is a curious fact that his death occurred at the same place as, and but a few weeks beyond, the centennial anniversary of that of his great predecessor Linnaeus.

Up to within a short time previous to his death he was still engaged to the extent which his advanced though vigorous age permitted, in the study of the *Agarics*, which had been a favorite one from his youth. The persistent energy of this venerable worker is a fresh instance proving the truth of the common saying that students of nature and of science always die in the harness.

IMPROVED NUT LOCK.

We illustrate this week a simple, inexpensive, and easily adjusted nut lock.

It is hardly necessary to state that mechanics in all branches of labor have long been troubled with nuts jarring or shaking loose. By this device all trouble from this source is at once obviated. Its merit arises from a simple adaptation of the property inherent in all metals in a cold state, whereby by pressure they conform to the shape of a mould constructed of a substance harder than the metal compressed. A nut prepared as indicated in the engravings can be locked, unlocked, and relocked without removing it from its bolt, and if, by reason of shrinkage in the material bolted, it is necessary to tighten a nut, it can be done, and the nut relocked at will.

For carriages, sleighs, and vehicles of all descriptions, for agricultural implements and locomotives, for car trucks, looms, and machinery of every kind, to securely fasten lag bolts and fish plates, in fact, wherever a nut is used or can be used, there this device can be applied, and as the soft metals used (copper and tin and their alloys) are not readily oxidized, these nuts can be employed where there is a continued or intermittent submergence in salt or fresh water without injury. If desired, the nuts are so prepared that after locking the surface of the soft metal will be flush with the upper face of the nut; this form is for use where unshrinking substances are to be bolted together, and the nut is unlikely to be required to be unlocked. The nuts are prepared for locking, and can be used or not at will, the hole through the nut being countersunk at both ends, thus preventing the soft metal from unintentional displacement.

Fig. 1 represents a nut with a vertical hole through it, filled with soft metal, to be driven into the serrations of the washer.

Fig. 2 represents a carriage bolt and nut, with a horizontal hole through the nut, filled with soft metal, to be driven into the notches in the thread of the bolt.

Fig. 3 represents a portion of material bolted, serving as a washer, the locking in this instance being effected, as shown, upon the head of the bolt.

Fig. 4 shows a cross section of a bolt and nut, with a soft metal plug extending through the nut; the end of the hole adjacent to the washer may be more or less countersunk, and thus a larger or smaller bearing may be had on the washer, as desired, without weakening or injuring the nut. The merit this lock nut possesses lies in these facts, that nothing is required externally to convert ordinary nuts into lock nuts, and that the device can be applied to bolts, washers, or nuts wherever in use, at a trifling cost. Nuts, bolts, or washers prepared under this patent for general or special service can be furnished in any quantity desired, and any further information will be given upon application to Daniel Cushing & Co., Metal Workers, Lowell, Mass. Patented December 11, 1877.

Communications.

A New Motor Wanted.

To the Editor of the Scientific American:

The recent Barclay street explosion brought out a list of similar occurrences, all of which go to establish the simple fact, that finely divided matter of the combustible sort, when intermingled with air in certain proportions, forms an explosive that only requires ignition to demonstrate its power. This hitherto inutilized motive agent, if properly developed, may perhaps be made available in one way or another.

It is not unreasonable to suppose that wood and various kinds of combustible refuse, when reduced to impalpable powder, might be utilized in an engine of special construction, contrived to introduce into an explosion chamber a certain quantity of the powdered combustible and air.

We are all familiar with the gunpowder engine, the gas engine, and the more recent hydrocarbon engine. These are examples of the successful application of explosives to the propulsion of machinery, and we see no reason why wood and other combustibles, instead of being burned under boilers, should not be reduced to the proper state and exploded in a suitable engine, so as to be available as a source of power.

It remains for our inventors to develop and bring out this motive agent, and to devise a motor adapted to its use.

GEO. M. HOPKINS.

Proposed Change in Locomotive Strokes.

To the Editor of the Scientific American:

In the SCIENTIFIC AMERICAN of March 9 and March 30, 1878, I notice articles on "Locomotive Strokes," by Messrs. F. G. Woodward and John A. Holmes. As to Mr. Woodward's suggestion, permit me to state that there would be no advantage whatever gained by his proposed change. The

work, in foot pounds, performed by any steam engine in a given time is obtained by multiplying together the mean pressure per square inch on the piston, the area of piston in inches, and the number of feet traveled by the piston in the given time.

For example, if we assume a 16x24 inch cylinder, with a mean pressure on the piston of 40 pounds per square inch, the work performed per stroke is $40 \times 201.0624 \times 2 = 16,085$ foot pounds. Now, it can be readily seen that the proposed change would simply result in dividing the above product by 2, and at the same time multiplying it by 2, which would leave the amount of work per stroke unaltered. Of course the time required for one stroke of the piston must be the same in both engines, as we have assumed above, otherwise the power of the two engines would not be the same. On the other hand, there would be the objection of increasing the wear on the piston in consequence of its increased travel.

C. A. SMITH.

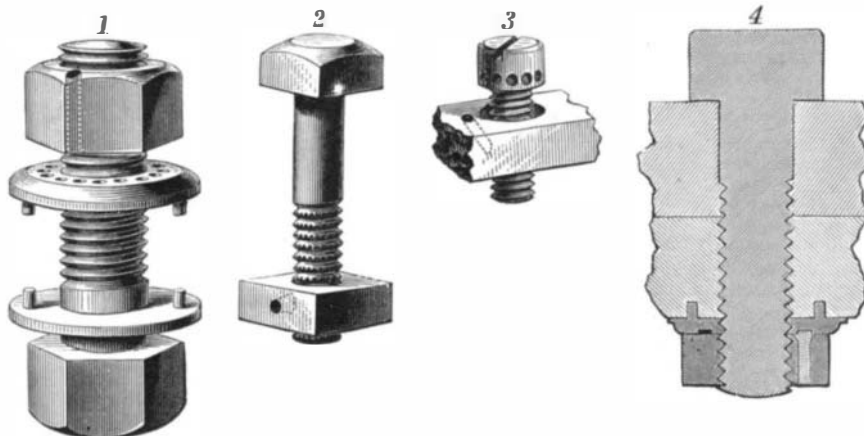
Columbus, O., March 27.

Cinders in the Eye.

To the Editor of the Scientific American:

I have often tried the remedy of putting flax seed in the eye for cinders, as suggested in your last issue, and have often found it efficacious, but too slow. I never knew the seed to cause irritation. They are inserted more easily when the patient is lying down or has his head well back, and must be put under the upper lid, else they will fall out. Another method, which I have never seen used by any one else, but which I suppose is used, is to fill a small sharp nozzle syringe with warm water, raise the upper lid from the ball, point the syringe under the lid at the outer corner, and shoot a jet toward the inner one. This is usually very effective.

A third way, common with medical men, can be easily practiced by any one. Let the patient look down (having



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the head thrown back), and let a person standing behind him turn the lid over a pencil or any small instrument; a nail will do. The offending substance is at once brought to light, and can be removed with a bit of cloth. Rest and a soothing wash usually complete the cure. Substances imbedded in the cornea or sclera are, of course, subjects for surgical treatment.

H. G. CHASE, M.D.

New York, March 28.

New Inventions.

An Indian Club, invented by Mr. E. M. Folk, of Brooklyn, N. Y., is of the ordinary shape externally, but has in its larger end a cylindrical chamber, in which are fitted a series of removable weights, held in place by heads and spring bolts.

Mr. F. M. Smith, of Vermilion, Dakota, has patented a device for Catching and Carrying Hogs, which consists of a cage having a detachable bottom, sliding end panels, and transporting handles.

An improved Specie Purse has been patented by Mr. J. C. Rundlett, of Portland, Me. It is made of flexible material, has a deep pocket for containing coin, and a shallow pocket which folds over the deep pocket, and has a space between the two pockets for exhibiting the contents.

An Automatic Fire Alarm, the invention of Mr. J. M. de Célis, of New York city, has a spring-acted arm carrying a button, which makes electric connection or otherwise rings a bell or explodes a gun, and which is retained by a block of wax, tallow, or other material melting at a certain temperature.

A Steam and Fume Box, invented by Mrs. E. Delong, of Stone Church, Pa., is intended to be placed on the top of a stove to collect the steam from cooking vessels, preventing the steam and odors from escaping through the house, and keeping the food warm after being cooked. It is provided with sliding doors at the top and sides.

Mr. W. H. Savage, of Kingston, Ontario, Canada, has invented an improved Brush Bridler, formed of an adjustable metallic band, clasping the brush by means of hooks fitting into slits, and having straps suitably secured to the plate which rests upon the brush head.

Mr. F. H. Trenholm, of Charleston, S. C., has patented a Cart Body, constructed so as to prevent the contents from being lost or stolen. It is furnished with a cover hinged at its forward end, and at its rear end provided with a hasp, which passes over the tail board and is secured by a staple at the bottom of the cart body. The tail board is in two

parts, and is hinged in such a manner as to give access to the top, bottom, or sides of the body, as desired.

An improved Cigar Package, designed to retain the flavor and moisture of cigars under all circumstances, has been invented by Mr. Pierre Cauhapé, of New York city. It consists of hermetically sealed and moisture-proof envelopes or capsules of gelatinous material, preferably a mixture of gelatin, honey, and gum arabic.

Mr. W. A. Miller, of Rigdon, Ind., has patented a Wash Boiler in which a continuous circulation is maintained by means of an adjustable and perforated central tube, which conveys water and steam from below a false bottom and projects them upon the clothes.

An improved Animal Trap has been invented by Mr. J. A. Palmer, of Noble, Ill., by which each animal killed is removed from the trap, and the trap automatically reset. A revolving arm, actuated by a spring, delivers a blow upon the head of the animal in such a manner as to eject the latter, and a drop pawl resets the trap until the spring has run down.

Mr. E. Wilson, of Otto, N. Y., has invented a Spring Back for Vehicles, which is capable of being adjusted as to the height and tension of the supporting springs. It consists of a second back supported on adjustable side spring arms, and on C shaped rear springs, which admit, on being turned, the raising or lowering of the back.

An improved Kitchen Table, invented by Mrs. Josephine Bliss, of Primghar, Iowa, has a number of boxes with hinged lids arranged along three sides, and a moulding board fitted into the space between the boxes. Sliding grates are arranged at each end, and drawers below the table.

Mr. G. H. Gerken, of New York city, has made certain improvements in the construction of Windows, intended to permit cleaning the sashes without removing them or necessitating reaching outside of the window. The sashes are centrally pivoted to end strips, so as to be turned on the pivots, and the joints of these end strips with the sashes are covered by hinged face strips.

A new form of Oil Stove, in which a number of original details are introduced, has recently been patented by Mr. H. L. Howse, of Sacramento, Cal. The manner in which air is led to the wick tubes is claimed to insure steady combustion and prevent the flame from being affected by cross currents.

An improved Heating Drum, for supplying a constant current of warm yet pure air to rooms, has been invented by Mr. W. A. Swaren, of Robinson, Ill. The air chamber has a series of alternating shelves, through which the air circulates, being admitted at a side opening and conducted upward to the registers. The passages for the smoke and gases of combustion are separated from the air chamber, but so arranged as to heat the air chamber effectively.

Improvements in the Running Gear of Wagons, for the purpose of obviating the strain caused by passing over uneven roads, are the subject of a patent recently issued to Mr. Wm. Ulrich, of Madison, N. J. The forward axle is made with rounded projections having a V shaped slot, into which enters the square lower part of the king bolt, thus permitting the axle to tilt without affecting the cross bar of the fifth wheel and the head block.

Mr. A. C. Fuller, of Middletown, N. Y., has patented a new Hat Folding Device, for producing hats known to the trade as "telescope" hats. It consists of metal bands, a receiver or die, heated by steam, and a rubber block operated by a follower, in an ordinary press.

An improved fastening device for Hat Mirrors, by means of which the mirror may be readily attached to the inner surface of the crown of any hat, has been invented by Mr. F. J. Hoyt, of New York city. A plate cemented to the back of the mirror has a boss, in which is a countersunk screw hole for receiving a screw which fastens the mirror to the hat.

One of the Highest Mountains.

According to recent geographical surveys, it seems that the Aconcagua Peak is the loftiest of the Andes range, and the highest in America. It is 100 miles east of Valparaiso, and nearly in latitude $32^{\circ} 30'$ south. Its actual height is not accurately known, but the measurements made by M. Pissis and other noted scientists make it reasonably certain that the elevation is between 22,400 and 23,900 feet above the waters of the sea. The French explorer made it 22,422, or four miles and 1,302 feet over, which would be 998 feet higher than the snowy summit of Chimborazo, as Humboldt measured the latter, when in 1802 the great German made his famous ascent of that mountain with Bonpland to a height of 19,286 feet. Aconcagua, seen from the Chilean seaport of Valparaiso, is shown only as a peak, towering above the other heights of the Andes at a distance of 100 miles or more inland, toward the sunrise. Aconcagua has been called an extinct volcano, but the best examinations yet made of its summit do not appear to bear out that idea. The recent observations make the height of the Chilean mountain 23,200 feet, and "probably" over that figure. The elevation of Mexico's highest mountain—Popocatepetl, or "Smoking Mountain"—is nearly 5,000 feet less than that of the Chilean peak, and Mount Shasta and Mount Hood fall short to about the same figure. Pike's Peak is about 9,000 feet lower than Aconcagua.