An Interstellar Resisting Medium.

O. Backlund recently made a brief report to the St. Petersburg Academy on his investigation of the hypothesis of a resisting medium in space, from which the *Naturforscher* extracts the following:

Encke's hypothesis of a medium filling interstellar space has met with no serious opposition from scientific men. Encke himself thought that it received strong confirmation from the theory of the comet that also bears his name. Asten, who has continued the theory of these comets since 1848, advocated Encke's hypothesis, and believed that his results offered a still stronger proof of the correctness of the hypothesis. Encke first found that the periodic time of the comet referred to decreased by time proportional to the square of the time, and he proposed this hypothesis: Interstellar (or interplanetary) space is filled with some substance that gravitates toward the sun, and its density decreases inversely as the square of the distance; it therefore offers resistance to the motion of the heavenly bodies, which is proportional, to the square of their velocity. It can be proven mathematically that such a medium must cause secular as well as periodical disturbances in their mean motions and eccentricity, but only a periodical one in the length of the perihelion. The period of the periodical disturbance agrees with the orbit, but such a medium has no effect on the inclination of the orbit or on the nodes.

Since Encke only took strictly into account the disturbance that took place in its mean motion, and did not investigate the periodical members of this disturbance, the theory of the comet named after him afforded no proof of the correctness of the hypothesis; for, if we are to adhere to the existence of a resisting medium, an infinite number of suppositions can be made concerning the properties of this medium, all of which shall fulfill the requirements mentioned.

An essential limitation of the possible number of hypotheses has been established by Asten's investigation, inasmuch as he independently deduced the secular disturbance in its mean motion and eccentricity from the observations.

The results of my investigations regarding this resisting medium are of a negative character, and can be summarized as follows:

As yet the treatment of the theory of Encke's comet has really proved nothing regarding the existence of a resisting medium in space.

If any one should succeed, on any hypothesis whatever, in explaining the increased mean motion, and the decreased eccentricity, during the interval between 1819 and 1848, so simple a hypothesis will not suffice to explain the course of the comet of 1865, inasmuch as the mean motion has very probably changed since that time. After the phenomena from 1865 to 1881 have been fully worked out, and their relation to former phenomena ascertained, it will probably be impossible to find out the nature of the hitherto unknown forces acting upon comets.

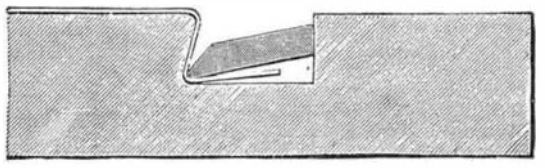
Petroleum's Surprises and Disappointments.

The history of the discoveries in the oil fields in this country has been one of a series of disappointments to the producers. From 1866 to 1872 the price per barrel averaged from $4 to $5, and the producers were making money rapidly. Then the field in Butler County was struck, and from that day to this the production has been greater than the consumption. Before Butler had begun to decline the Clarion field was opened. Then came the Bullion pool with its 2,000 and 3,000 barrel wells, which forced the price down to $1.50. This field was soon exhausted, and better times for the producers were at hand, when the Bradford field, the largest in extent ever known, was opened. For nearly five years the Bradford field increased its production, until it had a daily out-put of over 100,000 barrels. The consumption was not over one-half this amount, and, with the Standard Oil monopoly squeezing the producers, many of them went to the wall. Then Bradford began to decline, and again a silver lining was seen in the cloud; but again disappointment came. In May, 1881, the first well was struck in Allegany County, New York, and a new field was opened which soon more than made up for the decline. In the spring of the present year the Allegany field showed that it had passed the climax and was on the decline, and again the producers looked forward to the near future when the consumption would equal the production. Then was the great "646" mystery struck, and with it followed disaster to the owners of wells generally, and lower priced oil than since the summer of 1874, when for a short time it sold for 45 cents a barrel. Where the next field will be is only a matter of conjecture.

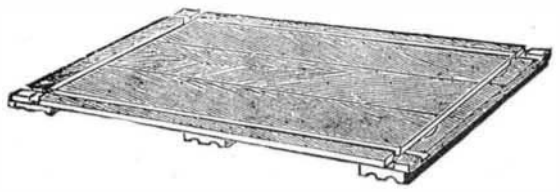
The only time when the excitement over a new oil field was as great as that now reigning in the Cherry Grove district was in 1865, when the Pithole fever took possession of the public. The first well was opened there in May of that year. In less than two months Pithole was a city of considerable proportions, and within six months it had 8,000 inhabitants and almost as large a floating population. At the pinnacle of its greatness it had fifty hotels, some of them palatial and gorgeous, and one of which cost $80,000. It had miles of streets lined with banks and all kinds of business establishments. A $50,000 transaction was considered of small account, and, miscalculating the future of the place, wealth was squandered on new enterprises which in the minds of its citizens promised fabulous fortunes; but Pithole was only a child of six months' growth when it began to exhibit symptoms of an early decay, and it declined almost as rapidly as it sprang up. The *Tribune* correspondent visited Pithole the other day and found only one voter living in the place. The railroad was long ago torn up, and most of the houses were torn down. Two of the streets are still open, and beside them remains a pitiful scattering of old houses in the last stages of decay. Fields of corn and oats stretch over the streets and squares where once were gaudy theaters and dance-houses, gorgeous saloons and mammoth hotels. When the oil fever was high a half acre of what is now waste pasture-land was sold at a rate equivalent to $100,000 an acre. Over on the hill still lives old Mr. Copeland, who in 1865 refused an offer of $700,000 for his farm. Two years later he would have taken as many cents. He still owns it, and his daughter teaches school and supports the family. In all this there may be a lesson for speculators at Garfield to-day.—*N. Y. Tribune.*

DRAWING BOARD PAPER HOLDER.

The accompanying engravings show a very neat and ingenious device for stretching and holding drawing paper on drawing boards without the use of glue or pins. It avoids the necessity of the frequent cleansing of the board by washing, planing, or scraping, accompanied with their attend-



ant "messing" and loss of time; it also prevents the roughening of the board by the accumulation of pin holes. It is exceedingly simple, consisting only of four rectangular channel grooves, each furnished with a thin lath of hard



wood placed at an angle. The paper when mounted is firmly secured, and cannot lose its grip, as from the angular position of the laths they act as a powerful circular wedge against the paper by the contraction of the latter in drying. In mounting the paper, it is first wetted on the board in the usual way, and a piece ⅝ in. square is cut out of each corner; its edges are then placed over the grooves equally all round, and pressed down into the bottom corner of the inner side of the grooves with the beveled narrow edge of the laths; the latter is then turned over till its other —angular—side rests against the outer side of grooves near the top, forming an angle downward to the bottom inner corner. The paper in contracting by drying, draws the lower beveled edge of the laths upon a radius from the outer angular edges into a gradually narrowing space in grooves, thus acting as powerful circular wedges against the paper, firmly fixing it against the inner side of grooves, and are jammed tighter in proportion as the paper contracts more. The paper is gripped close to the edge, and a drawing can be made on to it within ⅝ in. of the edges of the standard sizes of the paper. Tracing cloth or paper can be mounted on the top of the drawing paper in the same way, by taking each lath up separately, refixing the same on the top of tracing paper in the same manner. In mounting both the paper and tracing paper, the two ends should be done first, then the two sides. Finger holes are provided behind the laths for the purpose of taking them out when required.

The Fossil Trees in the National Museum, Washington.

The Smithsonian Institution has received from Fort Wingate, New Mexico, a car load of curiosities, including portions of two stone trees, one from the neighborhood of the Fort, the other from the banks of the Lithodendron, 20 miles from Navajoe Springs, Arizona.

For these massive specimens the museum is indebted to the thoughtfulness of General Sherman, who, while crossing the continent in 1878, suggested to Colonel Swaine, then in command at Fort Wingate, the expediency of securing them.

Acting upon this suggestion, an expedition was organized early in the spring of 1879 to proceed to the Lithodendron (stone trees) in Arizona. Thomas V. Kearns, a gentleman of long residence in that part of the country, and familiar with the locality to be explored, kindly volunteered his services, and success was, in a great measure, due to his efforts in carrying out the wishes of the General. The military detail consisted of Second Lieut. J. T. C. Hegewald, one sergeant, and twelve soldiers, all of the Fifteenth United States Infantry, and the party was well supplied with army wagon running gears specially arranged for hauling stone, and with tools and appliances complete.

In his report of the expedition Lieutenant Hegewald says that the Navajoes, who were pasturing their sheep about the head waters of the Lithodendron, thought it very strange that the "Great Father in Washington" should want some of the bones of the "Great Giant" their forefathers had killed years ago when taking possession of the country, the *lava beds* being the remains of the blood that ran from his wounds. Specimens by thousands were found on each side of the valley of the Lithodendron, there about half a mile wide. Along the slopes, which were perhaps 50 feet high, no vegetation whatever was to be seen; wood being very scarce, the soil was composed of clay and sand mostly, and the petrifactions, broken into millions of pieces, lay scattered all adown the slopes. Some of the large fossil trees were well preserved, though the action of the heat and cold had broken most of them in sections from 2 to 10 feet long. Many of them must have been immense trees; several which Lieutenant Hegewald measured were from 150 to 200 feet in length, and from 2 to 4½ feet in diameter, the centers often containing beautiful quartz crystals.

Only one of the two specimens obtained from the Lithodendron by Mr. Kearns and Lieutenant Hegewald was forwarded to Washington. In the place of the second one brought in from the locality of the Lithodendron, a better specimen was found on the Mesa, to the north of and adjacent to Fort Wingate. The specimens had to be hauled to Santa Fé, New Mexico, to be shipped by rail.

New Progress in Telephony.

A new advance has been made by this remarkable instrument. Mr. Van Rysselberghe has just devised a new system of telephone differing very sensibly from all those known. The arrangement and details of the apparatus have not as yet been made known to us, but the following result of some experiments that have just been made with it are communicated to *La Lumiere Electrique* by Mr. F. Geraldy:

The system had first been put in operation on the line from Brussels to Ostend, but its inventor, desiring to experiment with it to a greater distance, has just tried it between Paris and Brussels. . . .

Through the kindness of Mr. Van Rysselberghe I was permitted to be present at the experiments on the 17th of May. I ascertained that conversation between Paris and Brussels was easy, that articulation was clear, and that it was not necessary to speak loud, but only in a clear and distinct voice—that, however, being required by the telephone.

Such a result, were it the only one obtained, would doubtless not be absolutely new, for our readers will recall the experiments at great distances with the Herz system, that we have had occasion to describe. Various attempts of this nature have been made with more or less success, but we may say that that of Mr. Van Rysselberghe has succeeded better than any that has been tried. But that is only one feature of the system.

The inventor has bestowed his attention on a means of overcoming that terrible enemy of the telephone, induction. On this subject, I recall anew the studies made by Mr. Herz, on a means of employing the condenser in telephone lines as a preserver as well as receiver. The process employed by Mr. Van Rysselberghe has some points of contact with those experiments, while very sensibly differing from them. Mr. Van Rysselberghe, by an ingenious detour, instead of guarding against induction on the telephone line where it produces its injurious action, endeavors to prevent its occurrence by suppressing it in the lines on which it is produced. To this point we shall hereafter return more in detail. He has experimented, however, only imperfectly at Paris, where there was no time during these first experiments, designed only as a study, to provide all the prejudicial lines with preservative apparatus. The partial experiments have, however, sufficed to prove the efficacy of the process on telegraph lines.

From the combination of these two measures (I mean the improved telephone, and induction overcome), Mr. Van Rysselberghe has derived an unexpected and striking result; for he has succeeded in putting upon the same line, and in causing to operate at the same time, a Morse telegraphic apparatus and a telephone I have seen these apparatus work at the same time, and it is beyond dispute that they do not perceptibly interfere with one another, the double transmission being effected without any difficulty. At the first trial, which took place on the 16th, there were transmitted simultaneously to Brussels two dispatches. The telephone dictated one (which it is unnecessary to reproduce here), while the telegraph was registering another (and entirely different one). These two dispatches were at once sent to their address. It should be remarked that they passed at ten minutes past eight in the morning, that is to say, after the work of the office had been resumed, and when inductive actions were already very energetic. We shall study more at leisure the processes employed by Mr. Van Rysselberghe, but it has seemed to us well to call attention to these beautiful experiments at once after their occurrence.

Manufacture of Chemicals.

The report of Special Agent Rowland shows that during the census year there were 1,349 establishments engaged in the manufacture of chemicals, with an invested capital of $85,486,856, and giving employment to 29,500 hands, about 1,500 of them women and girls. The wages paid amounted to nearly $12,000,000; the materials used cost $77,344,281, and the total value of the products was $117,407,054.

The more important products were: fertilizers, $ 9,921,406; soaps, $20,365,599; dry colors, $4,086,821; white lead, $8,770,699; glucose, $4,551,212; sulphuric acid, $3,661,876, stearic acid candles, $2,281,600; nitroglycerine, $1,830,417.