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THE NEW TELESCOPE IN THE PARIS OBSERVATORY.

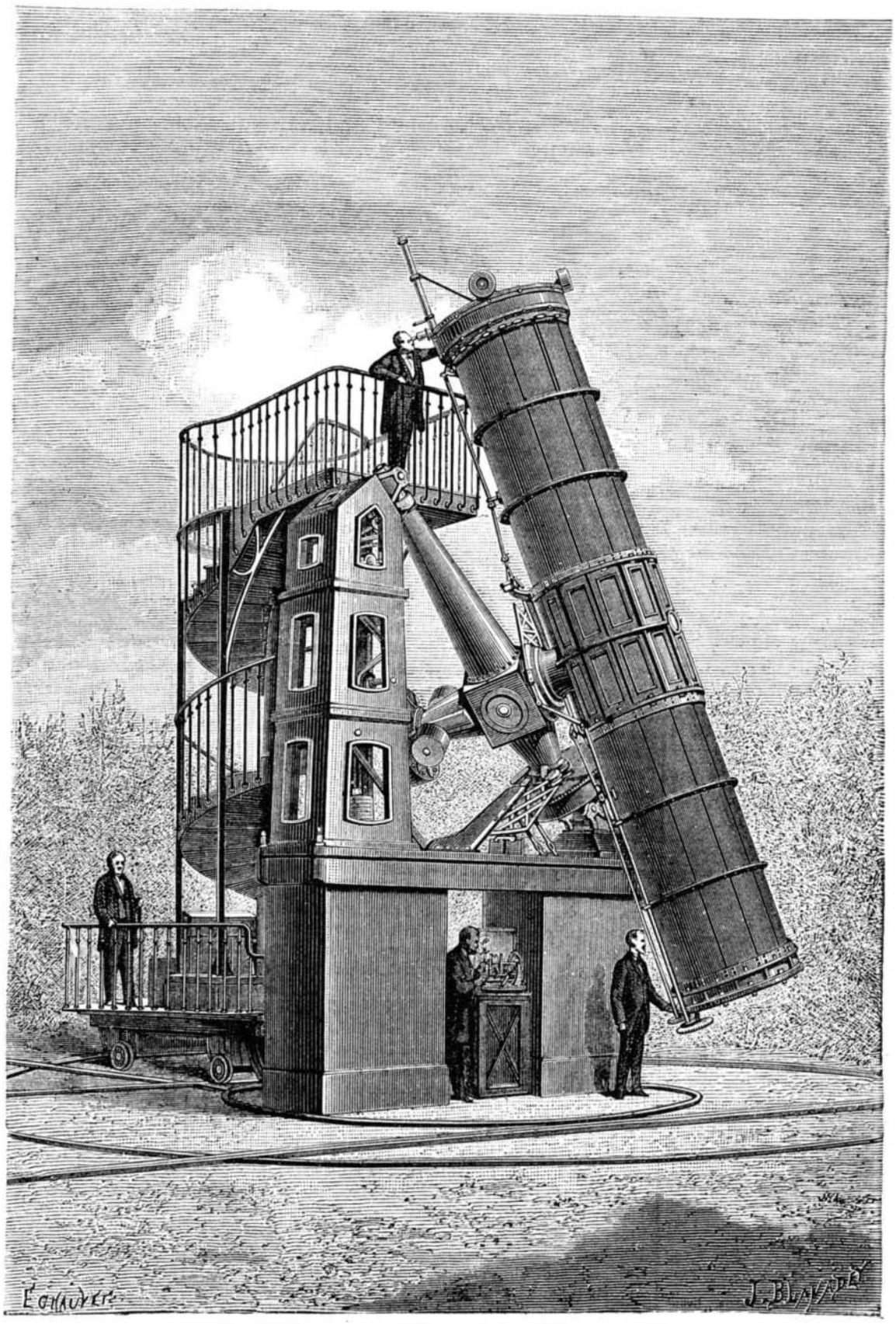
An immense reflecting telescope, equaling in size the similar instrument located at Melbourne, Australia, has lately been constructed under the supervision of M. Leverrier, at the Observatory at Paris, France. The reflector, which is 46·8 inches in diameter, is mounted in a tube 23·3 feet in length, which is composed of a central cast iron cylinder. to the extremities of which two smaller tubes, 9·6 feet long each, are secured. The end tubes are formed of four rings of wrought iron connected by 12 longitudinal bars of like material. The whole tube is covered with thin sheets of steel, and weighs 5,280 lbs. At the lower extremity is affixed the cast iron barrel which holds the reflecting mirror; at the upper end a circle, movable on the open orifice of the telescope, supports a plane mirror which reflects sideways the cone of rays previously reflected by the large glass, and directs them into the field of the eyepiece.

It will be seen from the above that the telescope is constructed on the Newtonian system, and differs from the Melbourne instrument in that the latter is built on the Cassegrainian plan. The weight of the huge reflector in its barrel is 1,760 lbs., and the eyepiece, with its accessories, aggregates the same. The poising of the mass is so perfect that even in the most unfavorable positions the mirrors are exactly concentric, and not the least deflection is perceptible. For the accommodation of the observer a carriage running on rails, as shown, is used, which supports a lofty balcony. The latter is sufficiently elevated to allow easy access to the eyepiece, which can be adjusted at any point around the orifice of the instrument.

The equatorial mounting turns on an axis of cast iron and steel, the direction of which is parallel to the axis of the celestial sphere. The telescope can be inclined more or less on this axis by turning around a second steel axis, which traverses the first at right angles, and participates in its movement of rotation. The two axes taken together are a marvel of mechanical accuracy. With the telescope they weigh 22,000 lbs., and yet so perfect is the machinery that the great tube follows the movements of the heavenly bodies, in obedience to the regulation of a chronometer, with as much certainty and delicacy as move the hands of the timepiece itself.

The optical portion of the telescope is as perfect as the adjusting mechanism. Both mirror and eyepiece are faultless, and the former, it is stated, reflects fully nine tenths of the light received. With an instrument, therefore, uniting in itself so many highly important advantages, it may be hoped that valuable discoveries will be made.

M. Wolf, the well known astronomer, to whom has been confided its care, proposes to begin with the study of the planets and their satellites, with the view of investigating many unsolved questions relative to the rotation of the worlds furthest removed from our own; and at the same time, an extended series of spectroscopic and photographic studies of the fixed stars will be prosecuted.



THE GREAT TELESCOPE AT PARIS, FRANCE.

Treatment of Horses in Winter.

A writer in the Baltimore *Trade Review* is of the opinion that horses that have been in the habit of running in the pastures during the summer suffer very much during the winter, for the want of green food to which they have become accustomed. They give evidence, he says, of this by the loss of appetite, by becoming hide-bound, and losing the glossy appearance of their coats. When the coat of an animal loses its gloss and assumes a dry, dull appearance, it is a sure indication that that animal needs green food or medicine capable of supplying the place of green food. Green food is much to be preferred, for an animal in such condition, to medicine for two reasons, partly because it is cheaper and leaves no bad after effects, and partly because it is better, being the remedy provided by Nature, and Nature is always more skillful than art in providing natural remedies for natural evils, just as a genuine diamond is of more value than any paste imitation. A couple of carrots, chopped up very small and mixed with the feed of horses, has upon them a very beneficial effect. They are slightly cathartic, and, given two or three times a week to horses standing in stables during the winter, they keep them in good condition, supply to a great extent the need of green food, increase their appetite, and prevent their coats from becoming dry, dull, and hard. Horses are very fond of them. When the weather is dry and not very windy, horses that are not much used should, in town, be taken out for exercise daily, and, in the country, should during the day be allowed to run at large in the fields, or they will become cramped and stiff from long standing.

Decreasing Flow of Rivers.

The Vienna Academy of Sciences is occupied with a question which concerns all Europe—the decrease of the quantity of water in springs, rivers, and water courses. A circular, accompanied by a very instructive report, has been addressed to the scientific societies of other countries, inviting them to undertake observations which, in time, may yield useful results. The Academy calls attention to the fact that during a certain number of years there has been observed a diminution in the waters of the Danube and other large rivers, especially since the practice of felling forests has become common. The Austrian Engineers' and Architects' Union are also occupied with this question, and have appointed a hydrostatic commission to collect facts and prepare a report The Danube, the Elbe, and the Rhine have each been assigned to two members, while two others will be occupied with the metereology relating to the same subject and with the influence that glaciers and Alpine torrents may exercise on the general result. The commission considers the question urgent, and recommends the immediate adoption of measures to remedy the evil. According to the *Revue des Eaux et Forêts*, it is unanimous in declaring that the prime cause of the disastrous decrease of the water is the devastation of the forests.—*Nature*.

Remarkable Locomotive Accident.

The Rochester *Democrat and Chronicle*, of January 20, states that on January 17, while a train, bound for Attica, on the Buffalo division, was nearing the river bridge about a mile west of the village of Avon, an accident occurred which was most singular in itself and serious in its results. The iron network over the top of the smokestack on the locomotive became clogged up with cinders, etc., in such a manner that the gas generated could not escape from it; consequently it was pent up within the furnace, and as soon as the fireman loosened the fastening of the door to open it an explosion occurred, the fire being blown with great force out into the cab, enveloping the persons in it in a sheet of flame. The fireman, William Russell, who was nearest the door, was flung backward with great force. His leg was broken and his body was badly burned. William Farnum, the engineer, was not so badly hurt. His left hand was burned in a painful manner, and the whiskers of the left side of his face were burnt off. M. Breen, a brakeman, who happened at the time to be

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in the cab, was very seriously injured. His face and shoulders were terribly burned, and his eyes were so injured that it is thought he will be blind for life.

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RE-DISCOVERIES AND RE-INVENTIONS.

The investigator who thinks he has hit upon some new and important fact, but finds, on publishing his discovery to the world, that he has merely re-discovered an old and long-known phenomenon, is very much in the position of an inventor who has spent months in perfecting some machine which he believes to be new, but which, as the Patent Office examiners tell him, was patented years ago: perhaps it was used and abandoned before he was born. The airy castles each has been building are dashed to the earth, and dire disappointment destroys the searcher's peace of mind. Under these trying circumstances, it is difficult for him to sit patiently down and feel that the experience gained while prosecuting his work is a sufficient reward for his time and toil. Yet such is frequently the case; and but for the fact that most inventors and investigators are dependent on their daily labor for the bread they eat, they could in all cases feel that an honest, conscientious labor in the pursuit of a noble end, whether successful or not, is its own sufficient reward. Failure is to some minds a spur to greater exertion; it incites them to increased care, and thus proves more beneficial than success would have done. That man (or crew) that comes out of a race second best is generally confident of his ability to win next time; and he goes into training with eagerness for another chance to test his power. To another class of minds, failure is very discouraging. They have not perseverance enough to try again; or if they stand the shock of a few failures, they break down at last under the weight of continued ill luck, as they call it. That "nothing is so successful as success" is not more true than that nothing is more disheartening than failure. But since failure and disappointment fall, in a greater or less degree, to the lot of every man in every undertaking, we would first offer such balm as we may to heal the bruises, and then prescribe some preventives that will reduce the number of failures, especially those of re-invention and re-discovery, to the minimum number.

We have already hinted at the manner in which we would have the unsuccessful investigator regard his labors. The searcher for truth can no more measure the value of his labors by their results, than can the competitors in our intercollegiate contests, whether literary or athletic, measure the benefit they derive from the training by the value of the prizes conferred. A school boy of ten or fifteen diligently pursues the study of some subject, for which a beautiful prize is offered, with that prize and its inherent honor as his sole object and incentive. The prize was offered for the purpose of teaching the boy perseverance, of imparting to him the habit of study, and, in some cases, of putting him in possession of the knowledge thus acquired. The competitor who has labored industriously for the prize, but failed to obtain it, is benefited quite as much by the training he has received as the one who is successful, provided only that disappointment does not breed discouragement. While boys may strive for prizes with no higher end in view, it is beneath a man, and more especially an investigator, to work with that aim only. Work undertaken in the proper spirit is never without benefit to him that does it; and although it does not yield the expected fruit, it has been all the while conferring other benefits, more lasting, if less pleasing. There is a story, no doubt familiar to most of our readers, about an old man, who, when on his death bed, told his sons that treasure had been buried somewhere on his farm. Eager for gold, they explored every field, digging over every foot of it to a considerable depth. Of course, they found no gold; but the increased fertility of the land amply repaid their labor. Parallel cases are abundant, wherein the object sought was never found, but where incidental results proved of immense importance. The old alchemists worked with but two aims before them, to transmute the base metals into gold, and to find the elixir of life. They succeeded in neither, but they gave us many substances more valuable than either. Many of the acids and metals, as well as phosphorus, were prepared or discovered by them, and their experiences have been woven together to form the foundation of the science now called chemistry. Unfortunately, however, their selfish jealousy induced them to conceal rather than promulgate their discoveries, and many of their most important secrets were buried with them. It is only recently that men have begun to observe and carefully record the little incidental discoveries. These little facts, trifling and disconnected as they are, may some day find a place of importance in the science, or they may become the seed which, falling on the fertile soil of some other active brain, will there spring up in a new and unexpected form.

Reader, if you are an experimenter, carefully record all your experiences, and publish such as are new, for you know not which of these tiny sparks will start a huge conflagration, or which trifle will be to some active mind what the falling apple was to Newton, or the oscillating chandelier to Galileo.

To give such directions as would aid the investigator to save his time and energies, on subjects already thoroughly examined, and in repeating well known experiments, is not difficult. Scientific men of the present century have been careful to record in permanent form most of their investigations, and hence it becomes possible for a person, before beginning a research, to ascertain just what has already been done, provided he has access to a good scientific library, such as the Astor or the Columbia College School of Mines Libraries in this city, both of which are free to all and possess excellent catalogues and obliging librarians. The method of study will be somewhat as follows: Suppose a chemical student is about to attempt the preparation of some new compounds of cobalt. He may first, if he chooses, make use of the excellent dictionaries of chemistry published in each of the principal languages, for our student ought to read French and German with some fluency. The best works to consult are Watts,' Wurtz, and Fehling, but every accessible work should receive attention. Having obtained a general idea of the subject in hand, he next proceeds to search the scientific journals one by one, from volume I to the latest number. Among the most important of these we would mention the *American Journal of Science and Arts*, 1818 to date, 110 volumes. The task of examining these numerous volumes is not so very great, since every tenth volume contains an index to everything in that and the preceding nine, so that only 11 indices have to be consulted. Poggendorff's *Annalen* now embraces over 230 volumes. from 1799 to date, but the titles of all the articles are registered in half a dozen indices. Dingler's *Polytechnisches Journal*, now in its 218th volume, has 3 indices. The *Annales de Chimie et de Physique*, which now number 275 volumes, beginning as far back as 1789, have several index volumes. The same holds true of most of the scientific journals where original papers are to be looked for. *Comptes Rendus* is an unfortunate exception to this rule.

Before beginning this search, a suitable note book should be procured, and so arranged that every reference can be quickly recorded as soon as found, either chronologically or in some other systematic order. Or the references may be taken down in a blotter, and subsequently posted in the order desired, care being taken to give date, subject, name of author, and name of journal, with page and volume. Such an index of a subject, carefully carried out, will be found invaluable. The student now has a guide book which will direct him at once to the spot where just such information as he seeks is given. From these, it is easy to ascertain just what has been accomplished, and hence it is almost impossible to repeat unwittingly what another has already done.

The inventor may not find it quite so easy to learn what has been attempted in his line, as inventors usually jealously guard their ideas as invaluable secrets. The patent records of different countries, however, afford material for quite an extensive search, and, as in the case of the chemist, will be of great assistance in preventing a waste of time in re-inventing old things.

Let no one say that it takes too much time to make all these preliminary examinations, for it will prove a saving in the end, not only of time and labor, but of good nature and enthusiasm. If those who can afford the time would join in preparing reliable indices of the whole literature of different subjects, and permit them to be published by the Smithsonian Institute or other scientific body, they would be valuable contributions to Science, and great aids to their fellow laborers of today and of the future; and they would serve to perpetuate the compilers' own memories.

FELTING AND ITS USES.

The employment of felt for other purposes than hats, which use was described in a recent number, has created several other branches of industry. The most common products are felts in flat layers like cloth, and the most usual mode of manufacture is a kind of wadding (by means of a machine similar to that used for the same purpose in cotton mills) and to submit this to the felting process, often felting several layers together so as to obtain great thickness. With improved modern machinery, such wadding may be made of considerable dimensions. A special and peculiar article of this kind, and of great comparative value, is the felt used for the covering of the hammers of pianofortes. The best material for this purpose is derived from the wool of sheep found only in Hungary. They are called the Esterhazy flock; and the wool gives a more elastic felt, resisting better the cutting effect of the strings, which soon wear other kinds of felt away. These felts come in the trade in elongated pieces, very thick at one end and quite thin at the other, so as to suit the requirements, which are that the hammers striking the bass strings should be covered with thick felt, the substance being gradually diminished for the higher tones, so that the hammers striking the strings producing high tones have a very thin covering. The pianoforte makers have then only to cut those felts into strips to have all the needed assorted degrees of thickness, it being a first requisite of the pianoforte, and in fact of every other musical instrument, to attain equality of tone, avoiding sudden changes in power when passing from one tone to another of the scale.

Other felts are manufactured into carpets, and printed with figures, forming the so called rugs, and others, well known, are blankets and materials for cloaks, women's skirts, socks, slippers, insoles for boots and shoes, etc. Some kinds of fine felts are saturated with varnish or paint, and changed into a material not unlike patent leather; this is used for the shades of caps, by carriage makers, etc., being much more tenacious and elastic than pasteboard, in which the fibers are not interlaced, and only are held together by a simple adhesion originated by great pressure during the process of manufacture. We must also mention the use of felt for roofing, for which purpose it is saturated with asphaltum, coal tar, pitch, or other equivalent waterproof material; and felt is also used in shipbuilding, as a layer below the copper sheeting, and on steam cylinders, conduits, and boilers as a non-conductor of heat, for which purpose it is often prepared with various ingredients, intended either to make it less combustible or to increase its capacity for retaining heat. A modern industry of this kind sprang up during the late war. Contractors, in order to increase their gains, had blankets and even soldiers' clothes made from felts of which the hair was not of the proper kind, but consisted of the offal of woolen factories, fibers too short to be spun, but which, by felting, could be made to hang together and form an apparently woven fabric; which, however, soon showed its tru

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