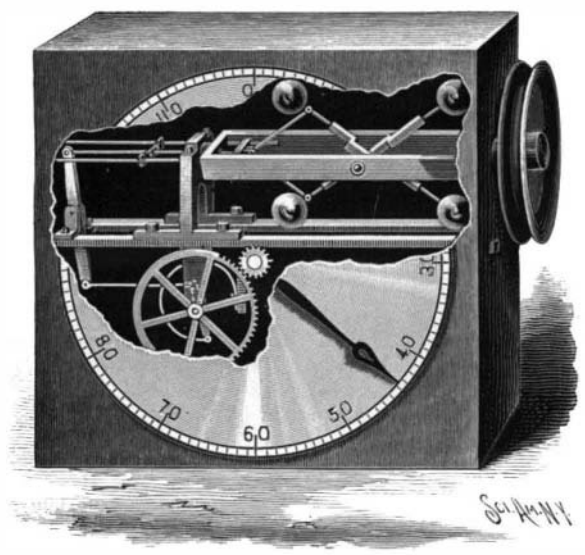
AN IMPROVED SPEED INDICATOR.

The illustration represents a speed indicator especially adapted to show the speed in miles of a railway train, or the speed by number of revolutions or feet for any piece of machinery. The invention has been patented by Henry Herden, chief engineer of the Buffalo and Susquehanna Railroad, Wellsboro, Tioga County, Pa., and is for an improvement on a formerly patented invention of the same inventor, designed to improve the construction and render the indicator more accurate. Upon a skeleton horizontal partition within a suitable casing are bearings supporting a shaft having a central rectangular opening in which two levers are pivoted at



HERDEN'S SPEED INDICATOR.

their centers. The levers are perfectly balanced upon the pivot pin, each arm carrying a weight at its outer end, and the inner ends of the levers are pivotally connected by links with a sliding crossbar, from which a rod extends centrally through the shaft and bearing to a swivel connection with a crosshead, which may be shaped to form an oil receptacle. The crosshead slides on horizontal guide bars and is pivotally connected by a link with a balance lever from whose lower end a connecting rod extends to an upper arm upon a spindle carrying a segmental gear, an opposite arm upon the spindle being attached to one end of a spring whose opposite end is secured to a hanger, the spring being designed to equalize the centrifugal force of the levers. A wheel having only a portion of its periphery toothed is employed instead of a segment, as affording a more perfect balance, and the gear is in mesh with a pinion whose spindle carries a pointer moving on a dial on the outer side of the case. To limit the movement of the levers when the index hand is at zero on the dial, a set screw is placed on the moving shaft in position to engage the outermost weight of one of the levers, the shaft being connected by belt and pulley with the machinery whose speed is to be indicated. This indicator is designed to be placed at any angle to the level plane, and not be at all affected by the jolting of a moving train or other forces, the indicator hand moving or remaining stationary as the speed of the machinery changes or remains even.

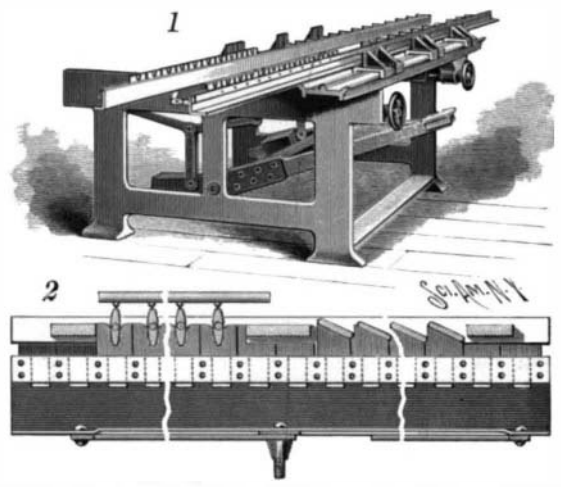
A NEW BLIND SLATTING MACHINE.

A thoroughly tested machine, in which it is stated one man has slatted, clamped and doweled from two and a half to three and a half as many blinds in a day as would be done by hand according to the present system, is shown in the accompanying illustration. The tests were made by men unused to working the machine, and it is claimed that two men, after becoming proficient in its use, will be able to clamp, slat, and dowel not less than six hundred blinds per day, ready for the rabbeting machine. The new machine has been patented by George I. Parks and William D. Nelson, of No. 427 Walker Street, Augusta, Ga., Fig. 1 showing the machine in perspective and Fig. 2 being an enlarged sectional view. Arranged at each side of the frame of the machine are frame-clamping dogs mounted on bars which may be moved toward and from each other by operating a foot lever, and between the dogs are two slat-supporting plates pivotally connected by links and a central bar, the plates being adjustable toward and from each other according to the length of the slats to be connected with the blind frame. Detachably connected to the upper portion of each slat-supporting plate are slat-holding teeth, those at one end supporting rolling slats and those at the other end stationary slats, as shown in our view, although the machine may be arranged to slat all rolling slats or all stationary slats. In operation the side rails of a blind are placed in the blind clamp and the dogs and clamp closed to bring the rails toward the slat-supporting plates, as many slats as desired being placed in the holding teeth. The side rails being blocked up so that the holes will come opposite the tenons of the blind slats, the frame-clamping dogs are moved toward each other, when the side rails engage with the slats, after which the entire blind may be wedged and doweled, or pinned at once. The machine is designed to do the work with greater accuracy, as well as with much greater rapidity, than it can be done by hand, and is adjustable to any size of blinds.

TEST OF A THREE HUNDRED HORSE POWER STEAM TURBINE.

In the common form of steam engine there is a serious loss arising from the fact that the cylinder is connected alternately with the steam supply and with the exhaust. The lowering of the temperature of the cylinder during the latter condition causes the condensation of a certain amount of the next supply of steam that is taken in, and this represents an actual loss of energy. The amount of loss will vary according to the range of temperature to which the cylinder is subjected. This difficulty is inseparable from all engines which utilize the expansive power of the steam in a closed cylinder. In the endeavor to reduce the variations of temperature, the steam has been expanded in two or more cylinders, and the quadruple expansion engine of to-day is giving economical results which fully justify the multiplication of parts and increased first cost of its construction.

The closed cylinder engine is finding a formidable rival in these later days in the steam turbine, or rotary impact engine. In these machines the energy of the steam is utilized by discharging it at an enormous velocity against the buckets of a wheel. The steam acts merely by its velocity and not, as in the expansion engine, by pressure. In order to secure the greatest possible velocity, the steam is expanded during the last few inches of its travel through the nozzle, the expansion being secured by making this part of the nozzle divergent. The theoretical speed of the steam as it finally strikes the buckets is enormous, and in the case of a jet with an initial pressure of 75 pounds, discharging into a condenser in which the pressure is 1½



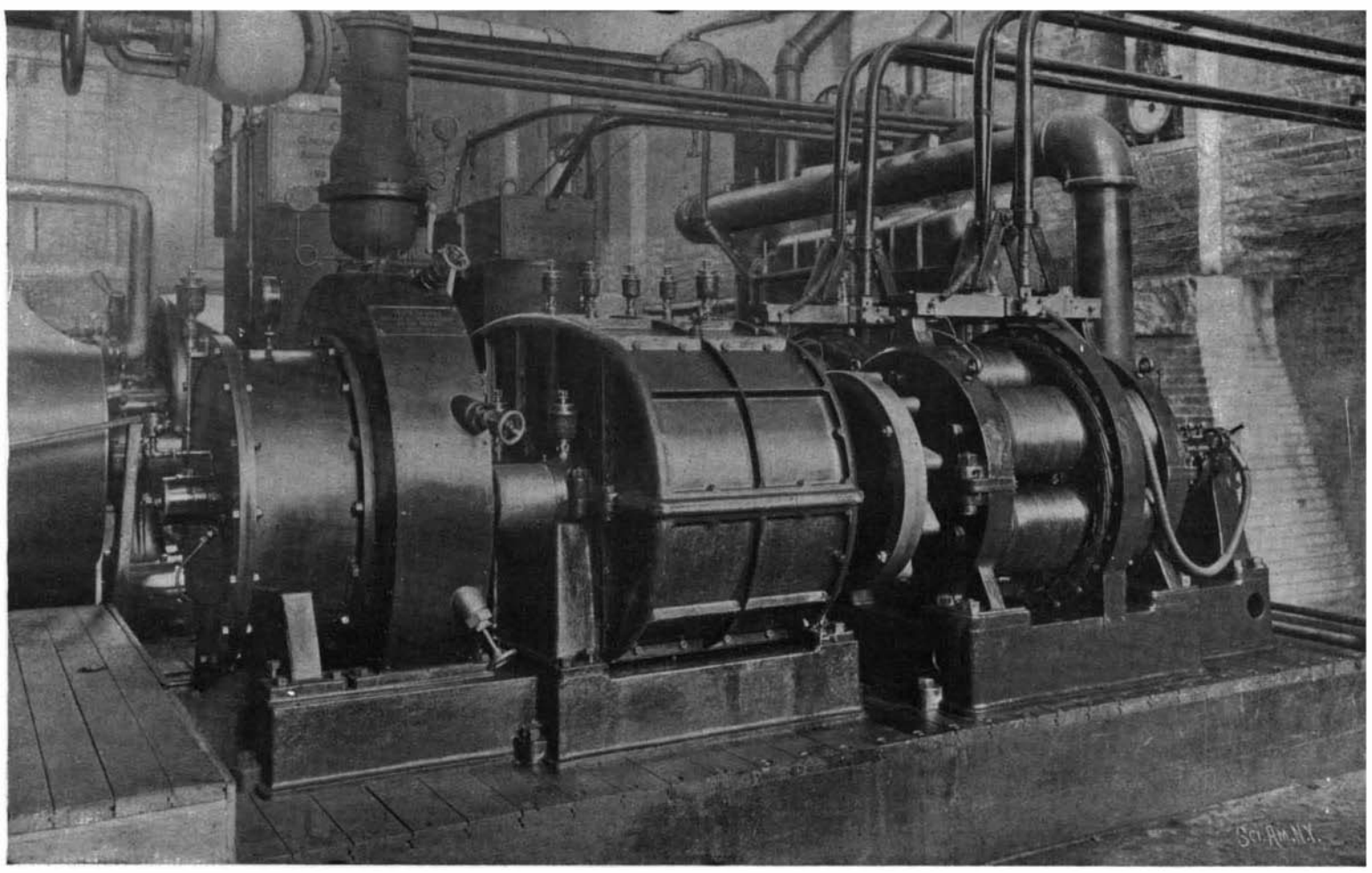
PARKS AND NELSON'S BLIND SLATTING MACHINE.

pounds, the speed would reach the theoretical speed of 4,600 feet per second.

There were great possibilities in store if engineers could only construct a rotary engine which would stand the enormous speed of rotation that was necessary in a steam turbine.

De Laval, in France, and Parsons, in England, each working on his own lines, have produced turbines which have shown their ability in actual test to give an electrical horse power on less than 20 pounds of steam per hour. De Laval did not hesitate to develop the total energy of the steam at a given pressure upon a single wheel, and he has built turbines that ran at the rate of 30,000 revolutions per minute. Parsons made use of several wheels and reduced the pressure of the steam in several stages. The steam was led through one set of turbines into a receiver. From this receiver it passed through a second set into another receiver, and so on until the steam finally reached the condenser.

The accompanying illustration shows a three hundred horse power De Laval steam turbine which is running very successfully at the Twelfth Street station of the Edison Electric Illuminating Company, New York City. The steam is led into a circular steam tight casing in which is located the turbine wheel. This wheel has a diameter of 29½ inches, and runs at 9,000 revolutions



LAVAL THREE HUNDRED HORSE POWER STEAM TURBINE.

per minute, the speed of the buckets being 1,160 feet per second. The blades are arranged around the periphery and are milled out of the solid steel spokes with which the wheel is built up. They are made very thin at the edges and are of a curved cross section. A steel band is left on around the periphery, in order to prevent the steam from passing out over the ends of the blades; and it also serves to oppose the tendency of the turbine to act as a fan. The steam enters the turbine chamber at a pressure of about 147 pounds, and it is directed upon the wheel by means of eight nozzles of the kind which we have already described. These nozzles are inclined to the sides of the wheel at an acute angle, and the face of the nozzle which lies opposite the line of the buckets is beveled to match the angle so formed. The wheel runs, as we have said, at the enormous speed of 9,000 revolutions per minute. This, of course, is not so high as that of some other turbines of this type, which have been run at the speed of thirty thousand revolutions per minute; but in the latter case the wheels have been very much smaller. De Laval found it a very difficult matter to perfectly balance a wheel at this high speed. The center of gravity of the wheel and the axis of the shaft upon which it turns are never exactly the same. To overcome the difficulty the wheel is mounted upon a long flexible shaft, so that when the turbine is running at high speed the wheel revolves on its true center of gravity, the axis of the shaft springing sufficiently to allow this adjustment to take place. The turbine shaft extends into a cast iron gearing box, where it carries a pinion whose teeth are helicoidal and are inclined at an angle of 45° in opposite directions. This pinion operates two toothed wheels, whose gearing is also helicoidal, which are placed symmetrically on each side of the pinion. The shafts of these two gears extend through the gearing box and operate two Desrozier 100 kw. dynamos which are connected on the three-wire system. The proportion of the gearing is such that the speed of the dynamo is reduced to 750 revolutions per minute.

The regulation of the turbine is effected by means of a centrifugal governor which is driven from the shaft of the larger gear wheel. The segment weights or wings of the governor are movable on knife edges with very little friction. When the governor revolves the weights diverge, their inner ends push a pin forward, this pin in turn causing the cut-off of the steam through the movement of the balanced valve in the steam supply pipe at the top of the turbine. A spiral spring inclosed in the governor keeps the weight in a state of equilibrium at a speed of 750 revolutions. After the steam leaves the bucket it passes into an exhaust chamber which will be noticed on the left end of the machine. This connects by the large pipe with a Wheeler surface condenser conveniently placed in any part of the station.

It will be noticed that in consequence of the great velocity of the steam turbine as here described the system as a whole presents proportions the reverse of those to which we are generally accustomed. Unlike the pressure engine, here it is the prime mover which has by far the smallest dimensions; then come the gearings with their inclosing jacket or case, and finally the relatively reduced speed but heavier parts of the dynamo. The advantages of this form of motor are its great simplicity, its compactness, the absence of heavy foundations, the great regularity and evenness of the running, the great ease with which a condenser may be adapted, and lastly, and for certain classes of work most important of all, its efficiency.

In the following table is given a series of one hour tests of the Twelfth Street station turbine when it was running respectively with 2, 4, 6 and 7 jets in use, from which it will be seen that, with 7 jets in use, it gave an electrical horse power on 19·95 pounds of steam:

TEST OF STEAM TURBINE, WHEN OPERATED WITH 2, 4, 6, 7 JETS.
(One hour duration each test.)

No. of jets used.	Average load.		Average watts.		Per cent of full load.	Vacuum.	Lb. of steam per E. H. P.
	+ Amps.	— Amps.	+	—			
2	153·78	147·15	18 707	18·283	18·50	27·00	27·35
4	433·60	455 80	54·156	57·886	56·02	26·43	20·22
6	700 85	718·65	87·746	91·268	89 51	26·07	19·75
7	771·94	787·33	97·418	100·856	99·14	25·79	19·95

A six-hour test gave the following results: The dynamo outputs showed on the + dynamo 127·25 volts, 692·48 amps.; and on the — dynamo 128·26 volts, 709·18 amps. The average amount of water consumed per electrical horse power hour was 19·275 pounds. The temperature readings, after the six-hour run, were as follows:

	+ Dynamo.		— Dynamo.
Armature	120° F.	—	129° F.
Average of fields	98°	—	107°
Commutator	144°	—	132°
Temperature of room	—	82°	—
Temperature above room:			
Armature	38°	—	47°
Field	16°	—	25°

In this connection it is interesting to note the tests of a Parsons compound steam turbine, which were recently carried out by the Newcastle (England) and District Electric Lighting Company. The turbine made 9,400 revolutions per minute, the speed of the alternator and exciter being 4,700 revolutions per minute. The steam pressure was 70 pounds. The total water used per electrical horse power per hour was 17·28, 20 and 22·01 pounds respectively.

We are indebted to Mr. J. W. Lieb, Jr., general manager, and Mr. J. Van Vleck, constructing engineer of the Edison Electric Illuminating Company, for courtesies extended.

Archæological News.

The Palais de Justice, at Brussels, one of the noblest of the modern buildings, has now a pair of bronze doors. About fifteen tons of bronze were used, and in size and weight the doors stand second to the Pantheon alone. In spite of this great weight the doors are easily moved, for steel ball bearings are provided to avoid friction.

The library of the late Prof. Curtius, who was one of the most distinguished among the German classical scholars of the last fifty years, has been recently purchased by Yale University. The library was purchased intact. It was one of the finest libraries of the country on works on Greek art and archæology. It contains about 3,500 bound volumes and as many pamphlets.

M. Dalou's group, the "Triumph of the Republic," which was commissioned several years ago for the Place de la Nation, Paris, is not yet entirely completed. A little of the work was set up in 1889 to celebrate the centenary of the fall of the Bastille. The models were allowed to remain in position for several weeks and became much deteriorated, and M. Dalou was compelled to remodel the whole group. The founding is still to be undertaken; so it is possible this magnificent group will not be erected until 1900.

Professor W. Weiler thinks the ancient Etruscans were acquainted with the lightning rod. The poet Lucan has the following reference to Aruns, an Etruscan of considerable learning. "Aruns, dispersos fulminis ignes colliget, et terra maesto cum murmure condit." "Aruns collects the scattered fires of lightning, and with sad rumble hides them in the earth." (Lucan, Pharsalia, I, 606.) This quotation seems to indicate a knowledge of some way of conducting lightning harmless to the earth.—Elektrotechnische Rundschau.

A society was formed at the Congress of Art Critics, at Nuremberg, 1893. Its object was to give good photographic reproductions of masterpieces which are little known, being preserved in galleries which are seldom visited. In the private and often in the public galleries of England, France, and Germany there are many splendid works of art which have never been photographed and are therefore not readily accessible to students, who are almost always largely dependent upon nearly complete collections of photographs The first series of reproductions of the society has appeared.

At last the famous Borgia apartments of the Vatican have been opened. The six galleries with frescoes by Pinturicchio, which have hitherto formed a part of the Vatican library, and have been piled with books to a great height, have now been cleared out, and the beautiful mural decorative paintings can now be seen. There are few places in the world where the student can receive more instructive lessons in pure decoration. Many of the paintings include contemporaries of Pinturicchio, including Lucretia Borgia pictured as a saint —Saint Catherine! For many years access to the Borgia apartments was only obtained through the greatest difficulty. Permissions were only possible through the aid of powerful introductions. When the apartments were opened a throne had been prepared for the Pope in each room, and here he sat and listened with deepest interest to the history of the various frescoes by one of the most learned cardinals of the Sacred College, and afterward by the chief curator of the Pontifical Museum. The frescoes have been restored in a conservative manner.

The Bicycle and Tuberculosis in Women.

At the last quarterly meeting of the American Statistical Association, Dr. S. W. Abbott, secretary of the Massachusetts Board of Health, presented some interesting figures regarding the proportion of pulmonary tuberculosis in females to that in males in Massachusetts. The rate in 1851 was 1,451 females to 1,000 males; in 1890, 1,055 females to 1,000 males; and last year only 974 females to 1,000 males. Last year was the first in the history of the State in which the number of deaths from phthisis in females was smaller than that in males. The fact that a uniform reduction in the rate of female deaths began some five years ago, about the time when women were beginning to ride the bicycle extensively, Dr. Abbott considers significant, and he is inclined to attribute the decrease in the death rate to the great increase in open air exercise among women which has been inaugurated by the use of the bicycle.—British Medical and Surgical Journal.

Science Notes.

Norway's Storthing has voted a lump sum of 4,000 kroner, $1,080, each to Nansen's twelve companions and 3,000 kroner a year for five years to Captain Svendrup, who is to command the next expedition in the Fram, planned for 1898.

The final selection of the plans for the statue of Von Helmholtz has not as yet been made, but the plans submitted by the sculptors Lessing, Hertert, and Janensch have been selected from those submitted and these designs have been exhibited in Berlin. The statue will be placed in the court of the university.

The firm of Frederich Bayer & Company, of Elberfeld, Germany, has purchased the entire library of the late Professor Kukulé consisting of 18,000 volumes and said to be the most complete collection of chemical works in existence. It is to such things as this that Germany owes her wonderful position in the industrial arts.

Prof. Elmer Gates, of Washington, claims to have produced an absolutely perfect vacuum by filling a very infusible test tube with a glass melting at a much lower temperature. Then by inverting the test tube and partially withdrawing the molten glass by suction, a space was left which, when the glass had solidified, was claimed to be perfectly vacuous.

The Italian electrical journal L'Elettricista contains an article by Prof. Mosso and Mr. Ottolenghi, in which they describe their researches made to test the poisonous action of acetylene on various animals, such as dogs, birds, frogs, and rats, etc. They found it to be a strong poison. A small quantity in the air or inoculated in the blood is followed by death, and even when the animals are resuscitated with fresh air before death, they die afterward. A mixture of 20 per cent of acetylene in the air is followed by death in one hour.

The shelless limpet pulls 1,984 times its own weight when in the air, and about double when measured in the water. Fleas pull 1,493 times their own dead weight. The Mediterranean cockle, Venus verrucosa, can exert a pulling power equal to 2,071 times the weight of its own body. So great is the power possessed by the oyster, that to open it a force equal to 1319·5 times the weight of its shelless body is required. If the human being possessed strength as great in proportion as that of these shell fish, the average man would be able to lift the enormous weight of 2,976,000 pounds, pulling in the same degree as the limpet. And if the man pulled in the same proportionate degree as the cockle, he would sustain 3,106,500 pounds.

Some six years ago M. Vallot erected on Mont Blanc, 1,400 feet from the summit, or 14,381 feet above sea level, the highest meteorological observatory in Europe. Having made twenty-one or more ascents of the mountain, and obtained observations during three successive summers, he now generously offers the use not only of laboratory and instruments, but of kitchen and salon to meteorologists of any nation who care to pursue their investigations amid such exalted surroundings. Intending visitors are advised to provide themselves with a somewhat substantial smelling bottle in the form of a steel tube filled with compressed oxygen, the most approved remedy or specific for mountain sickness being the inhalation of a few quarts of this enlivening element.

The mayor of Ripon, England, recently announced that anyone giving evidence in the county court might, if he wished, be sworn in the Scotch form. A new copy of the Gospels was also presented to the court, and it was suggested, says the Lancet, that a bacteriological examination should be made of the cover of the old one, which had been in use for sixty years. The examination was accordingly undertaken by Mr. F. W. Richardson, consulting chemist to the Bradford Corporation. The result showed that, besides various moulds, there were present the micrococcus pyogenes albus and aureus, but it is comforting to know that not one of the specific germs of the communicable diseases was found. Kissing the book is a filthy and useless custom, and the Scotch form of oath taking is, as has been over and over again insisted upon, infinitely preferable from every point of view.

Charles Burckhalter, the astronomer of the Chabot Observatory, will travel half way around the world so that for two minutes in far-off India he may endeavor to photograph the sun during the solar eclipse of next January. As the eclipse during totality will be observable only in India, many scientists will travel thither to make observations. Charles Burckhalter has obtained considerable prominence by his discovery of a new method of photographing the sun during an eclipse, which gives results that are of the greatest scientific interest. To give him an opportunity to apply his discovery, a number of wealthy San Franciscans, who wanted to add something to the cause of science, sent the astronomer to Japan during the eclipse observable there some time since. The day on which the eclipse occurred was cloudy and no photograph could be secured. The same friends of science have offered to pay the expenses of a trip for Mr. Burckhalter to India. Mr. Burckhalter has determined that if he goes to India his party shall be known as the Chabot Observatory expedition, so that the little Oakland observatory will be prominent in the scientific world.

Recent Patent and Trade Mark Decisions.

Clune v. Madden (U. S. C. C., Ind.), 77 Fed., 205.

Folding Bed Lounges.—The Clune patent, No. 294,957, has been held invalid as to claim 1 for lack of invention.

Invention.—There is no invention in the use of a pin or hook on the back of a folding bed lounge to automatically engage the eye on the head rest when the two sections are folded together, thus holding the back firmly in place.

Schenck v. Diamond Match Company (U. S. C. C. A., 3d Cir.), 77 Fed., 208.

Friction Match Device. — The Pusey patent, No. 483,166, for a friction match device to be carried in the pocket, has been held valid and infringed, it seeming to show invention, and, while so simple, it was new in the art, cheap and convenient and supplied a distinctly felt want.

Williams v. Breitling Manufacturing Company (U. S. C. C. A., 7th Cir.), 77 Fed., 285.

Preliminary Injunction.—A preliminary injunction should be denied, though substantial similarity between the two devices is conceded, where the patent is attacked for want of novelty and invention, when there has been no adjudication sustaining it and where there is no showing of defendant's inability to respond in damages.

Westinghouse Air Brake Company v. Burton Stock Car Company (U. S. C. C. A., 1st Cir.), 77 Fed., 301.

Preliminary Injunction.—It is within the discretion of the court to refuse a preliminary injunction, although the patent has been sustained, and infringement declared by another court, where there is possibility of grave and indefinite injury to the defendant who was a mere user, in case the final decisions were in his favor, but in such case the defendant must give an ample bond for damages.

Lublin v. Stewart, Howe & May Company (U. S. C. C. A., 3d Cir.), 77 Fed., 303.

Dress Stays.—The Bray patent, No. 440,246, has been held valid and the decision of the lower court reversed on the ground that it was not anticipated by the Curtis patent, No. 243,519, as the two devices consist of radically different combinations and accomplish palpably diverse ends.

McKay & Copeland Lasting Machine Company v. Copeland Rapid Laster Manufacturing Company (U. S. C. C. of Maine), 77 Fed., 306.

Patent on Unused Device.—The mere fact that the patented device has never been put to any continued successful commercial use is not sufficient to overcome the prima facie case made by the patent. There must be a patentable difference between claims in the same patent, and where a third claim in the patent differs from the first claim only in adding an element which contributes no more to the novelty of the combination than would the floor or block on which the machine rests, such third claim is void as mere surplusage.

Machine for Flanging Counters of Boots and Shoes.—The Hulbert & Kennard patent, No. 243,917, has been held void as to the first and third claims.

Smertz v. Appert (Commissioner's Decision), 77 O. G., 1784.

Affidavit to Overcome Foreign Patent.—A holding that the applicant has not presented an affidavit sufficient to overcome a foreign patent is not pleadable to the commissioner, because it does not relate to the merits of the case. Such affidavit should contain not only the deponent's conclusion that he was the first inventor, but should state the facts, and the facts only that support such conclusion. Such affidavit may be aided by the preliminary statement in the interference. Where an application becomes involved and motion is made to dissolve the same on the ground that one of the applicants had not under the rules overcome a French patent, the party is entitled to invoke the doctrine of priority of mere conception, and even though he can show nothing but mental acts prior to the reference sought to be overcome, the office must consider whether his conception was sufficiently clear and distinct and whether under the circumstances his progress was marked by due diligence, and this can only be done upon full record of the case and not upon preliminary motion.

Sixty Years of Progress.

BY SIR EDWIN ARNOLD.

The forward march of science during the past sixty years has been nothing less than astonishing. Justly did Professor Huxley call the Victorian period "a revolution of modern minds." Out of the love of knowledge pursued with single hearts before the reign, or at its commencement, by Herschel and Laplace, Young, Fresnel, Cavendish, Lamarck, Davy, Jussieu, Cuvier, Decandolle, Faraday, Tyndall, Darwin, and their like, there sprang up under this reign the fruit of countless rich practical applications. Three achievements in physical philosophy alone have been sufficient to immortalize the reign—the scientific doctrines, first, of the molecular constitution of matter; secondly, of the conservation of energy; thirdly, of evolution as divined by Darwin.

That last illustrious name shines of itself like a lonely star of glory, sufficient to make resplendent the Victorian constellation of talent. But consider how, practically, all our electrical developments also lie inside this period; with well-nigh all the marvelous utilization of steam on sea and land; almost all the amazing improvements in mechanical, industrial machinery; almost all the discoveries in hygienic matters; together with vast advances in chemistry, metallurgy, astronomy, physiology, and, we may add, geography, geology, and biology. Only to mention the spectroscope, the camera, the microphone, the phonograph, the telephone, and the kinetoscope—alluded to above—is to use words never heard sixty years ago, though now so familiar. One discovery, as is the wont of Nature, helps to lead to another. The exquisite experiments of Tyndall illuminating floating motes aided Lister to introduce antiseptic surgery and to abolish hospital gangrene. There are those, it is true, like the late Professor Huxley, who resent the idea of utilitarian science. He has said:

"That which stirs the pulses of the votaries of science is the love of knowledge, and the joy of the discovery of the 'causes of things,' the supreme delight of extending the realm of law and order ever farther and farther. In the course of this work, the physical philosopher, sometimes intentionally, but more often unintentionally, lights upon something which proves to be of practical value. Great is the rejoicing of all who are benefited thereby, and for the moment Science is the Diana of all these Ephesian craftsmen. But even while this flotsam and jetsam of investigation is being turned into wages of workmen and wealth of capitalists the crest of the wave of scientific inquiry is far away on its course over the illimitable ocean of the unknown."

The cynicism latent in this may be forgiven for the sake of its fine intellectual pride and noble passion for Truth, but I am of those who think Truth herself fairest when she is most beneficent, helpful and generous. With this view I hail, as specially and gloriously commemorative of the Queen's sixty years, the benign extensions of the arts of remedial surgery and medicine during its progress, and particularly the two arch events of the introduction of anæsthetics and of female nursing as a study and profession. From the sanguinary fields of the Crimean war arose, like an angel of compassion and redemption, Florence Nightingale, with all that train of skilled and gentle women, afterward following her excellent example, who have altered the history of the sick room and regenerated our hospitals. Lister's antiseptic treatment of wounds, already spoken of, founded on the information obtained by Tyndall's electric beam and the microscope, and such experiments as Pasteur's about infinitesimal life, have stripped surgical operations of their previous deadly peril by reason of septic organisms, while—as if Science designed to bestow a specially appropriate boon on the youthful and compassionate Queen—Simpson in Edinburgh, simultaneously with Wells and Morton in the United States, early in her Victorian age performed those merciful experiments with chloroform which terminated the epoch of unavoidable anguish for sick and wounded patients, robbed even war of its worst features, and commenced the present blessed era of anæsthetics. Read what a renowned surgeon, Mr. Brudenell Carter, writes about that happy discovery:

"The use of anæsthetics has changed the whole aspect of surgery. Prior to 1847, operations were few in number, and were almost limited to the amputation of limbs, the removal of cancerous and other tumors, the resection of a few of the larger joints, cutting for stone, and the ligature of main arteries for aneurism. The pain suffered by the patients was so horrible as to tax severely the endurance of the bravest and strongest, and to depress seriously and often beyond recall the powers of life. Death from shock was by no means uncommon, the patient sinking in a few hours from the effects of the suffering which he had undergone. The writer well remembers, as a medical student, turning sick and faint at the agonies which he was called upon to witness; and it was a point of honor with operators in those days to abbreviate such agonies as much as possible, and to cultivate speed in operating as the highest and the most valuable form of dexterity. Nothing was attempted which could not be done quickly, and an amputation in the hands of a practiced surgeon had almost the appearance of a feat of legerdemain. For the separation of the lower limb above the knee—of course, not including dressing—twenty seconds has been known to suffice, and forty seconds was regarded as a period of time which no one was justified in exceeding. When anæsthetics were employed, it came to surgeons as a kind of revelation that they need no longer be in haste, and they have utilized that knowledge in making leisurely examination and safe procedure."

I am almost more grateful for the tardy arrival of this anæsthetic revolution in the train of her gracious majesty than for railways, steamships, and electric telegraphs, for the great armies and navies, for vast expansions of imperial territory, and even education, photography, constitutional liberties, or anything else. It was so strange, so tantalizing to a lover of his kind, that what Humphry Davy had so long before noted and imparted about nitrous oxide should pass unnoticed and unapplied. The key was already there, but not until many years afterward did an almost casual hand (that of an American dentist) fit it into the golden door behind which sat waiting an angel of pity, kinder and more powerful than any Arabian fairy suddenly revealed in her divine beauty and bountifulness to any prince or magician of the "Thousand and One Nights." Before now I have asked whether there is anything anywhere in human history which more sternly teaches that man must win every boon of Nature by his own ceaseless striving than the fact that this simple chemical and physiological secret of chloroform should have lurked so long in its easy formula, undeciphered through all those waiting generations when Pain was an omnipresent tyrant whom Science could not control, and the operating room a torture chamber, dreaded almost as much by the surgeon as by the sufferer. Think of those gallant sailors of Nelson at Trafalgar, whose bleeding stumps, in the gloom of the orlop deck, were plunged into hot pitch to stay the hemorrhage!

One would almost expect that, out of pity toward such brave men, and for the sake of the countless tender women and children who, age after age, so hopelessly endured their anguish, Nature herself would have burst her iron law of impassive silence, and, as Helen did in the Odyssey for the sorely tried Greeks, have poured this pitying nepenthe into the bitter cup of mortal life. Not until 1847, however—although Davy had been so very near the revelation in 1839—did the anæsthetic age commence, giving to surgical art a sure control of agony, to its boldest practices confidence, quiet, and leisure, and to those who are constrained to come under that knife a sweet and complete oblivion. I have myself known what it is to pass, fearless of the kind steel, into that world of black, velvetlike tranquillity, of which these magic drugs now keep the gate, and to awake as good as healed, grateful beyond words for the soft spell of enchanted peace and the sure and faithful skill. This unspeakably good gift to mankind was of the American dentist's and of Sir James Simpson's giving, a participated glory of the reign, like that of the new school of nursing, which has wrought so much benefit and created a fresh vocation for many a young woman's gentle energies. In 1837 there was no proper nursing. There were Mrs. Gamp and Mrs. Betsy Prig, or else heavy-handed and heavy-footed male attendants, rudely different in mind, manner, and influence from the lightly moving and soft-speaking females whose trained intelligence and care now smooth every sick pillow, and faithfully discharge the ordinances of the doctor. There is no doubt the change was primarily due to the example of Miss Florence Nightingale—one of the glories of the reign—who went, at the head of a band of nurses—many among them of high birth—to the Crimean hospitals, and by demonstrating there, and afterward, the boundless advantages of skilled and first-class nursing, gave to the Victorian age the advantages of this modern system, and to a large number of her sex a new, suitable, and most honorable vocation.—Daily Telegraph.

Formation of Crystals in Cadavers.

Some work on the sewers done in Bearn Street, Paris, last August, brought to light two leaden coffins, which were found upon the site of an ancient church connected with the Convent of the Minimes. They date back to 1630. These coffins having been carried to the Carnavalet Museum, it was discovered that the bones that they contained were covered with white crystalline spangles. In one of them especially the cavity of the skull was converted into a magnificent geode, strewed with white needle-shaped crystals arranged in clusters and having a length of over a quarter of an inch. Mr. Lacroix, in a communication to the French Academy of Sciences, showed that these crystals were formed by a hydrated phosphate of lime allied to the metabrushite of mineralogists. The perfect tightness of the coffins showed that these crystals were formed at the expense of the cadavers exclusively and that we have here a case of autoimineralization. It was the bones that furnished the lime and doubtless also a portion of the phosphoric acid. The decomposition of the brain must likewise have furnished phosphoric acid, as the majority of the crystals were found upon the internal surface of the skull, and those of the exterior were almost all situated along the fissures of the latter.

Let us remark, by the way, that brushite and metabrushite, which the crystals under consideration resemble, are two substances found in deposits of guano, and must be of organic origin. In the grotto of Minerva (Aude), Mr. Armand has observed a curious layer of brushite associated with an aluminous phosphate. As this layer was strewed with bones, Mr. Armand suspects that it was due to the decomposition of soft organs that belonged to the animals whose skeletons were found above. The preceding interpretation is thus perfectly confirmed.—Revue Larousse.