THE NEW BUILDINGS OF PRINCETON UNIVERSITY.

The history of the library of the College of New Jersey probably began with the college itself, but the first mention of it is in the resolution of the Board of Trustees in 1755 authorizing the president to purchase a bookcase for the college. From the modest beginning, when one bookcase could contain all of the literary treasures which the college possessed, the library has grown until it now has over 150,000 volumes, and is one of the best arranged and most usable libraries which belongs to any university.

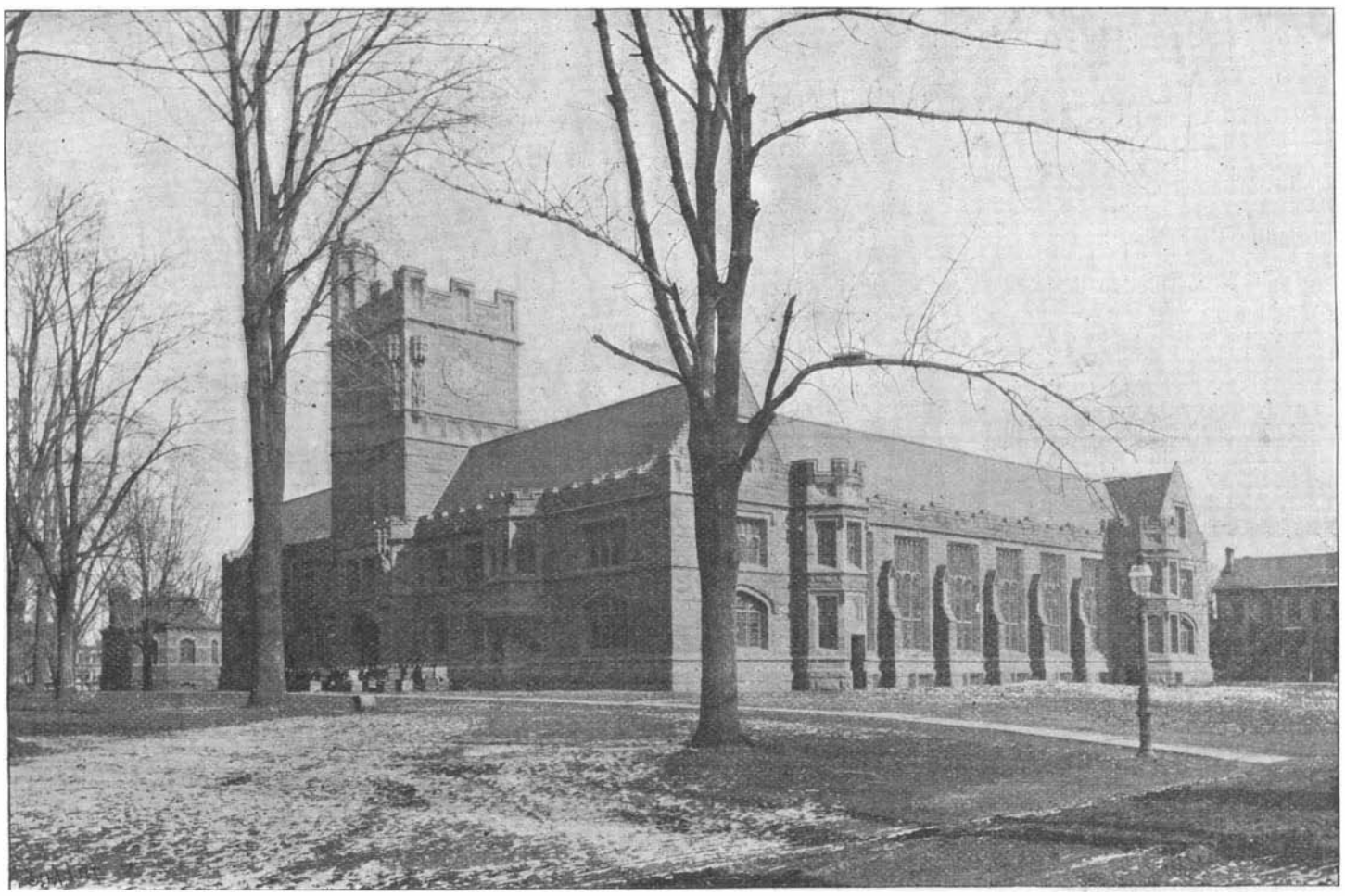
The Chancellor Green Library, an octagonal building with pavilions, was built in 1872, and was arranged to accommodate 100,000 volumes. It was in many respects a model library building for a college library, but the phenomenal growth of the collection during the years following the erection of the building was such that as early as 1888 the librarian recorded the fact that the building was already overcrowded. During the next seven or eight years volumes were stored in the cellar and attic, and still the building was inconveniently overcrowded. In connection with the Sesqui-centennial celebration a donor, whose name is still withheld, came forward and offered to provide a thoroughly adequate extension of facilities by the munificent gift of a building which was to cost $600,000. Shortly after Dr. C. E. Green made provisions for extensive improvements to the Chancellor Green Library, so that the library building to-day consists of the Chancellor Green Library and the new library building, which together represent an investment of about $800,000, and which affords storage room for 1,250,000 volumes.

The Chancellor Green Library building consists of a central octagon with two wings, which are themselves an elongated octagon. One of them may be seen at the very left of our engraving. The extreme length of the whole building from wing to wing is 160 feet. The central octagon is 64 feet in diameter and 50 feet high. It contains an elevated floor about 12 feet from the floor and 16 feet wide. The wings were used for trustee and administration rooms. The architect was W. A. Potter, of New York. The Chancellor Green Library has now been fitted with a complete system of forced ventilation and a complete system of electric lighting. It is now used as the general reading room and will accommodate 200 readers or more. Reference books are shelved in this library. This room contains the desk of the reference librarian, whose office it is to assist investigators in their studies, and it is connected with all parts of the building by telephone, so that any book in the stack rooms can be sent for at any time and it will be delivered at the desk of the reader by a page.

The new library building is connected with the Chancellor Green Library by the gallery shown in our smaller engraving, which measures 50×20 feet. This is used as a delivery room. The room is handsomely finished with a brown-stained paneled oak ceiling and mosaic floors. It contains the delivery desk and here readers must present their tickets before they are admitted to the stack rooms. The new library building, which forms the subject of our large engraving, is a quadrangular building 160×155 feet square, two and a half stories high, and is built in the so-called English collegiate style. The center is occupied by a court 75×75 feet. The building running around the quadrangle is 40 feet wide, which is considered the proper width for a stack room. The building is two stories and a half high in the seminar rooms, five stories in the stack rooms, and the towers are higher still. After the gift was presented through Mr. M. Taylor Pyne, plans were submitted, and those of W. A. Potter, of New York, the architect of the old library, were accepted and work was begun August 2, 1896. Great care was used in the selection of an architectural style which was thoroughly practical for the library of a great university. As a matter of fact, the hollow quadrangle is the most practical form for a library, as it allows of indefinite expansion in the same form and permits of obtaining light from both sides. The building and the connecting passageway contains the delivery room, the stack rooms, and about 40 smaller rooms for various purposes, including 10 administration rooms, 16 for seminar work, 13 for machinery, toilet, etc. It has the latest systems for heat, light, and ventilation and is provided with electric light, interior telephone system, two electric elevators, etc. The stack rooms have a capacity for 1,250,000 books and occupy a room running all around the quadrangle. Roughly speaking, all of the north and south portions of the building, except at the ends, are taken up in this way. The stack is what is known as the library bureau system and consists of five stories, each being 7½ feet high. The construction is of iron, steel, and glass, except the shelves, which are made of wood. The shelves are supported on brackets attached to a center upright. The light and graceful structure of the shelving system with the glass floor makes the stack room particularly attractive from a technical standpoint. Even on the ground floor practically the same amount of light is obtained by the use of glass prisms. It is expected that the electric light will not be needed in the daytime, only on the very darkest days and toward the end of the afternoon. The whole building, however, has been fitted with electric light, so that it can be open in the evening, if desired.

Immediately adjoining the delivery room in the northwest corner of the stack is an exhibition room 40 by 50 feet, with an alcove 12 by 25 feet which has been made by leaving out two stories of the stack for this space and fitting this up with oak cabinets and show cases. The alcove contains the unique collection of portrait masks presented by Mr. Laurence Hutton. The northeast corner of the building is occupied by the administration room proper. Cataloguing is done in the corresponding rooms on the second floor. On the third floor there is a room for the cataloguing of periodicals and pamphlets. The ordering room is connected with the cataloguing room by a small electric elevator. Books are brought into the former room by a door opening under an arch of the east tower. After they have been checked up with the order slips they are taken on the elevator to the floor above, where they are catalogued. The room in the east tower is furnished with two stories of stacks, which are used for the "purchase system" of the collection, the booksellers' catalogues, clippings, recommendations, etc., which form the apparatus from which the list of books most needed for the library is being prepared. The list at present includes 200,000 volumes, which is being increased to 500,000.

A special feature of the new library building is the provision for what is known as seminar rooms or rooms for instruction in the methods of research. This instruction is chiefly intended for post-graduates, and necessitates having the actual sources immediately about the instructor and the handling of them by the pupil. This is peculiarly a method of book research and corresponds for the historical, philological, philosophical science to the laboratory for instruction in the physical sciences. There are nineteen seminar rooms, measuring 27 by 22 feet each. The basement contains the printing, binding rooms, and for storage and machinery. Four portrait statues on the west tower are by J. Massey Rhind, and represent James Madison, Oliver Ellsworth, President Witherspoon, a signer of the Declaration of Independence, and President McCosh. In many respects the library of Princeton University is the most remarkable in the world. It is planned primarily for university use, and no essential convenience has been sacrificed for mere architectural effect, and ample provision is offered for necessary growth. The rooms are planned for economical administration and supervision with the fewest number of attendants possible. Natural light is provided in every room and the accommodations for special readers near the books is unexcelled, and no shelf is higher than a person can reach.



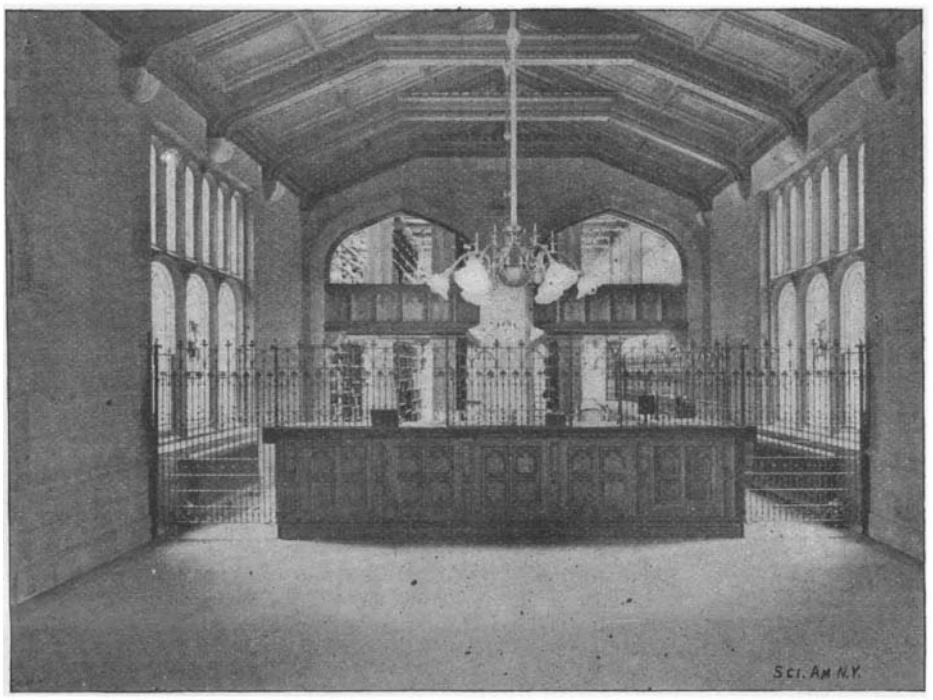
THE NEW LIBRARY OF PRINCETON UNIVERSITY.

Princeton University is also fortunate in possessing another new building which has added greatly to the architectural appearance of the lower end of the campus. "Blair Hall" is a dormitory building, costing $150,000, and was the gift of Mr. John I. Blair. Our engraving shows the approach to Blair Hall from the railway station. The building stands at the end of the elevation upon which the college buildings are erected, overlooking the valley, and through the archway may be seen Alexander Hall, one of the most imposing buildings on the campus.

The new dormitory building is approached from the station by a flight of bluestone steps, twenty-five feet wide. These steps give access to the tower, which is four stories in height, and is terminated by a machicolated parapet and four battlemented tourelles. The tower passageway, with its fine groined roofing, is a very effective approach to the buildings scattered about the campus. The building proper is long and narrow, being shaped somewhat like the letter Z. The section at the left of the tower is 143 feet long, the section on the right is 93 feet 8 inches long, and the third section, which projects from this, is 50 feet long. The width inside the walls is about 32 feet.

The building is of the ordinary stone which is common near Philadelphia, and the face of it is roughly tooled off. The color is a warm yellowish gray. The

stone at the windows, doors, and quoins and all stone for carving is Indiana limestone. The roofing is of Vermont green slate. In plan the dormitory consists of a series of isolated blocks entirely separate from each other. Access is given to these apartments by eleven different entrances, in each of which is a staircase leading to the second story. Eight students live in each section, but in two or three instances the number is increased. The total capacity of the building is 110 students. Each student has a bedroom, and two students have the use of a common study or sitting room. This arrangement gives much more privacy and comfort than in a large dormitory, which may have from fifty to a hundred apartments. The architects are Messrs. Cope & Stewardson, of Philadelphia, Pa.



DELIVERY ROOM, LIBRARY, PRINCETON UNIVERSITY.

A New Spectroscope.

What is the most remarkable advance in optical research in many years, in the judgment of experts, is the invention of a new form of spectroscope by Prof. A. A. Michelson, of the Ryerson Laboratory, University of Chicago. He has been using it this year for investigations of great delicacy, and descriptions of it are now creeping into the technical publications.

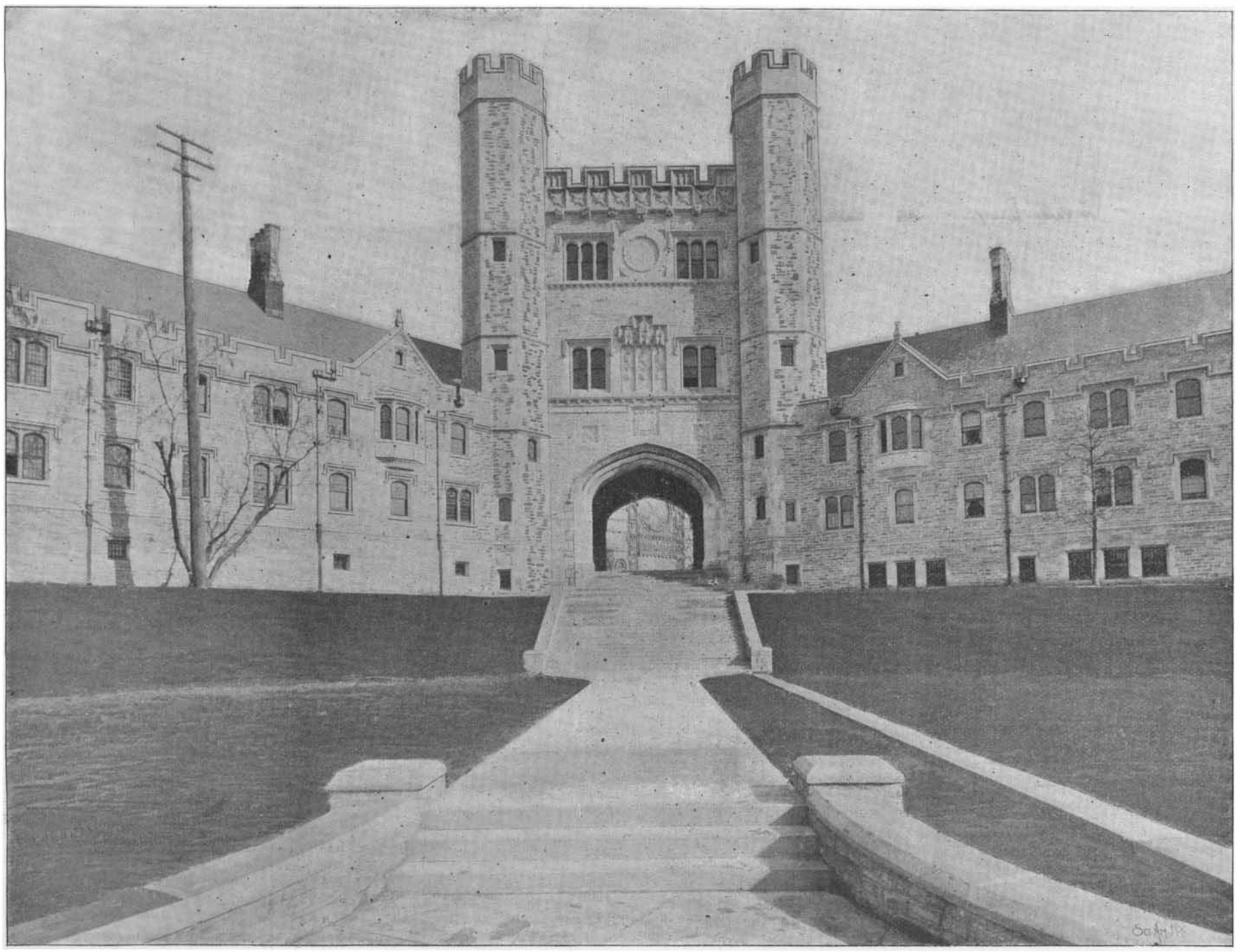
The old style of spectroscope was made with a prism. This broke up a ray of light into the constituent colors and spread them out in a rainbow-tinted band, the red at one end and the violet at the other. If the ray proceeded from the sun, the prismatic ribbon was found to be crossed by a number of black lines. If it emanated from incandescent vapor, the lines were bright instead of dark. The position of these lines along the spectrum, which can be measured with great precision, tells the scientist a good deal about the nature of the substance that emits the light, and reveals something in regard to its motion if, as is often the case, the object under examination be a star.

Naturally, so soon as spectroscopic work was undertaken by the astronomers, it became desirable to stretch a spectrum out as far as possible, in order to separate adjacent lines. Hence a train, or series, of prisms was used, instead of a single prism. Thus a higher "dispersion" was secured, and the lessons of the lines in solar, planetary, and stellar spectra could be more rapidly grasped. With faintly luminous objects, like nebulæ and very small stars, only a limited degree of dispersion is practicable; for when a spectrum is greatly expanded it becomes less and less visible, and beyond a certain point it will not reveal anything to the spectroscopist. On the other hand, when the light is intense, like that of the sun, and when it is important to distinguish positively between lines that occupy nearly the same position, the utmost separative power is wanted, and it can be used with safety.

After a little it was found that an excellent spectrum could be obtained by a piece of apparatus quite unlike the prism. A small mirror, slightly concave, was ruled with fine parallel lines. This device, called a "diffraction grating," has been improved wonderfully by Prof. H. A. Rowland, of Johns Hopkins University. His principal achievement in this field was in devising the machinery for ruling the lines. Many of the best gratings are only a few inches in diameter, but have from 10,000 to 20,000 lines to the inch! It is said, though, that the famous ruling engine in Baltimore is capable of cutting over 100,000 lines to the inch. The narrowness of such scratches is almost inconceivable.

The grating is superior to the prism in two respects. It is more compact and manageable and it has a higher dispersive power. In the latter respect, if not in the former, the new instrument of Prof. Michelson surpasses the grating. The best gratings now in service have a resolving power of 100,000. That of the spectroscope which Prof. Michelson has recently been using is 300,000, and he expects soon to have one that will rate at 500,000. With such an inquisitor the physicist is sure to get at a host of secrets hitherto beyond his ken.

The general arrangement of this instrument is easily understood even by one who does not master the principle on which it works. A series of glass blocks, shaped something like rather thick dominoes, compose it. An idea of their appearance and position can be obtained by imagining these blocks to be placed on edge, on a table or other horizontal surface, close together, with the face of one against the back of the next. The spectroscope at the Ryerson Laboratory has eighteen of these pieces and they are all about seven-eighths of an inch thick (18 millimeters, to be exact). It may be assumed that they are all of the same width, say three-quarters of an inch, and as they stand on their edges, the



PRINCETON UNIVERSITY'S NEW DORMITORY—"BLAIR HALL."

"width" here means height above the surface of the table.

But the lengths vary. If a ruler or other straight edge be brought against the series, so as to bring their left-hand ends in a line, it will be discovered that the other ends do not match, but constitute a regular flight of steps. The first domino is an inch or more long. The second is shorter by 1 millimeter. The third is 2 millimeters shorter. The eighteenth is 18 millimeters shorter, and therefore is not more than a third of an inch long.

When this instrument is in use, the ray of light to be analyzed is sent through the whole series from the wide to the narrow end; and the magnifying apparatus or eyepiece is placed next the latter. It will be perceived, therefore, that if the beam be wide enough, this succession of events will ensue: After going through the first plate in the series, most of the light will pass on through the next one, but a small portion of it will come out into the open air, in consequence of the diminution in size of the second block. That portion which comes out will travel parallel with that which goes into the second plate, but it will move a trifle faster, because the glass offers some resistance to its progress—only a little, yet enough to produce a certain peculiar optical effect.

At each step in the series this phenomenon is repeated. Another small portion of the original beam comes out into the air, but continues to go on in an unchanged direction. At the further end of the instrument, then, there are eighteen slices of the beam, each traveling at a slightly different rate.

The retardation in the progress of the light amounts to 20,000 waves for each plate it goes through. Therefore, the small portion of the original bundle of rays that has traversed the whole eighteen plates is about 360,000 waves behind the portion that did not go through any of them. So soon as one recalls the fact that color is due merely to differences in the rate of vibration, he can see that this gradual retardation must break up the beam, not into all the colors of the rainbow, but into infinitesimally delicate shades of some one hue. The instrument is not intended to give a full spectrum, but to examine microscopically a minute portion of it.

Owing to its peculiar shape, Prof. Michelson calls his device an "echelon spectroscope." Although the design is exceedingly simple, the construction is unspeakably difficult. The plan here employed for treating a light ray makes necessary a degree of uniformity in the thickness and levelness of the plates that can scarcely be imagined by the uninitiated. Workmanship of the most wonderful precision is required in the process of manufacture. In practice, the optician would make one little plate of glass of the proper thickness and smoothness, having, as the mathematicians say, "perfectly plane and parallel surfaces," and then cut this up into the proper number of pieces.—New York Tribune.

ACCORDING to British patent No. 11,695, of May 11, 1897, an alloy of 63 parts of iron and 37 parts of nickel has a coefficient of expansion almost equal to naught, and is therefore particularly adapted for scientific instruments, for water tubes for boilers, etc.—Stahl und Eisen.

The Current Supplement.

The current SUPPLEMENT, No. 1191, contains many articles of great interest. The "Ghost Dance," by Cosmos Mindeleff, is continued and is illustrated by engravings from the reports of the Bureau of Ethnology. This series of two articles is particularly interesting in view of the uprising in the Northwest. The "Trunk Trick" describes an interesting trick which has proved very popular in Paris and London, and is fully illustrated. "The Improved Photogravure Process for Printing from Stone, Aluminum, Zinc, and Copper," by Benno Koerner, gives practical directions for working the same. "The Opening Address before the British Association," by Prof. W. F. R. Weldon, President of Section D, discusses the principal objections which are urged against the theory of natural selection and describes the way in which these objections may be met. "Recent Advances in Science," by Prof. Virchow, is also a most important paper. An article on "Phosphorescence" completes this issue.

Contents.

(Illustrated articles are marked with an asterisk.)

RECENTLY PATENTED INVENTIONS.

Agricultural Implements.

THRESHING MACHINE.—JAMES E. WOOD, Hetland, South Dakota. With the automatic bundle-feeder and rotary threshing cylinder of this machine are connected an intermediate band-cutter composed of a rotary shaft having a series of curved cutters or blades, and a vibrating table provided with slots for the blades, the table being hinged in the rear of the shaft and extending forward of the latter to a point contiguous with the cylinder. Cams on the shaft successively vibrate the table. All shafts are driven from the threshing cylinder by means of belts. All moving parts operate simultaneously.

REEL FOR HARVESTERS.—JOHN C. LEE, Climax, Minn. The purpose of this invention is so to construct a harvester-reel that the blades may be given any desired lateral or horizontal inclination relative to the reel-shaft, and may be quickly restored to the usual straight position. To this end the reel shaft is made in two telescopic sections, the exterior section having V-shaped slots, one at the front and one at the rear. A sleeve on the exterior section has opposite angular slots, the arms of one slot being inclined upwardly from the center and the arms of the other slot being inclined downwardly from the center. A pin extends from the interior section of the shaft into all of the slots. Means are provided for operating the sleeve.

SPRINKLER.—JOHN EVANS, Salt Lake City, Utah. This sprinkler is designed to deposit upon plants a liquid poison, by which vermin on the plants may be killed. The device comprises one or more tanks or reservoirs, and a drag-bar for each tank, the bars controlling valved outlets from the tanks and being actuated by engagement with the plants.

CULTIVATOR.—WILLIAM H. SAYER, Adams, Ore. By means of the present invention, the shovels of a cultivator may be caused to travel at any desired depth or to be carried entirely out of the ground. In the main frame a crank-axle is mounted which is provided with wheels. Cultivator-shanks, having blades, are carried by the frame. Pivotally connected with the main frame by its forward end is an auxiliary wheel-supported frame. By means of an adjusting lever on the main frame and a connection between the lever and the crank-axle the cultivator-blades may be raised or lowered slightly. By means of a second lever, the blades can be carried deeply into the soil or raised entirely from engagement with the ground.

Bicycle Appliances.

BICYCLE-FRAME.—MOSES L. HALL, Knobel, Ark. The purpose of this invention is so to construct the seat-mast that a perfect spring seat will be obtained, and that the distance between the seat and the pedals will remain constant. To this end the saddle-post is spring-controlled, and the spring-controlled crank-hanger attached to the saddle-post is made movable therewith. In order that the chain may be kept tight under all conditions, the inventor journals the rear wheel of the bicycle in head-blocks moving in the rear forks. Springs guided by pins projected from the head-blocks normally pull the head-blocks rearwardly and with them the shaft and its sprocket-wheel.

TIRE.—OSKAR E. NATHANSON, Copenhagen, Denmark. This invention provides tires for the wheels of cycles and other vehicles, which are possessed of the same resiliency as pneumatic tires, and which need not be inflated, the tires not being affected by puncture. The tire consists of an inner rigid ring, two additional rings outward from the inner ring and at each side thereof, an elastic tube inclosing these additional rings and engaging the adjacent side of the inner ring, a wooden ring lying outside and between the last named rings, being in engagement with the elastic tube on the side exactly opposite that engaging the inner ring, and an envelop inclosing all the rings.

Engineering Improvements.

ROTARY ENGINE.—ALMER N. BLAZER, Mescalero, New Mexico. The engine forming the subject of the present invention has cylinders opening longitudinally into one another. Pistons are secured on shafts journaled in bearings on the cylinder-heads and extend beyond the heads to connect with the machinery to be driven. The pistons are mounted to turn in unison within the cylinders, and are formed on their peripheries with spiral piston-heads running in opposite directions. One piston-head fits into the spiral groove formed by the piston-head of the other piston. The spiral grooves have a long pitch, whereby the use of extra gearing for the connection of the piston-heads is avoided. At the ends of the cylinders are steam-chests into which open the ends of the spiral grooves of the pistons. The steam-chests have ports and a rotary reversing valve located between a steam-inlet port and an exhaust-port and controlling the inlet and the exhaust.

GAS OR OIL ENGINE.—FRANK S. MEAD, Montreal, Canada. In this improved engine, adapted to be run either by gaseous or liquid fuel, the gas is fed and mixed with fresh air upon entering the working-chamber of the power-cylinder. The amount of fuel used is completely controlled by a governor, according to the amount of work to be performed, maintaining at the same time a uniform speed under varying conditions of load. In most gas-engines, the vaporizing chambers are placed in the path of the air passing from the air compression chamber to the power cylinder, and hence do not maintain sufficient heat for economy. The inventor of this engine places the vaporizing chamber so as to be independent of this air passage, the only matter passing through the chamber coming from the spraying device.

MECHANISM FOR OVERCOMING DEAD CENTERS.—WILLIE H. JOHNSON, Navasota, Tex. The present invention is an improvement upon devices patented by the same inventor to overcome dead-centers. With the crank-shaft and the reciprocating rod in an engine the dead-center mechanism provided by this inventor is so connected that it will operate alternately about two centers as two levers, and then about one center as one lever. Locking devices alternately lock the mechanism about its single and double centers. A valve-gear is operated by these locking devices to admit steam to the cylinder at the dead-center points, thus doing effective work when the crank is on the dead-center.

Electrical Improvements.

UNDERGROUND ELECTRIC RAILWAY.—CHARLES W. JENKINS, Richmond, Va. In the conduit provided by the inventor for his railway, a yoke is provided having a central post. Hand-hole casings extend from the yoke in the direction of the length of the track. An insulating side beam spans this casing and a transverse insulating beam is supported at its ends by the side beams and the slot-plates carried by the yoke. By this arrangement of transverse insulators and side beams of wood, the insulators can be spaced a considerable distance from any point of contact with the earth, and thus reduce to a minimum the loss of power incident to a more direct connection.

Mechanical Devices.

TRANSPORTATION-APPARATUS.—NORMAN B. LANE, Lane's Mills, Pa. This improved transportation apparatus is designed to furnish a kit especially serviceable in the Klondike regions. In this apparatus are combined a boat, a sled, a storehouse, a place of abode, and a vehicle adapted for use on narrow bridle-paths. The apparatus consists essentially of a boat provided with brackets, in which wheels are supported, with runners extending along the bottom, and with carrier-bars, so that the apparatus can be carried by two men.

BRICK-CUTTING TABLE.—JAMES C. STEELE, Statesville, N. C. This apparatus belongs to that class of machines in which the clay is fed in continuous bars to the cutting devices. These cutting devices are operated from a main shaft having a crank projection. The feed of the clay to the cutting devices operates a pulley. A pivoted detent is arranged at one end to engage the crank-projection of the main shaft. A projection is connected with the pulley to operate the detent whereby the operation of the cutting devices will be controlled by the on-feed of the clay bar. The bed-plates which support the clay to secure a square, clean cut, are so controlled as not to interfere with the movement of the clay over the table or carriage.

FREIGHT AND PASSENGER ELEVATOR.—JOHN H. MOON, Portland, Ore. The cage of this elevator slides in the usual elevator guide beams. Embracing the top cage-bar is a clevis. Between the clevis and the bar a spring is arranged. A hoisting rope and its pulley are attached to this hanger. Links are pivoted on the pulley axle, which axle passes through the hanger. Spring-levers are connected with the links, and pendent rods and slidable blocks have projections to engage the guide frame.

LIFT FOR BINDING-MACHINES.—OLE JOHAN ANDREASON, Copenhagen, Denmark. The new and characteristic features of this machine consist in the arrangement of a second carrying belt lying above the common carrying belt, and provided with pikes to carry along the crop, by which arrangement the crop gathered cannot accumulate on the picking-up teeth. The teeth are so arranged, each on its revolving arm, that the single teeth, independently of one another, can follow the varying surface of the ground and, consequently, always grasp below the crop. Firm, but adjustable guide-wires are placed at the side of and on a level with or a little in front of the upper ends of the teeth for picking up, between these and the lower carrying belt. These guide-wires assist in preventing the crop from sliding away between the teeth. The belt prevents the upper ends of the teeth from being squeezed when the crop is passing.

WOOD-EMBOSSING MACHINE.—ALOIS KOHLER, New York city. This invention provides an improvement in those wood-embossing machines employing a circular die to impress a pattern in the wood. The rotary die is adjustable in angular position. An endless belt forms the work-supporting table, and is composed of connected slats having upwardly-projecting knees at one end adapted to take the side-thrust, and teeth formed on their inner sides. A toothed pinion is mounted to rotate in engagement with the teeth of the slats, and is located immediately below the die. Bearing bars are placed at each end of the slats and overlap the ends and bottom sides thereof.

COMBING MACHINE.—ANTHONY GUNERMAN, Hoboken, and GEORGE SCHACHT, Jersey City, N. J. The machine forming the subject of this invention is an improvement upon a similar apparatus patented by the same inventors. In the present machine a reciprocating upper comb is provided, having reversible tooth-carrying bars, the teeth of these bars being inclined. A lower comb is also provided having tooth-carrying bars mounted to rock. The toothed carrying-bars of the lower comb may be rocked by the action of the upper comb. Locking devices are provided for the toothed bars of the lower comb, whereby these toothed bars may be held stationary when desired.

DRILL.—THOMAS W. GRAY, Peoli, O. In this drill a frame is provided that comprises two sections sliding one upon the other, one section being provided with ratchet teeth. Dogs are mounted in the sections of the frame without teeth and are held in engagement with the ratchet-teeth by means of a spring. These dogs are provided with gear-teeth meshing with one another, and the shaft of one of the dogs is extended to receive a crank.

REVERSING MECHANISM.—FRANK S. MEAD, Montreal, Canada. The purpose of this invention is to provide a reversing mechanism for propeller-shafts by means of which the driven shaft may be quickly reversed or released without changing the direction of the power-shaft. An annular pulley running continuously in one direction drives from its inside surface an idle-pulley rotatably mounted on a stud and held in one position circumferentially relative to the annular pulley. A driven-pulley is made movable to engage either the driving-pulley or the idle-pulley.

BRICK-MACHINE.—JOHN ROWE, Sidney, Ia. This brick-machine is provided with a former having sets of openings, of which the openings in a succeeding set are larger than those in the preceding set. A presser operates in conjunction with the former to press the material successively in layers through the sets of openings into the registering compartments of the sanded molds. Means are provided to bring the sanded molds into position at the openings of the former.

Railway Appliances.

CAR-COUPLING.—JOHN G. SHERRILL, Gordon, Tex. The car-coupling of this inventor is of the hook-and-catch type, the two parts being adapted for automatic engagement with each other. The coupling has a draw-head in which a pusher-bar slides longitudinally and is actuated outwardly. A rockable coupling-hook having a notch in the circular edge on its flat rear end is pivoted on the pusher-bar. A detent-dog is spring-pressed toward the notch of the coupling-hook. A lever is pivoted on the draw-head and is shackled to the detent-dog so as to actuate the dog when rocked. An arch-piece on the car-body is adapted to hold the lever when rocked, to lock or release the coupling-hook.

RAILWAY SIGNAL.—JEHU D. BUNDY and ARTHUR L. JACKSON, De Kalb, Tex. This signaling apparatus is designed to be attached to locomotive engines and to be thrown into action by a detent on the track. The detent is controlled by the switch, so that when the switch is opened the signal of the locomotive engine is actuated and the engine-driver is informed in time to check the train. The apparatus is automatic in its action and will therefore be actuated independently of signalmen, thus considerably lessening the danger of accidents incident to negligence.

Miscellaneous Inventions.

CASING OR TUBE ELEVATOR.—SCOTT E. LEECH and GEORGE ASLETT, Mannington, W. Va. The present invention is an improvement in elevating devices for use in lifting casing or tubings such as are used in wells. The links by which the casing is suspended are readily detachable, so that in case one or both such links should break, they can be readily removed and another inserted in a few moments, thus saving the expense and loss of time required to return the device to a repair shop.

FOLDING-UMBRELLA.—FRANK G. GROVE and FRANK E. STOVER, Luray, Va. These inventors have provided improvements in those collapsible umbrellas having ribs made in sections adapted to slide on one another. One of these sections in the present umbrella is free at its inner end and curved or deflected at this free end, thereby springing into engagement with the other section, whereby the two sections are interlocked. By depressing or straightening the curved portion, the sections may be unlocked. The handle of the umbrella is made in sections which are screw-jointed. A special locking device is provided, by means of which the handle-sections are prevented from rotating one on the other.

ATTACHMENT FOR BUOY-CABLES.—CHARLES A. HUTCHINS, Halifax, Canada. In the use of floating buoys, it frequently happens that changes in the tides and winds cause the cable to be fouled either with itself or with the bottom, so that the cable is shortened and the efficiency of the buoy is impaired; or, in a heavy sea, the buoy is liable to part the cable and go adrift. The inventor avoids these difficulties by holding the loose folds of the cable off the bottom of the body of water in which the buoy is placed so that the cable is slacked off and taken in according to the strain from the buoy. The strain in the mooring is also relieved by employing a drag against the strain from the floating buoy, so that as a heavy sea strikes the buoy, the strain on the cable is transmitted first to the drag and thence in a diminished degree to the mooring itself.

Designs.

SPOON OR SIMILAR ARTICLE.—AUSTIN F. JACKSON, Taunton, Mass. The leading feature of this design is the arabesque ornamentation of the inner end of the handle and the adjacent portion of the bowl or body. Another feature is the ornamentation of the outer end of the handle. The shank or intermediate portion of the article is ribbed and slightly tapered.

STAMP.—JOSEPH ROTHSCHILD, New York city. This design consists of a base or body from which depends the character-strip. A handle extends upwardly from the middle of the base or body and has a flattened portion in a plane approximately parallel to the inner face of the base-block.

NOTE.—Copies of any of these patents will be furnished by Munn & Co. for 10 cents each. Please send the name of the patentee, title of the invention, and date of this paper.