

tions there are eleven wooden piers with a maximum distance of 1,312 feet.

In Fig. 2 is shown part of the first section, the ropeway traversing the thick woods. A spirally wound rope, one inch in diameter, made from first-class case-hardened steel wire and having 95 tons breaking strength per square inch, supports the loaded buckets, while a similar rope of the same quality and of  $\frac{3}{4}$  inch diameter has been provided for the emptied buckets. Both of these ropes are anchored at the first intermediary station with their tension weights in the lower motor station. In order to avoid any sliding of the traction rope in the 1,312-foot span (Fig. 1), wooden supports have been provided, carrying cast-iron guiding rollers. From the first intermediary tension device, B, the ropes are carried as far as the second tension device by a single double support, c, situated not far from the second station, C, so as to obtain a span of 4,100-foot length with 2,296 feet level difference. On this span of the railway two different views are represented in Figs. 2 and 3. The second intermediary tension device, C, with the double support, c, located in front of it, is shown in Fig. 5. The supporting ropes of this section are 1.12 inches and 0.8 inch in diameter.

Another large span of 7,380 feet length, overcoming another 1,968-foot level difference, will be found on the third section, where supports, d, have likewise been arranged shortly before the two stations, D, to insure the same satisfactory guiding of the rope. The supporting ropes are 1.12 inches and 1 inch in diameter respectively, and are anchored at the unloading station situated at 10,496 feet above the level of the sea, whereas the tension weights are arranged in the second intermediary station. As the various lengths of rope vary between 1,205.6 and 1,476 feet, their ends have been provided with couplings, which are filled with cast metal and which have a far higher breaking point than the rope itself, thus avoiding a loosening of the couplings.

The unloading station at Chaberton (D in Fig. 1), which is situated at 10,496 feet above the level of the sea and therefore covered with snow during the greater part of the year, is a structure built almost entirely of wood. The carrying ropes of the third section are anchored by means of railway rails in the foundations, and are thus perfectly isolated from the wooden discharging structure. The transition from the ropes to

the station is effected by means of a steel tongue, to which are connected the suspended railway rails of the station, serving to transfer the arriving unloaded trucks to the empty rope. For the suspension of these rails there have been arranged so-called suspension shoes, which are fixed to the wooden structure at 6 to 10 feet distance. On entering the station the truck is automatically unlatched from the continually moving hauling rope and after being unloaded by the operator is conveyed to the other end of the rail, there again to be automatically coupled to the hauling rope.

The two intermediary tension devices serve for carrying the tightened and moored ropes by means of suspension rails, effecting by the aid of tongues a connection between the rope and rail. These rails have the same gage as the two carrying ropes, so that the trucks are allowed to pass over the rails without being loosened from the hauling rope, thus doing away with the necessity of any superintendence in such stations.

The tension weights above referred to, which tighten the ropes of the second and third sections, are loaded to one-fifth of the aggregate breaking strength of the rope, warranting in the latter a five-fold safety against breaking.

The driving and loading station (Fig. 6) is designed entirely of cement masonry, being connected with the 80-horse-power turbine plant which serves for the operation of both the wire-rope railway and the electric lighting dynamo. The trucks are here also automatically disengaged from the hauling rope and again coupled to it. The station is provided with a suspended railway serving for the passage and loading of the empty trucks.

The driving gear, as seen from Fig. 7 (showing an internal view of the station), comprises a main driving sheave with two leather-lined grooves, several intermediary sheaves and the sledge sheave of 6.56 feet diameter. The drive is transmitted from the turbine shaft by means of a belt disk and conical wheel gearing to the vertical shaft, to which the main rope disks are fixed. For stopping the ropeway there have been provided two wood-lined brakes.

The ropeway is engaged and disengaged by means of a clutch mounted on a turbine shaft. Beneath the floor has been arranged the sledge for the hauling rope

which, owing to its length, has been designed as three-groove tackle with disks of 6.56 feet diameter. The traction rope, which is made from the best, highly flexible, case-hardened steel wire of 120 tons breaking strength per square inch, is  $\frac{3}{4}$  inch in diameter and is stretched to one-tenth of this breaking strength. The speed of the hauling rope varies between 5 and 7 feet per second, the distance of the trucks being about 1,575 feet. As the latter arrive at intervals of 240 seconds, the output of the plant will be 13,000 pounds per hour, the capacity of each truck being 880 pounds. The motive force yielded by the turbine is about 55 horsepower, only eight men being required to operate the arriving and starting trucks.

The mean gradient of the railway is 50 per cent, while gradients of up to 100 per cent or 1 in 1 as occurring in some parts, are dealt with with the same safety.

#### The Failure of Santos Dumont's New Aeroplane.

Santos Dumont tested his new aeroplane on the parade grounds at St. Cyr on March 27, with the result that this latest and most fragile flying machine was smashed beyond repair, and was afterward cut to pieces with a saw. Two runs were made across the field. In the first one, a speed of but 12 miles an hour was obtained. In the second, the speed was perceptibly greater, but after the machine had covered half the length of the field it struck a rough spot and broke in two. The accident was apparently the result of insufficient bracing of the planes. These, as can be seen from a glance at the photographs in our last issue, were set at a wide dihedral angle without any bracing whatever. M. Dumont signified his intention of building a third aeroplane soon, and of using better material in it. In the meantime he expects to experiment further with his old machine, "14 bis," with which, it will be remembered, he flew successfully last autumn.

In a paper on the "Installation of Centrifugal Pumps," by Mr. W. O. Webber, the author states that it is safe to say that 65 per cent represents the average commercial efficiency of the multiple-stage turbine pump in the market to-day, while 80 per cent can be realized upon the straight, single-impeller, volute, centrifugal pump at heads of less than 100 feet.

#### RECENTLY PATENTED INVENTIONS.

##### Electrical Devices.

**TELEPHONE-RECEIVER.**—L. STEINBERGER, New York, N. Y. The several objects of the invention are to provide the receiver with a casing of metal; to provide telephone receivers or similar devices in which the magnet and other parts—such as binding-posts, binding-post sockets, and the suspending-hook—are imbedded in an insulating material which forms a core that is received in an outer case, and finally to intensify the sound-waves reproduced by the receiver.

**ALTERNATING-CURRENT PLANT COMBINED WITH STORAGE BATTERY.**—L. SCHRÖDER and A. MÜLLER, 31A Luisenstrasse, Berlin, Germany. The invention relates to alternating-current plants combined with storage batteries, and has the purpose to regulate the charging and discharging of the storage battery in such a manner that if the current used in the plant varies the prime mover actuating the main generator continues working with constant load. The application is for a division of the pending application formerly filed by these inventors.

**ELECTRIC SIGNAL SYSTEM.**—E. CHOUTEAU, JR., St. Louis, Mo. The invention relates to electric railway-signals, the more particular object being to produce a system which is to a certain extent automatic and to a certain extent is controlled at will. By means of the arrangement the engineer's mind is kept constantly trained, so that vigilance becomes habitual and there is no relapsing into the habit of carelessness.

##### Of Interest to Farmers.

**CORN AND BRUSH KNIFE.**—D. B. DATE and A. B. KUGELMANN, New York, N. Y. One of the purposes of this improvement is to provide a construction of corn and brush knife whereby labor will be much reduced and which will cut simultaneously and equally at both sides of the slanting stalks and brush, producing a clean shear cut having an upward inclination.

**CULTIVATOR.**—A. M. BARKER, Franklin, Neb. This invention relates to straddle-row cultivators, and has for its object the provision of means effective in operation, and durable in use adapted to cultivate one or more rows of plants, as may be desired. Means are provided enabling the gang-beams to be adjusted at the desired distance apart.

##### Of General Interest.

**WINDOW-SHADE ADJUSTER.**—NELLIE F. CAPPS, Red Bluff, Cal. This invention introduces a new feature in shade adjusters, enabling the operator to raise or lower the shade, admitting air and light as desirable in offices, or to bring out the shade transversely

from the window casing, to swing it to right or left to admit air and shut out rays of light, as is especially desirable in sleeping rooms in hot weather. It is very simple, requires no fitting, is easy to put up, does what is claimed for it, and can be cheaply manufactured.

**DIVISION-PLATE FOR EGG-CASES.**—C. J. VOORHORST, Chicago, Ill. The invention is an improvement in pocketed packing-plates for use in holding eggs, fruit, or other articles during transportation or storage. The plates when made of paper-pulp or similar material will be comparatively rigid as to their egg-receiving units or pockets and somewhat flexible as to the lines along the curve-reversing line, so it will possess the strength of the dome or arch in the pockets to protect the eggs and also the desired flexibility to permit its adjustment or yielding when in use.

**PAINT.**—J. F. VILLARD, Rexton, New Brunswick, Canada. In this composition of matter adapted for use as a paint the ingredients are so united that they will remain homogeneous and in it the oil will not separate from the other ingredients even when the paint is left standing in the cans. This paint will not prematurely run and drop from the brush.

**TRUCK FOR WOOD-PRESERVING RETORTS.**—H. M. ROLLINS and A. J. NEFF, Houston, Texas. The principal object of the invention is to so construct a truck as to permit the loading of a greater amount of wood upon it than has heretofore been the case, and especially to provide for filling practically the entire space with a retort with wood or other articles to be treated. A further object is to provide for preventing the lifting of the truck when the liquid preservative is introduced into the retort.

**CASK OR VESSEL FROM WHICH LIQUID IS DISCHARGED UNDER PRESSURE.**—G. LINDNER, 88 Kriegstrasse, Karlsruhe, Baden, Germany. The object of the invention is to cause the vessel to operate with expansion of compressed air in order to fully utilize the energy of the compressed air, to effect economy in driving power. For this purpose two floats are employed. This air enters the vessel with a higher pressure than is necessary. In consequence the air-pressure at the commencement accelerates the motion of the liquid and maintains rapid current. The vessel emptied to a certain extent, one float closes the air-supply. Compressed air now operates in further expelling the liquid until pressure has sunk correspondingly to pressure of the liquid-column. This attained, the second float opens the air-discharge.

**PIANO SOUNDING-BOARD.**—THEODORE WOLFRAM, Columbus, Ohio. Mr. Wolfram's sounding-board is formed with a continuous rib spaced a uniform distance from the inner contour of the back frame. The usual trans-

verse ribs are secured to the face of the sounding-board within the continuous rib. By this arrangement that portion of the sounding-board lying outside of the continuous rib is wholly unobstructed, so that the sounding-board is rendered exceedingly sensitive to vibrations. Every part of the sounding-board is in sympathy and weak places in the scale are prevented. In general, the tone is richer, and a very superior sustaining quality is obtained.

##### Hardware.

**CULINARY TONGS.**—C. F. SMITH, New York, N. Y. The tongs are for use in grasping and lifting such articles as eggs, potatoes, and the like. They are composed of a single wire bent upon itself at its center to form arms, connected together by an eye, which serves as a spring tending to hold the arms in separated relation. At the end of each arm a pocket is provided of like construction, these pockets being formed by spirally coiling the wire conically and in an oval shape, thus adapting the pockets for grasping and lifting the above-named articles.

##### Machines and Mechanical Devices.

**PAPER-MAKING MACHINE.**—J. B. WALKER and A. R. BOND, New York, N. Y. The invention relates to paper-making machines, particularly of the type known to the art as "cylinder-machines." The fibers of paper ordinarily made have a general trend or grain in the direction of the length of the paper, mainly due to the fact that the fibers deposited on the screen are dragged through the pulp in the tank as the cylinder revolves and are virtually combed in the direction of rotation. By means of the invention, a paper is produced with a grain running transversely to the length of the paper.

**MACHINE FOR CUTTING WEB MATERIALS.**—W. D. SKIDMORE, Pelham, N. Y. A carriage reciprocates along the line of movement of paper or other stock and is actuated by a cam device to move with and in direction of the stock during cutting operation. Stock cutting is effected by ledger and shear blades mounted on the carriage, the latter blade being periodically advanced to cut by a tappet mechanism geared to work in time with the movements of the stock and carriage. From the knives the cut stock is received by a set of delivery-rolls which deliver from the machine. These rolls may also be made to crease edges of cut material so that each length will preserve its direction until clear of the machine, to make room for the succeeding length.

**PISTOL.**—M. J. SHIMER, Freemansburg, Pa. The frame mechanism consists of but two main elements, the trigger and hammer and accompanying springs. The trigger automatically

follows the hammer to cocked position and acts as a sear to hold it cocked until the trigger is pulled. The principal purpose of the inventor is to provide means whereby when the barrel is broken or opened to introduce a cartridge the hammer will be automatically locked in full cocked position and the trigger will be held stationary until the barrel is restored to normal position.

**SAW-SHARPENING MACHINE.**—J. D. MCAULAY, Baddeck, Nova Scotia, Canada. The machine comprises means for carrying the saw and actuating devices for moving the saw to bring the teeth thereof successively into proper position to be sharpened. Reciprocating sharpening devices are used, together with a guide therefor, in association with a horizontally-shiftable supporting-frame for said guide, the organization being such that the sharpening devices proper may be quickly shifted and set to different positions relatively to the stand for enabling the sharpening to be effected.

**FILLING-FINGER.**—W. E. LYFORD, Thompsonville, Conn. The invention pertains to yarn-printing machines, such as are used by carpet manufacturers in making tapestry and other carpets, rugs, and the like. The object is to provide a finger for guiding yarn onto the printing-drum, and arranged to smooth the yarn on the drum, thereby insuring a proper uniform application of the color onto the yarn during the subsequent usual process of printing.

**AIR-COMPRESSOR.**—A. GOOD, Claffin, Kan. The invention has reference to cylinders and valve mechanism suitable for use as an air compressor or as an engine. In operation the device may be used for withdrawing an aeriform body through a pipe leading to any desired point—say to the bottom of a mine and expelling the body through a hand-valve. The device is used in this way for the purpose of removing choke-damp and noxious gases from mines and causing the latter to be filled with fresh and pure air.

**ADDING-MACHINE.**—A. I. GANCHER, New York, N. Y., and A. T. ZABRISKIE, Passaic, N. J. The object of the present invention is to provide a machine arranged to render the action of the number-wheels positive and without danger of the parts easily getting out of order and to allow convenient and quick resetting of the machine to zero when desired. It relates to adding-machines, such as shown and described in Letters Patent of the United States formerly granted to N. H. Kodama and A. I. Gancher.

**BOOKBINDING-MACHINE.**—W. E. BLAUVELT, New York, N. Y. The invention relates to improvements in machines for affixing the crash, the head-bands and the paper lining to books preparatory to placing the covers thereon, an object being to provide a machine of this character by means of which the work

may be rapidly carried on and the books delivered from the machine in a strong and neatly finished condition.

ATTACHMENT FOR CLEANING COTTON-GIN SAWS.—H. J. FITZPATRICK, Athens, Ga. Gin-saws must always be dry, and in ginning wet or green cotton the saws become clogged.

Musical Devices.

SELF-PLAYING PIANO.—H. MEYER, New York, N. Y. The object of the invention is to provide a piano arranged to insure accurate playing of the keys and with the proper touch and expression and to allow the use of a single note-sheet containing a number of pieces of music.

MUSIC-LEAF TURNER.—E. R. ELDRIDGE, Sumter, S. C. In the operation of this improvement the folio is placed upon the support with the back thereof engaged by clasps, and the individual leaves are engaged with jaws of the turning arms.

Prime Movers and Their Accessories.

ROTARY ENGINE.—A. GLIOME, New York, N. Y. This invention pertains to certain improvements in rotary engines adapted to be operated by steam, compressed air, or other fluid under pressure.

PUMP.—W. Y. CRUIKSHANK, Freeland, Pa. This invention relates to pumps, and especially to rotary lift-pumps. The object is to construct a pump of the class described having an improved arrangement of the vanes whereby the efficiency of the pump will be much increased.

Railways and Their Accessories.

CAR-REPLACER.—W. Cook, Hoboken, N. J. In this instance the invention relates to car-replacers, such as used for replacing derailed trains upon the track. The object of the improvement is to produce a device of this kind which can be readily set in position and which will be reversible in its nature.

HAND-CAR.—J. W. FINCH, Elizabeth, Miss. In operation when the rock-lever is rocked upon its bearings the parallel arms are rocked about a counter-shaft, and since the stub-shaft is rigid with the pitman and a gear-wheel is rigid with the stub-shaft, another gear-wheel which meshes with the first one is constrained to rotate and carries the counter-shaft therewith at a much higher speed than were the parallel arms secured directly to the counter-shaft and acting thereon as a crank-arm.

Pertaining to Recreation.

FISHING-REEL.—G. W. BLACKBURN, Sarasota, Fla. The principal objects in this case are to provide reels with an improved friction-drag, with an automatic stop, with means for setting the drag for any desired pull, with a locking device to prevent the nut of the reel-post from working loose, and with other advantageous features without using any screws on the face of the device to injure the hands or any washers to wear out or clog.

Designs.

DESIGN FOR A HAND-BAG, PURSE, OR SIMILAR ARTICLE.—F. M. KAHN, New York, N. Y. The design in this case shows a hand-bag or purse suspended by a ring-linked chain. The form of the bag keeps well within the usual lines, yet exactly represents a sitting "Teddy Bear."

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



HINTS TO CORRESPONDENTS.

Names and Address must accompany all letters or no attention will be paid thereto. This is for our information and not for publication. References to former articles or answers should give date of paper and page or number of question.

(10487) W. T. H. writes: In your reply to C. B. R. of March 16, page 289 (10437), you state in your closing sentence that "some" people "habitually use the right and others the left eye at their ordinary work."

But is it not also true that when both eyes are kept open the alignment is always made with the right eye? Let any one with both eyes open hold out either his right or his left hand at full length of his arm, and then range the point of his forefinger with a distant object. Let him then while holding his hand steady close his right eye, and he will find that his finger is not in line with the object.

(10488) J. J. G. writes: Referring to query No. 10426, issue of March 16, second question: A claims that in foggy weather, when smoke descends to the ground, the atmosphere is light and will not support the smoke. B claims that it is heavy, and will not permit the smoke to ascend.

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because it is heavier than the air at the time, without taking time to cool and take on water drops by condensation. Nor can the cooling of the smoke be by conduction as stated above, but by radiation into the air, since neither air nor carbon is a conductor of heat.

(10489) C. E. B. asks: 1. Is it theoretically possible to get as much work out of a permanent magnet as it takes to magnetize it? For instance, suppose a certain magnet takes 100 foot-pounds of work to magnetize it, and suppose further that the work done by this magnet at one lift is 1-10 foot-pound. Will it be possible to make the magnet do one thousand lifts, removing the armature each time by outside power? Magnet and armature to be laminated to prevent as much loss in currents as possible.

(10490) F. A. McD. writes: Referring to your answer to query No. 10428, for a process for electro-plating with aluminium, in your issue of March 16, I beg to refer you to Prof. Richards's book on "Aluminium," the last edition of which contains several formulas for this deposition, and is, I believe, a more reliable volume in this connection than the one you mention, Watt's "Electrodeposition."

INDEX OF INVENTIONS For which Letters Patent of the United States were Issued for the Week Ending March 26, 1907.

Table listing various inventions and their patent numbers, including: Acids, bromin derivative of fatty, E. Fischer 848,230; Addressing machine, A. E. Grapp 848,546; Adjustable table, E. Kohler 848,469; Air, moistening, H. Bentz 848,340; Air, regulating the temperature of, Mandeville & Walker 848,595; Air siphon, G. Schwabek 848,055; Alumina and alkali sulfur salts manufacture of, A. Clemm 848,612; Ammunition case, G. Schwarz 848,500; Amusement apparatus, E. A. Smith 848,061; Anastomotic clamp, G. F. Roosevelt 848,126; Animal trap, J. M. Dubois 848,295; Annunciator, D. H. Coker 848,535; Apron supporter, J. G. Kountz 848,470; Armor plate, E. Gathmann 848,024; Automobile wheel, E. C. Phillips 848,046; Awning, P. & W. Walger 848,216; Awning, F. Thoms 848,509; Axles, nut retainer for vehicle, O. F. Jordan 848,176; Bag attachment, L. McCann 848,481; Baling press, J. S. Tuttle 848,411, 848,412; Baling press, C. E. Wehrenberg 848,420; Baling press plunger, G. Schubert 848,054; Baling presses, self feed mechanism for, J. S. Tuttle 848,413; Ball cover clamp, base, F. A. Brusseau 848,097; Bank, pocket, J. B. Weir, et al. 848,218; Bank, pocket, coin, W. P. Harvey 848,302; Battery plate, W. G. C. Krause 848,559; Bearing, adjustable, E. S. Clough 848,224; Bed, sofa, G. E. Holmes, et al. 848,305; Beer or other beverage cooler, J. Eitel 848,228; Belt stretcher and tightener, A. Y. Foltz 848,300; Bicycle attachment, J. H. Sager 848,324; Bin. See Storage bin; Binders, alarm attachment for self, L. J. Phillips 848,491; Binding device, temporary, A. G. Hoelscher 848,242; Blasting machine, electrical, L. W. Bowman 848,153; Bleaching cabinet, W. E. Strong 848,138; Blower and suction device, Brown & Dahl 848,343; Bobbin stop mechanism, R. H. Cook 848,013; Bobbin stop, twister, R. H. Cook 848,012; Body conformer, C. Munter 848,479; Boiler cleaning device, multitubular, J. Alexander 848,082; Boilers, means for promoting circulation in steam, S. J. Ross 848,496; Bomb for coyotes, J. N. Gassett 848,454; Book, combination check, M. H. Berry 848,429; Books, etc., file, J. H. Horwitz 848,245; Book manufacturing machine, Marvin & Vessey 848,563; Boot tree and stretcher, F. A. MacKenzie 848,038; Boots and shoes, long tooth finder for cutters for edge trimming machines for, G. E. Fuller 848,097; Boring or milling cutters, manufacturing, J. G. Matthews 848,112; Bottle and the like closure, T. C. Booth 848,152