

**The Panama Canal.**

The company which has just been formed for taking over the works at the Isthmus of Panama has issued a report, giving, says the Engineer, what it professes to be an accurate idea of the present state of the canal. It had been expected that after being abandoned for nearly five years to the ravaging influences of the floods from the river Chagres, and the growth of vegetation which flourishes with remarkable luxuriance at the Isthmus, the works would have been greatly deteriorated, necessitating perhaps the re-excavating and banking of those sections of the canal already completed. Judging from the report issued by the liquidator, the canal itself has remained practically intact, and the machinery and other plant has only partly deteriorated from the climate.

The first section of the canal, from Colon to a distance of 21,700 kiloms., has been greatly modified by the action of the river which has flowed into it, and after following the incline of the canal for about 5 kiloms., the river deposits a great deal of sediment and turns off into the Rio Mindi, which has considerably enlarged during the past four years. Beyond the point where the Chagres breaks into the canal the works are in very good condition, though they are so covered with vegetation as to be sometimes indistinguishable from the surrounding country, and it is explained that this is one of the reasons why untechnical observers have insisted so often upon the complete ruin of the works. The report urges that, so far from being a disadvantage, this growth has actually been of service in preserving the canal, and the vegetation can be cleared away at very little cost. After the maritime reach, which terminates at 23,500 kiloms., are the works of the first lock, and these are in excellent state of preservation. From this point the cutting continues with an embankment 50 meters in height, but notwithstanding the steepness of the sides not a stone has given way, and this is set down to the protection afforded by the dense vegetation. This state of things is unchanged across the plain of Tavernilla as far as kilom. 36; at this point the excavation runs close to the river, from which the water descends during the rainy season. This is particularly noticeable between kiloms. 25 and 28 and between kiloms. 33 and 34. In the middle of the plain of Tavernilla are the large cunettes, which, notwithstanding their steep incline, have been in no way affected by the severe floods of four years ago. The works facing San Pablo are also unchanged, though entirely covered with vegetation. The same condition prevails up as far as the second lock, where the cutting had first been made in view of a level canal, and then

altered to meet the exigencies of the plan ultimately adopted.

The canal then follows the bottom of the narrow valley, where it now and then cuts the river as far as the 40th kilom. The result is that the filling-up process has been very active, in consequence of the floods, and the vegetation in this part is particularly luxuriant. At Matachin, where preparations were made for the third lock, the works are often covered with water, but the cutting is nevertheless in a good state of preservation. After Matachin the canal leaves the valley of the Chagres and enters the valley of the Obispo. Here, at the 46th kilom., the works for the fourth lock are in good order, and owing to the uneven state of the ground the canal has a depth in certain places of 44 meters. A little more than a kilometer further on the banking fell in during the work of cutting. From the 48th kilom. a cunette has been made over a distance of several hundred meters through a very hard rock. Then, after passing the works between the Obispo and the Rio Camacho, the valley extends and merges into the plain of Emperador. In cutting through the high ground in this plain the canal has a depth varying from 35 to 40 meters. The fifth lock at this point is likewise in an excellent state.

From kilom. 52,600 are the works of the Culebra, and at one place, where the depth is about 40 meters, the bank has fallen in. Notwithstanding the influx of water, the works are very much in the same state as they were five years ago, though between kiloms. 54,300 and 55,400 the soft soil that had to be cut through has given way. This is due entirely to the action of the water, and it is stated that with proper drainage the difficulty can be overcome. The same influence has been at work on the Pacific slope, where a great deal of shifting soil has been met with. Between the sixth and the tenth lock, descending toward the Pacific, there is nothing worthy of remark, except that the works are very humid and the vegetation is consequently very thick. From the tenth lock the valley opens out in a low, marshy country, and between kiloms. 65,500 and 66,700 the canal has been partly filled up. Further on the canal is in a better state of preservation, owing to the water having a freer course. The maritime channel commences at the 68th kilom. It makes a detour around the mouth of the Rio Grande, and then continues in a straight line until within 200 meters of the northern point of Perico Island. In some parts, where the channel is exposed to the winds, it has been filled up by as much as four meters.

As regards the machinery and other material, the report speaks favorably but sparingly. Of the six-

teen dredgers of 120 horse power ten are almost as good as new, and have hardly been used, but the others will require a great deal of repairing. There are several other dredgers, including two marine dredgers and two of the Suez type. All the floating material is found on different points of the canal, principally at Colon and upon the Pacific slope. The rolling stock is likewise distributed over different portions of the canal, and it is not in such a bad condition as might have been expected. Some of the locomotives have been repaired since 1888, and may again be put into service; but many of the wagons have rotted in the destructive climate. In short, it is thought that all the metal plant will be available for use after being overhauled. The wharves at Colon and Boca, the docks and other installations will have to be entirely reconstructed, and repairs will be needed in every direction before the work can be resumed. The railways will likewise have to be relaid; the wooden sleepers are entirely useless, but the steel sleepers are still serviceable. The rails, nuts, and bolts will all have to be replaced. In view of the many costly repairs that will have to be carried out before the work of cutting the canal can be proceeded with, it is difficult to fully understand the project of the new company, whose available capital of not more than twelve millions sterling will be practically swallowed up in preliminary works. It is not pretended, even, that the new company has any definite plan in view.

The first object is to get a few hands at work upon the Isthmus, so as to fulfill the clause of the agreement with the government of Colombia which makes it necessary that the work should be resumed before the end of October, in default of which all the material would be confiscated. When half of the capital has been spent in preliminary works the technical commission will meet to decide whether it is worth while to continue the work, in which event the public will be asked to subscribe about twenty millions sterling. If, on the other hand, it is found inadvisable to pursue the undertaking any further, the money already subscribed will be used for working the Panama Railroad, in which the old company had a considerable interest. So far, no plan for completing the canal has been definitely adopted, and this matter will be left to the technical commission which will be appointed as soon as the company is in working order.

It is stated that in round numbers there are on all lines of street railways in the United States, 50,000 cars, including steam and electric motors, cable grip cars, trail and horse cars.

**RECENTLY PATENTED INVENTIONS.****Engineering.**

**VALVE GEAR.**—Franklin W. Hagar, Nashville, Tenn. This invention relates to marine engines, and the improvement comprises a rocking lever for oscillating exhaust valves, and a rocking shaft journaled in the lever and having an independent turning motion to control puppet valves for the admission of steam, the valves being all contained in a single chest, while a valve link operated from the main driving shaft engages either a pin on the lever or the shaft. The engine cuts off at half stroke, and the cut-off is not adjustable, but is very prompt, the movement being of such a nature that it easily seats the valves, without slamming or knocking.

**SPARK ARRESTER.**—Henry E. Bultman, Oak Park, Minn. This improvement comprises a lower cylindrical gauze-covered portion attachable to a smokestack and with upwardly projecting and outwardly inclining bars supporting a top band, an exterior funnel-shaped screen having its bottom adapted for attachment to the cylindrical part of the arrester and its upper part bent over the top band and formed into a deflecting cone. The improvement entirely closes the stack so far as the emission of sparks is concerned, but does not interfere with the draught, while an easily actuated cleaning apparatus removes the sparks and thus preserves the life of the arrester.

**Railway Appliances.**

**RAIL TIE.**—Jesse C. Cowdrick, Ogdensburg, N. J. This is a tubular metallic tie, somewhat oval in cross section and approximating the shape of an ordinary wood tie, but with a slot in its upper face extending from end to end, affording a certain degree of elasticity. Parallel transverse cuts are made where the rails cross, forming a tongue at each side of the slot, and the rails being seated on the tongues, where they are held by retaining shoes and bolts, the latter engaging a connecting plate on the under face of the upper section of the tie.

**RAILROAD CATTLE GUARD.**—Andrew J. Gwin, Minden, La. This is a gate-operating mechanism in which movable rails at the side of the traffic rails are connected with a vertically sliding gate, so that when a locomotive approaches the guard from either direction the gate will be depressed below the rails and held depressed until the train has passed, when the gate rises to normal position, to prevent cattle from passing along the track. The gate is arranged transversely of the track, cutting off the passage between the rails and also on each side, and it slides vertically in a box provided with suitable guideways.

**Mechanical.**

**WRENCH.**—Alf L. Winge, Miles City, Montana. This wrench has a toothed stock with fixed

jaw, having a perpendicular gripping surface and a movable jaw embracing the stock, and having longitudinal sliding movement. The movable jaw has teeth to mesh with those of the stock, and a wedge slides between the movable jaw and the stock, to lock the jaw to the stock, while secured to the wedge is a spring catch under control of the operator, a projection on the catch engaging a recess in the jaw. The improvement affords a strong and simply made tool, the jaws of which may be quickly adjusted and locked.

**Miscellaneous.**

**HELIOGRAPH ATTACHMENT.**—Albert L. Wetherill, Philadelphia, Pa. A graduated segment is, according to this invention, mounted upon the mirror bar to turn with one of the mirrors carried thereby, the center of the segment coinciding with the pivot of the mirror, and a vernier being secured to the mirror bar. The improvement may be utilized as a range finder or for taking vertical and horizontal angles, the attachment being readily used for surveying purposes without interfering with the employment of the heliograph for transmitting flashes. The attachment may be readily disconnected and carried in the same pouch with the heliograph.

**CARBURETOR.**—Eugene M. Westcott, Hampton, Iowa. This is an apparatus to make carbureted air, to burn like ordinary illuminating gas, in which the depth of gasoline through which the air is forced may be readily controlled. Means are accordingly provided for regulating the air supply, and the apparatus is so constructed that it may be easily and thoroughly cleaned, and the water supply can be so regulated as to cover the distributor and prevent it from becoming clogged by freezing.

**MAKING SULPHURIC ACID.**—Peter S. Gilchrist, Charleston, S. C. This invention covers an improvement on apparatus formerly patented by the same inventor, and relates particularly to the construction of the columns or cases between the lead chambers, provision being made for their free expansion without breaking or buckling. The cross air pipes are also so arranged in the column that the pipes may be exceptionally strong, while effecting a thorough mingling of the gases passing through the column and collecting weak acid, which, coming into contact with the nitrosulphuric acid formed on the surfaces of the pipes, decomposes the acid, thereby promoting and cheapening the process of acid manufacture.

**PHOSPHORIC ACID WITH AN ABSORBENT.**—Gaston Descamps, Havana, Cuba. This inventor has patented a new article of manufacture, a vegetable cellulose, as sawdust or cane bagasse, dried and charged with phosphoric acid, thus affording phosphoric acid in dry form, designed for use in the manufacture of sugar and other industries, and to be conveniently transported without deterioration.

**SEPARATOR.**—John E. Borchard, New Jerusalem, Cal. This is a machine for separating one

kind of seed from another, and also for removing dirt and refuse. The seed are fed between oppositely revolving inclined rollers of different sizes, each roller having a different degree of inclination from the other, and the surfaces of the rollers being preferably roughened. The smaller roller, termed a guide roller, is concaved longitudinally, admitting of its being elevated at its lower end and yet leaving the space between the two rollers of a uniform width the entire length of their roughened surfaces, the guide roller then assuming a somewhat spiral relation to the periphery of the main roller.

**MUSIC LEAF TURNER.**—Cyril P. Brown, Spring Lake, Mich. According to this invention a wheel pivoted on a suitable case or frame carries a number of outwardly extending arms at whose ends are swinging fingers arranged in pairs, the apparatus being readily applied to a music stand, piano or organ, and the fingers being adapted to clasp the leaves, whereby they may be easily turned one by one without touching them with the hands. Any desired number of leaves may also be turned back simultaneously.

**MUSICAL INSTRUMENT.**—Evaristo Enriquez, San Juan Bautista, Tobasco, Mexico. This instrument has an elongated solid wooden body, mainly cylindrical, flattened on top and tapered toward the head, and there are frets on the top, strings fast at the head and keyed at the lower end of the body, with a removable peg at one side and a longitudinal pin at the lower end of the body. Music is made with the instrument by the joint action of the fingers, mouth and tongue, the melody, when played according to the design of the inventor, partaking of the nature of strains from a guitar and an Æolian harp.

**FARM GATE.**—James M. Hurst, Lurcetta, Va. This is a strong and simple gate, mainly like the ordinary swing gate, but with means for latching it from top to bottom and a convenient lever for simultaneously operating the latches. The lever may also be operated by a person on horseback, and a guard is provided to prevent the lever from being moved by live stock. There are means for automatically closing and locking the gate.

**METHOD OF CLOSING CANS.**—John Banbury, Auckland, New Zealand. This is a method of sealing cans in which a wire is placed between the inner surface of the can body, just at its upper edge, and a narrow marginal upturned flange of the cover, and then applying pressure to bring the flange and the adjacent surface of the can body nearer to each other to hold the wire between them. To make an air-tight closure, solder or other sealing material may be employed, and one end of the wire has an outwardly extending loop, by pulling upon which the cover is loosened and the can opened.

**NECK YOKE.**—James S. Brown, Eureka, Cal. This is an improvement upon a formerly patented invention of the same inventor, the improved yoke admitting of a vertical as well as lateral movement upon

the pole, whereby the neck yoke may be used with vehicles adapted for freighting or traveling over rough roads, promoting the comfort and proper working of the team.

**TUG ADJUSTER.**—Frank Sherry, Jacksonville, Ill. This is a very simple and durable device whereby the tug straps may be quickly shortened or lengthened as required. It consists of a base plate with an eye at one end to receive one end of the crupper and an opposite eye for one end of the back strap, while on the plate is a metal loop open at both sides and with a top opening, a bolt sliding on the base plate being adapted to enter the loop and force any straps into engagement with its top portion, the bolt being forced into the loop section when the straps have been properly adjusted.

**TILE TRUCK.**—Joseph W. Bienz, Rockford, Ohio. The cradle or bed, according to this invention, is hinged at one end to the truck proper, and is movable toward or from the truck at its other end, while a stay rod is jointed at one end to the cradle and hooked at its other end, the side pieces being hinged to the cradle, and a latch connecting and clamping the side pieces together. With this truck large tile, whether green or dry, can be handled by one man instead of requiring the service of two, the side pieces being removed in handling dry tile.

**SHOE STRING HOLDER.**—Henderson T. Small, Chanute, Kansas. This holder is adapted to receive shoe strings in assorted kinds and sizes, and so hold them that one or more may be withdrawn without disarranging the others, the improvement also forming a convenient display rack for the strings and a receptacle for quantities of strings in bales or bundles.

**SUPPORT FOR CARDS, ETC.**—William F. Jones, Baltimore, Md. This is a simple foldable support, readily adjustable to afford a firm, stable rest, for a card, or other similar article, so that it may be pushed back and forth upon a show case. It comprises a light frame held in inclined position by a base piece and jointed strut piece, a slotted keeper being arranged at the rear of the frame. The support may be formed in one piece, of cardboard or similar material.

**TOY PISTOL.**—Henry D. Medrick, Port Jervis, N. Y. In this pistol the hammer is moved entirely by the trigger, which automatically raises the hammer to firing position and releases it, when a spring acts upon it to force it against a cap to be fired. A tape of caps in the handle chamber is fed upward around the pivot of the hammer to engagement with the anvil, thus rendering the device a self-cocking and repeating, or rapid firing pistol.

**NOTE.**—Copies of any of the above patents will be furnished by Munn & Co., for 25 cents each. Please send name of the patentee, title of invention and date of this paper.