A TOUR OF FRANCE IN A BALLOON.

An interesting experiment in aeronautics was tried in the latter part of September to determine the conditions under which a series of ascensions might be made for a certain number of days, executed successively with the same gas and the same balloon. A series of ascensions were made forming a spiral to the north and northeast of Paris, stops being made at Mery-sur-Oise, Persan-Beaumont, Creil, Mery, Raulat and Essigny-le-Petit. The gas contained in the small balloon which had been put at the disposition of the aeronauts, MM. De Fonvielle and Mollet, by the observatory was used as a feeder to the large balloon, which had a capacity of 1,200 meters. The trip continued for a week. The ascensions were determined by the action of the sun's rays, which expanded the gas and dried the material of which the balloon was made. The descent invariably took place by reason of condensation at twilight. During the entire trip it was not once necessary to open the escape pipe. The balloon carried a horizontal propeller, which was intended to vary at will the altitude of the aeronaut. This apparatus was only used at the ascent from Creil. The results were satisfactory. MM. De Fonvielle and Mollet have now made some necessary modifications, so that the propeller will hereafter be a regular part of the equipment of the aeronaut. Our engraving is from L'Illustration.

Arctic Exploration.

News of the Jackson-Harmsworth Polar expedition has been brought to England by Mr. J. Russell Jeaffreson, who obtained the information at Thorshavn from the captain of the Betsy, a walrus sloop recently returned from her summer voyage in the Barents Sea. It appears that the captain first saw the steam yacht Windward near the well known Matotchkin Schar, where the ice was very heavy, about the middle of August. Returning west toward the end of August he again met with the vessel in latitude 75° 45′ N. and longitude 44° E.; but on this occasion she was steaming in the direction of Franz Josef Land without let or hindrance, the ice being in this locality brashy and rotten, the Windward actually steaming up a lead of which no termination northward was visible. The captain of the Betsy, though unable to distinguish the name of the ship, describes her accurately, and from the positions in which she was seen and the respective dates there is no reason to doubt that his report relates to the Windward. It is worth mentioning that this report is precisely what might have been expected, as Mr. Jackson hoped to find a region of loose, brashy ice about 45° to 50° E. longitude, and after getting abreast of the Matotchkin Schar, intended to make directly for it. The voyages of Mr. Leigh Smith showed that such a condition obtained in favorable years, and the recently published experience of Mr. Arnold Pike, who was yachting in the Barents Sea last summer, testified to a similar phenomenon in a year so unfavorable as the present. This has now been confirmed by the report of the captain of the Betsy, and consequently the outlook for the Windward may be considered very favorable.

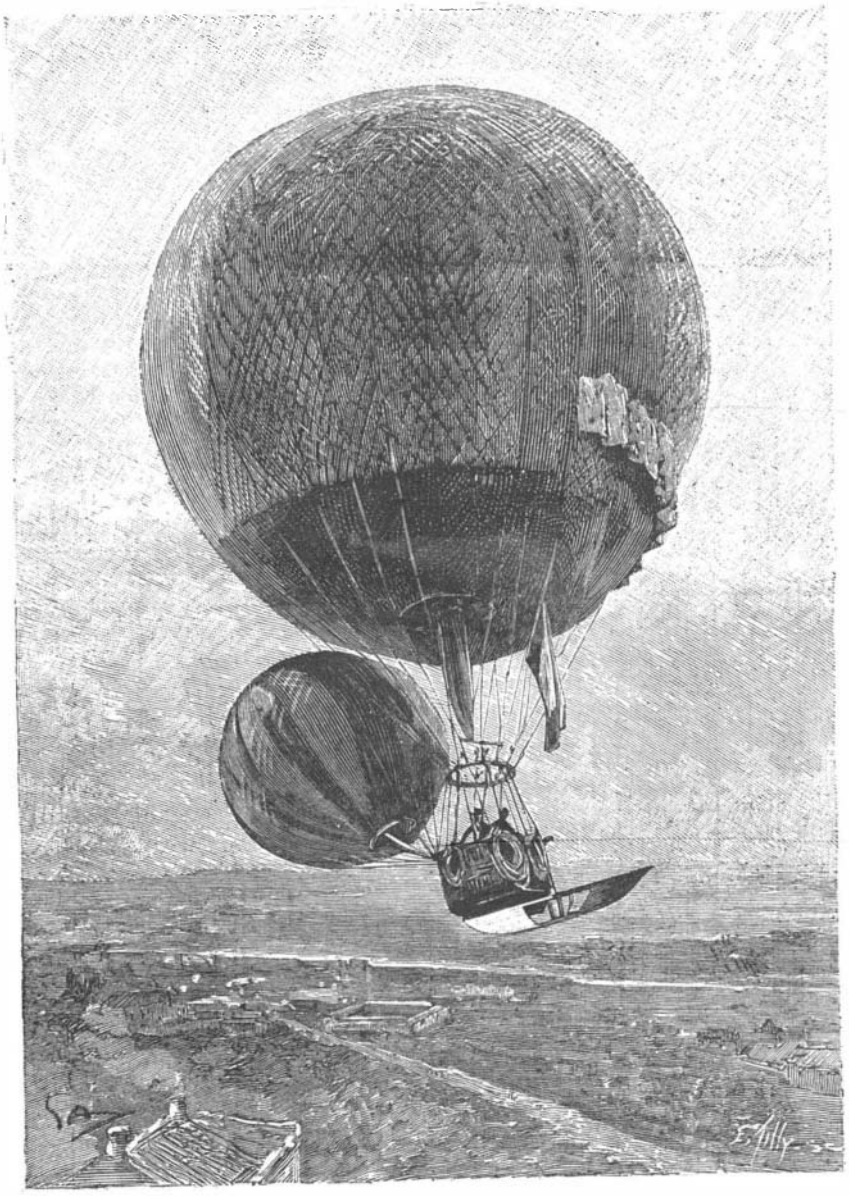
Bodily Temperature.

The Kansas Medical Journal has the following to say concerning the temperature of the body:

"It is remarkable what slight variation there is in the temperature of the healthy human body. The normal temperature is 96·6, and it is a fraction less than this one or two hours after midnight; while the maximum temperature occurs from one to two hours after the noon hour. The ingestion of food, fasting, exercise, all are factors in slightly varying the temperature. The great peculiarity about the temperature in men is its evenness under all conditions. Heat or cold causes but slight variation, and in man less than in any other animal. In extremes that would be fatal to many animals, man can endure and enjoy good health under those circumstances. We read of Arctic voyagers enduring a temperature ranging from 80 degrees to 90 degrees and even 102 degrees below zero, while, on the other hand, in the tropics, during the greater part of the year, the temperature ranges from 106 degrees to 110 degrees above, and yet men enjoy health in such varying temperature. We are told that the workmen of Sir F. Chantrey were accustomed to enter a furnace in which his moulds were dried while the floor was red hot and a thermometer in the air stood at 250 degrees F. And Chabert, the fire king, was in the habit of entering an oven the temperature of which was from 400 degrees to 600 degrees F. Such heats are dry, and should the atmosphere be moist and evaporation from the body thus prevented, such intolerable heat could not be endured."

The Apple as Medicine.

Dr. G. R. Searles, of Brooklyn, N. Y., thus discourses on the apple as medicine: "The apple is such common fruit that very few persons are familiar with its remarkably efficacious medicinal properties. Everybody ought to know that the very best thing they can do is to eat apples just before retiring for the night. Persons uninitiated in the mysteries of the fruit are liable to throw up their hands in horror at the visions of dyspepsia which such a suggestion may summon up, but no harm can come to even a delicate system by the eating of ripe and juicy apples just before going to bed. The apple is an excellent brain food, because it has more phosphoric acid in easily digestible shape than any other vegetable known. It excites the action of the liver, promotes sound and healthy sleep, and thoroughly disinfects the mouth. This is not all. The apple agglutinates the surplus acids of the stomach, helps the kidney secretions and prevents calculus growths, while it obviates indigestion and is one of the best preventives known of diseases of the throat. Everybody should be familiar with such knowledge, and I hope you will help disseminate it. In addition, next to the orange and the lemon, it is the best antidote for the thirst and craving of the person addicted to the alcohol or the opium habit."



TOUR OF FRANCE IN A BALLOON.

Antidiphtheritic Serum.

One of the subjects exciting the greatest interest at the recent meeting of naturalists and physicians at Vienna was the treatment of diphtheria by means of a prepared serum. In a paper read by Dr. Behring, the opinion was expressed that the preparation of serum for the purpose should be undertaken by the state, under the direction and control of the sanitary authorities. It was stated that among children the mortality from diphtheria, amounting now to 240 in 10,000, might thus be reduced to one-third of that rate. Dr. Ehrlich spoke of this method of treatment as one of the most important results known in the history of medicine, and he stated that trials made in the Berlin children's hospitals showed that without the use of serum there were twenty-five deaths out of seventy-two cases, while there were only two deaths out of seventy-eight cases treated with serum during the first two days of illness. Antidiphtheritic serum is therefore likely to become an article in demand for medical use, and pharmacists will require to provide for the supply of it.

Camels in Australia.

Some interesting particulars concerning the part which the camel is playing in the development of the Australian colonies are given in the British Australasian dealing with the gold fields of Western Australia. The great central depot for the animals imported from India is Port Augusta, 259 miles northwest of Adelaide, Here a camel quarantine station has been established. and the arrivals are kept in it and carefully watched for the first three months to guard against outbreaks of a certain deadly mange which carried off most of the earliest animals. Once acclimatized, the camels are not liable to the complaint, and they thrive wonderfully upon the natural shrubs of Australia—salt bush, wattle, mulga, acacia, and other varieties. The imported animals, however, are not nearly so valuable as the Australian-bred camels. The pastoralist breeds his camels, as he does his sheep, on scientific principles, so that already, within 25 years, there has been produced in Australia a race of camels "larger in frame, sounder in wind and limb, and possessed of greater weight-carrying capacity than the Indian animals orginally imported." The British Australasian continues: "By means of camel caravans—there are now close upon 10,000 camels at work in Australia—the pastoralists have been enabled to take up and stock new country which was formerly incapable of being utilized, because a broad belt of land that is either waterless or liable to prolonged periods of drought intervened between the good country and the settled regions, whence all supplies have to be drawn, and where all products must be marketed. It is only within the last few years *that* mining men have awakened to the utility of camels in their industry, and large numbers of the animals have lately been drafted to Western Australia. On the older goldfields of that colony the camel caravan has already knocked out the bullock team by reason both of economy and efficiency. But, more important still, the camel is enabling new goldfields to be reached and worked which were previously, if not absolutely inaccessible, incapable of being permanently occupied and utilized. Mining machinery is being made in sections convenient for slinging across the back of the pack animal. Camel wagon transport, unknown both in Asia and in Africa, has also been developed in Australia, the animals being yoked in teams of eight, just like bullocks. Well sinking machinery is likewise being sent into the waterless country on camel-back, and after the magnificent results achieved by artesian boring in the arid region of Queensland, where some of the bores yield 2,000,000 gallons a day and have caused rivers to run where water was never before seen except in the form of an all too scanty rainfall, there is no saying but that by this means the West Australian goldfields, now worked with difficulty owing to the scarcity of water, may be converted into regular oases." During the Lindsay expedition, it is added, the camels had spells of 23 and 21 days without a drink of water.

Heating by Combustion and by Electricity.

Herr A. Wilkie discusses certain experiments made by Mr. J. L. Roberts with the object of ascertaining the comparative efficiency of heating by electricity and by combustion. Mr. Roberts heated masses of metal (rods of platinum and iron) to a red heat, first by combustion methods and then by the electric current When the substance was heated by a flame, the energy expended was calculated from the loss of weight of the combustible and the corresponding calorific power; when electrical energy was used, the energy expended was calculated from the current and voltage. In the first series of experiments, a platinum rod was heated in the flame of a spirit lamp, and also by passing a current through it. When red hot, it was dropped into water. The results showed that less than 0·5 per cent of the thermal energy produced in the flame was transferred to the bar, whereas 90 per cent of the electrical energy appeared as heat. In the second series of experiments, an iron bar weighing about a kilogramme was heated, first by means of well dried charcoal, and then electrically. In the former case, about 0·75 per cent of the thermal energy was transferred to the bar, in the latter case 88 per cent was thus accounted for. These experiments are admittedly crude; but they show that for some purposes electrical heating has claims to consideration.

ONE pound of cork is amply sufficient to support a man of ordinary size in the water.

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 22·500 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 sixteen 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 distributer 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 nitro-sulphuric 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, Lucretia, 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.