

## Correspondence.

## The Lever in the Bicycle.

To the Editor of the Scientific American:

In your paper of November 19 Mr. Hatcher gives a very nice explanation of how the lever is used in a bicycle.

I would like to add, that with one season's experience I find that a well constructed bicycle will automatically move this lever itself, and that after a limited amount of practice one can, at a moderate rate of speed, ride almost any pace desired without the use of the handle bar.

This I explain as follows, and if any one has a different explanation I would be glad to hear it: Nearly all bicycles are constructed so that the point of the front wheel that touches the ground is in direct line with the pivot on which the front fork and wheel are hung. This brings the greater part of the wheel above and in front of the line above mentioned. When the machine begins to tip, this excess of weight will turn the wheel, and thus right the machine. When the rider wishes to turn he has but to throw himself out of balance in the direction he wishes to go.

A. W. HARROUN.

Mason City, Iowa, November 28, 1892.

## Engineers in the Navy.

The annual report of the engineer in chief, G. W. Melville, just submitted to Congress, contains some important suggestions as to the need of an enlarged force of engineers to man our new war ships, and the necessity of their being more efficiently aided by engine room petty officers composed of machinists, blacksmiths, boiler-makers, coppersmiths, etc. Without entering directly into the long-standing differences between the "line" and "staff" officers, the report throws a strong side light upon such disagreements between the two classes of officers as resulted in the Danforth case, noticed in our issue of December 10, saying on this subject: "Whether or not it is good policy to intrust the full control of sailless ships, every function of which is performed by a machine, to officers who, by education and training, are ignorant of the operation, care, and management of machinery, is a question that is worthy of very serious consideration.

"It has been claimed that the possession of rank and the right to exercise command in their own department is merely a matter of sentiment on the part of the engineer officers. When officers find themselves charged with the maintenance of all the vital parts of

a huge and costly war ship, and when the exercise of their prescribed duties involves the direction and superintendence of the labors of one-third or one-half of the ship's crew, they very naturally expect to be clothed with the legal right to perform their duties—a right that is now denied by Section 1,488 of the Revised Statutes of the United States. There is not much sentiment in this, but merely an effort on the part of a class of officials who have to perform military duties involving command and obedience to have their exercise of authority made lawful."

Engineer Melville furnishes a vivid description of the arduous task of an engineer officer who is unfortunate enough to be detailed for duty on the largeships, those of from 5,000 to 10,000 horse power, on which usually there are only one chief engineer and three assistants: "The latter are obliged to stand watch in three watches at sea and often in port—a duty so exhausting that no officer can long perform it efficiently; for he never has a whole night's rest, and when on duty has to withstand a constant, merciless assault upon his physical and mental powers. His post of duty is one of intense heat and villainous atmosphere; to get from one part of his station to another, which he must do very frequently, he must climb up and down narrow ladders, crawl through air locks, explore coal bunkers, etc., all the time in a state of mental anxiety on account of the innumerable casualties, great and small, that are constantly occurring, and for the prompt remedying of which he is strictly accountable; in one watertight compartment some boiler tubes are leaking and the men are in a panic; in another, 100 feet or more away, a feed pump is refusing to work or a thrust bearing is hot; and while hurrying from one scene of danger to another the engineer is liable to receive tidings of trouble in some remote coal pocket, or even be summoned to appear on deck, where he must calmly answer questions regarding the amount of smoke escaping from the smoke pipes, or the necessity for hoisting ashes, wholly unmindful of the disasters which he knows are impending below. So it goes, watch after watch and day after day, until in the course of a week or two the engineer is a nervous wreck, fit for nothing but the hospital; and all because the lack of numbers imposes upon him the work of at least two men."

Mr. Melville thinks the membership of the corps should be increased to not less than 300, and says the only opposition thus far to a bill before Congress providing for such increase has come from some of the officers of the navy, who seem to view with jealous

distrust the growing importance of the engineering branch of the service, and see in it an imaginary menace to the supremacy of the positions which they have inherited from naval conditions now obsolete.

Speaking of the difficulty now experienced in obtaining a desirable class of enlisted men for the engineer's force, Chief Melville complains that the machinists have a pretty hard time on shipboard, there being nothing to induce respectable and ambitious men to take such positions. "If a machinist or fireman crawls out of the hellhole where he is on duty to get a breath of fresh air, he may be promptly driven below again or even punished for appearing on deck 'out of uniform,' while the discovery of a speck of dirt anywhere on deck subjects any member of the engineer's force who may have the rashness to be above the fire room gratings to abuse from the boatswain's mates and probable punishment at the mast. That the decks of a man-of-war should be of spotless purity is a tradition handed down from the days of wooden ships and barefooted crews, and is so impossible a condition in these days of coal and iron and steel that it seems a little intelligent consideration would lead to its abandonment. All these unhappy details are different on different ships, but the general results are the same. The useful and self-respecting man, when he finds himself so unfortunately circumstanced, will, in sheer self-defense, leave the service forever."

## Sugar in Boilers.

Some two or three years ago a mining engineer in the Yorkshire district, anxious to prevent the incrustation in the boilers at the collieries in which he was interested, tried a mixture of sugar and soda. The proportions were as follows:

	Sugar, lb.	Soda, lb.
Egg-end boilers, 30 ft. x 4 ft. 6 in. diam.....	5	2
Lancashire " 30 ft. x 7 ft. 6 in. diam.....	7½	3
" 30 ft. x 8 ft. 0 in. diam.....	9	4

He writes recently that he is still using it, and finds it is giving good results. His method is as follows: When the boiler has been cleaned and is ready for filling with water, dissolve the sugar and soda in a bucket and pour it through the manhole. Clean every three weeks. Cane sugar only must be used. Many collieries in Durham have tried it with equal success.—*Markets Review*.

PLATINUM can now be drawn into wire strands so fine that twenty-seven twisted together can be inserted into the hollow of a hair.

RECENTLY PATENTED INVENTIONS.  
Engineering.

**ENGINE.**—James Smith, Dresden, N. Y. This invention is for a device to be applied to the cylinder of a steam engine, consisting preferably of a valve to connect the two ends of a cylinder at a time when the pressure of the live steam on the driving side of the piston is about equal to the pressure on the exhaust side, the exhaust pressure then opening the valve to establish communication between the two ends of the cylinder, whereby the pressure of the live steam after expansion has taken place will never fall below the pressure in the exhaust end of the cylinder. The device is actuated only when the live steam and the exhaust are thus of relatively unequal pressure.

**ENGINE REVERSING GEAR.**—Joseph O. Des Chapelles, Havana, Cuba. An eccentric disk with a diametrical groove fits in a block on the main driving shaft, there being inclined apertures on opposite sides of the groove, while a sleeve sliding on and turning with the shaft has inclined rods projecting through the inclined apertures of the eccentric disk. By shifting the sleeve, more or less throw can be given to the disk, and thus to the slide valve. The device is simple and not liable to get out of order, and but little power is required to accomplish the shifting of the valve.

**UPRIGHT TUBULAR BOILER.**—Truckson S. La France, Elmira, N. Y. This boiler has an overflow feed-water jacket to and inclosing the group of upright smoke flues open above, a boiler feed connection supplying the jacket with water, while an outer jacket within the steam space of the boiler incloses the overflow jacket for a portion of its depth, and is open below to supply the water overflowing from the first jacket down to the lower portion of the outer steam chamber of the boiler. The upright fire or smoke flues are thus kept mainly or wholly submerged in the feed water, to protect them without choking the steam space with water, while the circulating and heating capacities of the boiler are improved, and the crown sheet is prevented from injurious exposure should the feed water supply be interfered with.

## Mechanical Appliances.

**COG WHEEL.**—Frank Saxon, Worthington, Minn. This is a compensating cog wheel made in two sections, having spring cushions intervening between them, so that when the wheel is employed to communicate motion suddenly to any portion of the machinery, it will not give to the parts any sudden or injurious shock. When the outer section of the wheel is turned the inner section is not moved until the springs are compressed, after which the force is exerted through the spring cushions. The improvement is especially adapted for use in connection with agricultural or road engines.

**BIT BRACE.**—Andrew Knudsen, Tucson, Arizona Ter. In this brace the knob is so attach-

ed as to exclude dust or dirt, the bearing being made very easy, and means provided for easily attaching and detaching the knob. It has an extensible and adjustable crank, so that a single brace may take the place of several braces of different sizes, and a convenient, nicely finished, and easy handle. The ratchet connection between the brace crank and the bit shank is improved, efficient means being provided for fastening bits of various sizes to the brace, together with an improved construction of the bit-holding jaws. It has been the design of the inventor to improve the entire construction of the brace, that it may be easily adjusted, readily operated, and nicely and strongly finished.

## Railway Appliances.

**CAR BRAKE.**—John W. Neumann and John R. Pfanz, Louisville, Ky. This improvement embraces a drawbar designed to operate the brakes automatically under certain conditions, and one which can also be locked to form a perfectly rigid drawbar, while a combined drawbar and brake-operating rod can be operated while the cars are rounding curves. The brake-operating mechanism can be actuated by hand or automatically, or by both at the same time, compensation being provided for the wear of the brakeshoes and wheels, and means of avoiding jerks when the cars are started.

## Agricultural.

**PLOW SHARE ATTACHMENT.**—James Gilbert, Crystal Brook, South Australia. This invention relates to plows in which movable shares are attached by slipping them onto a foot, the shares being removable as desired, and being made with a shoe or socket, into which the foot is inserted. The shares used with this invention do not contain any such shoe or socket, but are formed of a combination of a flat share or plate and a separate preferably detachable loop, which together form the required shoe or socket. The improvement is to be used with plows in which the foot is projected in the line of progression.

**INSECT POWDER DISTRIBUTER.**—Christian H. Joosten, New York City. This is a light and simple hand device for blowing the powder upon plants, one portion of the device consisting of a bellows, against a stationary side of which is held the powder receptacle. The amount of powder delivered is regulated by a damper or slide, the knob operating which carries a pointer on a scale indicating the quantity of powder the implement is set to deliver. An agitator is provided to keep the powder in circulation and prevent the formation of lumps in the receptacle.

## Miscellaneous.

**COMBINATION LOCK.**—Edwin Vanwart, Port Madison, Washington. This is a simple lock, designed to be cheaply made, its parts being readily stamped out, and is especially adapted for use on a house door, although it may be used with other articles.

Within the case is a sliding locking plate, having transverse recesses with connecting slots and the usual spring and knob operating mechanism, while recessed stationary plates are arranged opposite the locking plate, tumblers having flanges at right angles to their bodies being held in the recesses of the several plates, and a plurality of latches being pivoted on one side of the lock to engage the tumblers. It is not necessary to work the combination to open the door from the inside.

**FIRE ESCAPE.**—Jonathan B. Stott, Aurora, South Dakota. A rope is suspended on the outside of a building, within convenient reach of those at the windows, the rope passing through a casing in which is pivoted a clamping plate, and attached to the casing is a supporting device consisting of a belt and straps, to be secured around a person desiring to descend. A handle extends outward from the casing, by taking hold of which a person who has attached the supporting device to his body may easily clamp the rope in the casing with sufficient force to absolutely control the speed of descent, increasing or diminishing it as desired.

**BURGLAR ALARM.**—Harry W. Reynolds, Long Branch, N. J. This is a simple device to be arranged adjacent to a door or window, the opening of which automatically closes an electric circuit and causes a bell to ring, the circuit being closed only momentarily, and not being closed at all when the open door or window may be closed.

**REVERSIBLE WINDOW.**—James Farquharson, Tacoma, Washington. The window frame has on the side of its stiles beads, oppositely located hinges being connected by one member to the beads at the middle of the stiles, and sliding stiles being connected with the other members of the hinges, while a bead fixed to the sliding stile at the front extends downward from the hinges. Shoulders are formed on the stiles to form abutments for the rear edges of the beads, and semicircular recesses are formed on the sides of the stiles to form air passages when the windows are closed. By means of this improvement the window may be conveniently raised or lowered, or reversed for cleaning the outside, glazing or painting from the inside.

**SASH HOLDER.**—Irvin A. Shaw, Kinsey, Kansas. This improvement consists of a stop bead mounted to slide transversely in specially constructed bearings secured on the window frame, springs being concealed in the bearings and pressing the bead to hold the latter in contact with the side rail of the window sash or door. The bead not only forms a guide for the side rail, but also forms a guard for it, as the springs hold the bead firmly in contact with the side rail, preventing the ingress of cold air, or holding the sash in any desired position.

**REPEATING AIR GUN.**—Elmer E. Bailey, Sinnamahoning, Pa. This is an improvement in guns whose magazine tube is traversed by a small firing tube through which large shot or small bullets are projected by an air blast from a chamber in which air is compressed by a spring-actuated sliding piston.

The magazine has a capacity to contain at least one thousand B B shot, and the breech of the small firing tube within the magazine is secured by novel means to a lock frame made in longitudinal recessed halves to hold the loading and air charging and discharging mechanism.

**CARTRIDGE.**—Jacques A. C. de La Touche, Paris, France. This cartridge has an explosive body to be filled with loose powder, and gas check for the cartridge, comprising a series of washers separated by layers of wax, which when the projectile is fired will lubricate the gun and then fall apart and be thrown out of the gun's trajectory. The bore of the gas check is coated with collodion before the projectile is seated, and when the cartridge is fired the projectile slips readily from its seat and the wax which issues from between the washers serves to lubricate the gun.

**HORSE DETACHER.**—Henry Leeman, Louisiana, Mo. This is an attachment applicable to any vehicle, whereby a fractious or runaway animal may be readily freed from the vehicle. According to this invention the thills are so connected with the forward axle that they may be readily released therefrom, a vertical shaft actuating racks for the release of the thills, and there being at the top of the shaft a handwheel within easy reach from the driver's seat.

**WHIFFLETREE.**—Henry McF. Wright, Aspen, Col. This invention provides a singletree and support of simple and durable construction, readily applied, and arranged to prevent detachment of the tree in case the bolt breaks. The improvement embraces various novel parts and details and combinations thereof.

**NECK YOKE.**—James S. Brown, Eureka, Cal. On the forward end of the tongue is a clevis-like projection, with an upper and lower member and an aligning bolt hole through each, while a central rigidly attached sleeve on the neck yoke has a lug fit as a clevis, with a flat projection fitting in between the members of the clevis-like projection on the end of the pole ferrule, thus forming a special construction and combination of parts covering the pivotal connections uniting the neck yoke with the pole.

**HORSESHOEING RACK.**—Samuel M. Martin, Sidney, Ohio. This invention covers an improvement on former patented inventions of the same inventor, simplifying the construction and providing a rack that can be quickly and conveniently folded up when not in use. It has forward and rear sections detachably united by pivotal bolts and locking pins, a cross bar connected to the sections where they join, while a locking bar holds the suspending bars in place. The rails can be adjusted to suit various sized animals, and a harness and means of using it are provided for.

**VEHICLE POLE.**—Thomas B. Cultra, Omaha, Neb. This invention provides a simple and economical construction conveniently adjustable for two or three horses abreast, the center draught being preserved in either case. The device consists of a circle or plate, preferably of steel and with side arms piv-