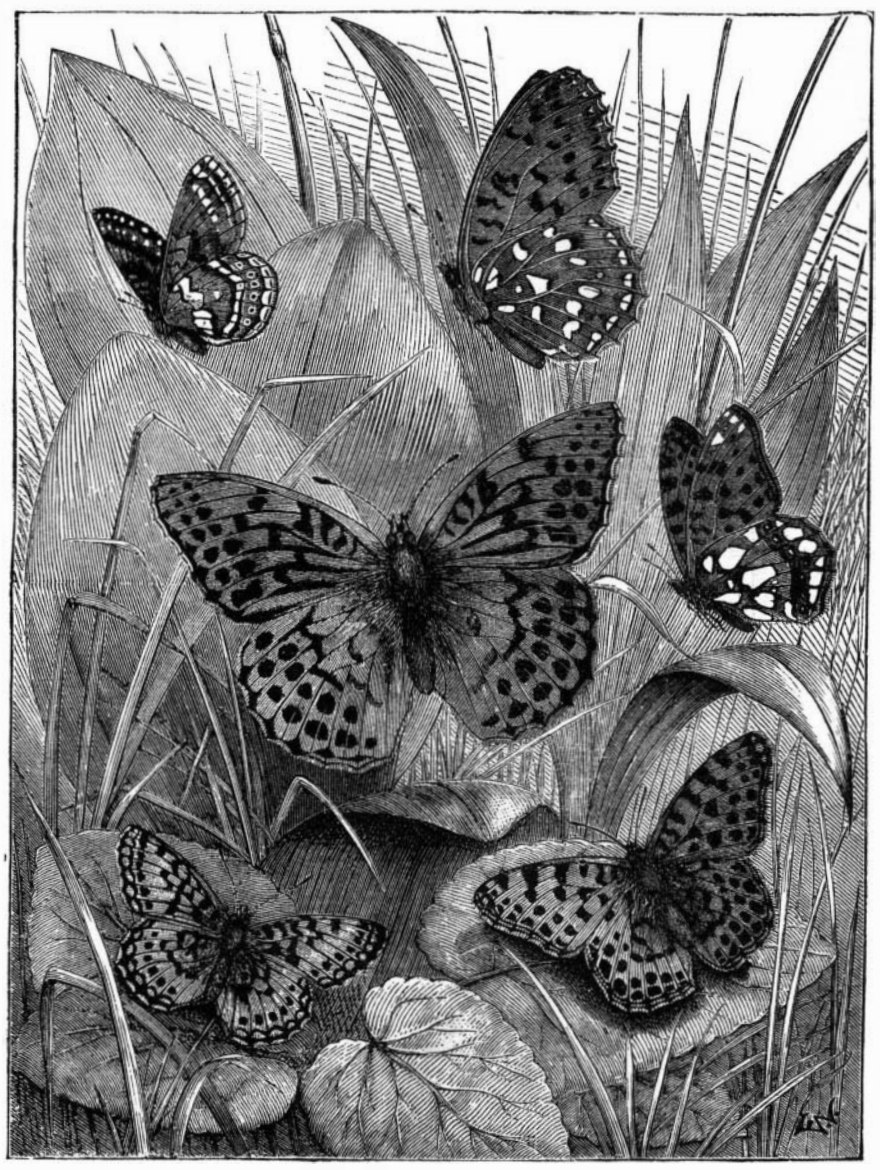
SOME WELL KNOWN BRITISH MOTHS.

Our engraving shows three specimens of moths, which resemble each other somewhat in the marking and color of the wings, but differ in size. The large one in the center is the privet hawk moth (*sphinx Ligustri*) which is nearly as common as the eyed hawk moth; its wings are brown, streaked or rather clouded with darker shades of brown, the hind are of a pinky color, with three black bands across them; the body is marked with brown and black in the center, and the sides marked with pink and black. The caterpillar is green, with seven pink stripes down the sides; the horn is black and green; it feeds on the privet or lilac bushes. The chrysalis is brown, and has a beak in front. The privet hawk moth appears about midsummer, and frequents woods and lanes. Sugaring is a good way to obtain this moth.

At the lower part of the picture on the left hand is seen the bedstraw hawk moth (*deiliphila Galii*), which is only locally known, but in the south of England it is by no means uncommon. The fore wings are brown, with a white line across the middle; the hind wings are pinky white, with a black margin. The thorax and body are of a uni form brown, with the exception of a few white lines on the sides of the thorax and on the end of the body. The caterpillar is green, with a pale line down the back, and a row of pale spots along the sides; the horn is a rusty red; it feeds on the bedstraw. The chrysalis is brown. The perfect insect appears in June or July; it fre quents lanes, and the downs near sea coasts.

The smallest of the three specimens, on the left hand in the engraving, is the small elephant hawk moth (*chærocampa porcellus*). The forewings are of a greenish shade, banded with pink; the hind wings are pink, but black at the base. The caterpillar is brown, with two conspicuous eye-like marks on the fourth segment; the first three segments narrow suddenly; this, together with the eye-like marks, give the caterpillar the appearance of a hog, hence the name *chærocampa*, or hog caterpillar. The caterpillar feeds on the willow herb or bedstraw. The perfect insect appears in June, and frequents lanes and the sides of brooks, especially where the willow herb is plentiful.

The reverse sides of the wings of the three specimens are shown by the flying moths in the upper part of the picture.



BRITISH MOTHS.

A Great Gold Mine that Runs as High as $100,000 to the Tun.

The American mine owned by Hiram Hitchcock, aud superintended by Professor J. Alden Smith, is the most extensively worked in Sunshine district, Col. Ter., and for quantity and richness of ore one of the most wonderful mines in the world. The *Courier* says it is turning out large quantities every month, that sell to the smelters at from $100 to $6,000 per tun, and has paid large dividends constantly from the very commencement. The first class ore, by the tun, assays $5,000 to $12,000; the second class, about $800; and the third class, $200. Pieces can be picked from any of the first class sacks that will yield from $1 to $3.50 per ounce, or at the rate of $30,000 to $100,000 per tun. The quantity and quality of the ore has gradually but constantly increased from the surface, and now, at the depth of 220 feet, the vein is fully twice as large as it was at the surface, and the ore is far richer. From what is already known of this remarkable vein few will dispute the assertion that no mine thus far discovered has produced such extraordinary yields as the American at Sunshine. Its character under development proves it to be a true fissure, strong and exceedingly rich in precious metal. Its net returns at this time, and since the first ten feet of opening had been accomplished, have been and are greater than those of any other deposit of gold-bearing mineral in the country. Much of the crevice matter is worth from $10 to $40 per pound, and selected specimens have returned at the rate of $200 per tun. The Chicago *Inter-Ocean*, in speaking of this district, says: "But the latest mining sensation is the recent development in the Sunshine district of Boulder county. Tellurium has heretofore been found in only three localities in the world. It carries the richest deposit of gold. This species of ore is found in this district. Its yield is well nigh fabulous. The entire locality develops telluride ore, but among the discoveries the American mine has been worked to a demonstrable extent. The shaft is only down 220 feet, worked by a hoisting engine. The vein is 2 feet thick, of which a streak of 7 or 8 inches is pay ore. The first class of this is shipped to the Omaha Smelting Works, where the net sales average $5,050 per tun. To bring this price the ore has to assay $6,000 per tun, from which are deducted the freight charges, and $100 per tun for treatment; 90 per cent of the balance is paid to the owner of the ore. The getting out, sorting, and handling of the ore cost, when laid down in Omaha, $100 per month, freight inclusive. The mine employs 30 men, at a cost of $3,000 per month, who produce 20 tuns of milling ore in that length of time. Of this ore there is shipped, as first class, to Omaha, 2 to 4 tuns per month, and the balance to Professor Hill's works, at Black Hawk, as second class. The net profit of the mine is $40,000 per month. The present owners of the mine bought it, when partially developed, for $17,000. It cannot now be purchased at any price within reason.—*Miner's Journal.*

Brussels International Exhibition, 1876.

The Brussels International Exhibition, which was opened on June 26, is exclusively devoted to means or appliances for promoting health and public safety. It will be followed by a Congress, where all questions interesting to these subjects will be discussed, and, so far as possible, decided. A leading feature of this enterprise is that it has been started and sustained solely by private action. It received, however from its commencement the encouragement of King Leopold, who became a patron of this useful undertaking, and of his brother the Count de Flandres, who was elected the honorary President of the Central Committee.

The Exhibition was opened by the King of the Belgians with the usual solemnity. The exhibits are divided into ten classes, as follows: 1. Saving of life from fire; 2. Apparatus and engines of all kinds acting on water and in water, to diminish danger, prevent accidents, and give assistance; 3. Means of preventing accidents resulting from traffic on roads, railways, and tramways; 4. Means of assistance in time of war; 5. Public health; 6. Sanitary measures and means of saving life applied to industry; 7. Domestic and private hygiene; 8. Medicine, surgery. and pharmacy, in relation to the preceding classes; 9. Institutions for improving the condition of the working classes; and 10. Hygiene and protection of life as applied to agriculture. Each of these classes is subdivided into a certain number of sections.

The Russian department contains amongst other things a very complete collection o analyzed foods, such as are seen at South Kensington, showing their various qualities as human food. There are likewise a great number of plans and drawings showing various arrangements for schools, houses, public baths, etc., while the military staff has also sent a number of ambulance wagons, and surgical and medical appliances for use in war time.

Next comes the Belgian department. Here the Minister of Public Works exhibits reduced models of various life and tug boats, and other objects of the same kind, together with railway appliances, Amongst these we must notice an accident wagon, containing all that is necessary or useful in case of an accident occurring on the line, either by collision, fire, or by any other cause. This wagon is very good both in design and construction, and affords credit to M. Docteur, who has designed it and superintended its construction. The Grand Central Railway exhibits also some objects worthy of notice, among which are two carriages fitted with Maquet's *garde de corps*, for preventing guards from falling down when running along the train; this is rather of local interest, owing to the Belgian mode of collecting the tickets. A plan for warming the trains is shown by M. E. Belleroche engineer of the same company.

M. Waroque, the President of the Exhibition, and one of the richest coal owners in Belgium, exhibits a working model on a large scale of an apparatus called *Waroquiere*, from his own name, intended to raise and lower the workmen in the coal pits. There is also a direct-acting blowing or rather exhausting engine constructed by the *Société Anonyme des Atêliers de la Meuse*, under the direction of M. A. Stevart. This powerful engine, which has two cylinders of 6 feet diameter, is intended for the ventilation of coal mines, principally those troubled with noxious gases.

France comes next; but wonderful to say, this great country offers but few interesting exhibits, the greatest space being occupied by culinary and pharmaceutical articles, and those relating to dentistry. Near the French Department we find Sweden, Norway, and Denmark, and these sections, if they are not the most extensive, are certainly not in the least interesting of Exhibition. They relate principally to school buildings and furniture and houses for workmen.

Germany covers a great surface, and the exhibits are well arranged and useful. They include a good quantity of pumps and other machinery for saving life from fire. Plans and drawings showing the mode in which large public works have been conducted are numerous and very interesting, and the varied specimens in each of all the classes of the catalogue make this section specially worthy of notice.

Messrs. Siemens and Halske, the well known electrician engineers of Berlin, exhibit their numerous appliances for working railways under the block system, also their dynamo-electric machine with accessories. The ambulance wagons and cars, the medi cal and sanitary appliances to help wounded men in time of war, and to help them in all possible ways, are also very numerous and interesting.

In the Austrian department we find also a very complete assortment of ambulance wagons and cars, etc., even a complete train of eight carriages, the property of the Sovereign Order of the Knights of Malta. There is also a pretty good collection of maps showing the general arrangement of light-houses round the Austrian coasts.

Holland has also a good but small exhibition. In this naturally the greater portion is devoted to the means of protection against water. We must mention, however, specially the organization of the fire service of the city of Amsterdam, which is perhaps the most complete on the continent, all the stations being connected by a regular net of electric communication, which can be worked by the public as soon as a fire is perceived.

Italy has some curious exhibits, among which are several furnaces proposed for cre mation purposes. As a specimen of the merits of his *modus operandi*, one enterprising inventor shows a bottle containing a human body reduced to a weight of about 2 lbs.

At a right angle to this gallery is the British department. It covers a surface about equal to that of Belgium, and the exhibits are numerous and well chosen in all the different classses above mentioned. We shall briefly name *en passant* some of the exhibits most remarkable for their utility or their workmanship. Messrs. Saxby and Farmer have a splendid show, containing their various and well known appliances for railway signals, crossings, etc. The Brockelbank Syndicate demonstrate by a working model their system of wagon couplings, which attracts the attention of the public. The exhibit of the London committee for the second class is the most complete of the Exhibition in all respects. The Westinghouse Continuous Brake Company has only a drawing, illustrating the application of their system to an American and English train; but what is still better than a working model, they can show two trains in action on the State Railway lines, one which has now been running for three years on the Belgian railways, and the other fitted on their new automatic principle. —*Engineering.*

Steam Power for Street Cars.

Two separate trials were lately made in Edinburgh of Gran tham's patent tramway car, propelled by Shand, Mason, & Co.'s patent steam engine, with tubular boiler. The trials took place on the tramway rails of the Woodside Ferry and Hoylake Company. The car runs on a bogie with four wheels, the other end of the machine resting on two wheels. The latter being small, an acute curve is taken with facility. On a level part of the line the speed attained was not less than 14 miles per hour. The car can be stopped as suddenly as one drawn by horses. It is claimed for the engine referred to that it gives 12 horse power by a consumption of ½ cwt. of common gas coke per hour, or the work of 12 horses for 10 hours, at the cost of 5 cwt. of common gas coke, or less than $1.25. Out of fifty or sixty horses met by the car four of them shied on its approach. A small quantity of smoke was emitted from the funnel when the car stopped, and some when the steam passed through the safety valve.

The Excavations at Olympia.

The excavations which have been going on at Olympia, under care of the German government, are to be resumed in September. Many enteresting discoveries have been made in uncovering the ruins of the temple of Zeus, although has been only partially accomplished. It is inferred that

the temple was destroyed by earthquakes, since whole ranges of columns have been overthrown together. These have been preserved from spoliation and decay by being covered with sand and clay; and the sanguine explorers almost think that the materials exist for rebuilding the façades. The bases of most of the columns, and frusta of some, remain *in situ*, as do also a portion of the pedestal of the statue of Zeus, some portions of the walls, and the bases of two altars in the aisles. The mosaic pavement, discovered by the French in 1829, has been re-examined, and covered again with sand to preserve it till work is resumed in the fall, when careful drawings will be made of it. Only the nave (so called) of the temple was paved with marble, the aisles being floored with stucco. A raised platform of about thirty by forty-five feet has been discovered in front of the eastern facade. It is encumbered by fallen columns, and has not been thoroughly examined. The statements of Pausanias concerning the dimensions of the temple agree with the measurement of the explorers, which prove that his were taken at the base of the lowest step on which the building stands. Two sculptured metopes have been found, one very well preserved and the other very ill. The Greek government, which takes great interest in the explorations, has stationed a detachment of troops at Olympia, and put the magazines under seal till the work shall be resumed.—*American Architect & Building News.*

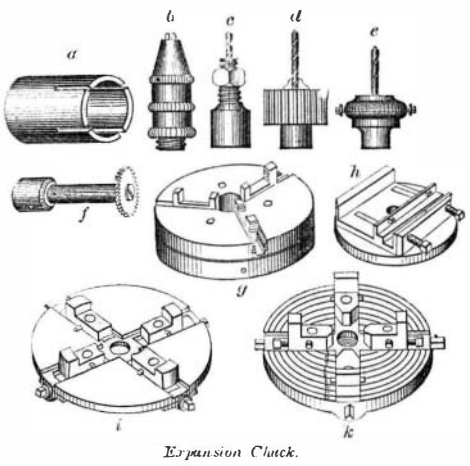
CHUCKS, FORMS OF IRON, AND LUBRICATORS.

Our extract from Knight's "New Mechanical Dictionary,"* for this week, includes an interesting series of illustrations of useful devices and forms of metal. The latter embody a very large number of sections of girders, beams, and other objects of iron, and the engravings will doubtless be found of utility for reference, in determining the selection of any especial shape desired for a particular purpose. Of

CHUCKS,

several improved forms are represented in Figs. 1 and 2. An expansion or elastic chuck, *a*, having a certain range of capacity, may be formed by giving a quadrifid cleft to the end of a cylindrical tube, whose other end screws on to the

Fig. 1.

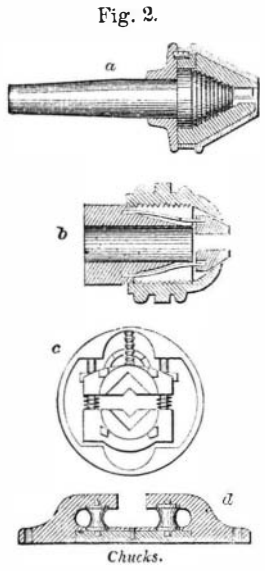


Expansion Chuck.

threaded mandrel of the lathe head. The object to be turned is thrust into the chuck, expanding the quadripartite socket. *b* is Beach's patent drill chuck. *c*, center drill chuck. *d*, Warwick chuck. *e*, Morse's adjustable chuck. A circular saw of small diameter may be mounted on a lathe chuck, *f*, which has an axial tenon to fit the hole in the saw, and a central screw or nut to fix the same. *g* is a scroll chuck with three radially adjustable dogs. *h* is a planer chuck. *i* is a screw chuck. *k* is an independent jaw chuck.

Fig. 2 shows three forms of lathe chucks having jaws to grasp the tool or the work, as the case may be. In *a* the stock of the chuck terminates in a conical, threaded head, which opens or closes the jaws, which are threaded, and slide in grooves in the conical shell. The nut in *b* has a conical opening in the end which operates against the inclined backs of the jaws, to clamp them upon the drill; when relieved they are expanded by springs. The chuck, *c*, belongs to that class which is constructed with screws for the purpose of operating the jaws. It is provided with a double screw, the pitch of one being just half that of the other, to operate the jaws simultaneously in opposite directions, so that they will approach or recede from the center at equal speed, thereby forming a self-centering mechanism. *d* is an entirely different device though having a similar name. It is a warping chuck, in which hawsers or ropes run. Friction rollers prevent the wearing of the rope. It is used on the rail or other portion of a ship's side.

Fig. 2.

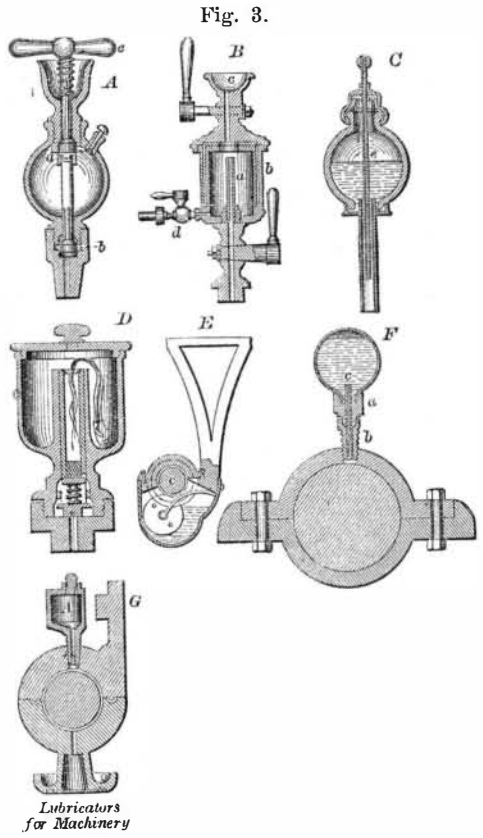


Chucks.

LUBRICATORS,

designed for supplying oil or grease to rubbing surfaces in order to diminish friction, are represented in Figs. 3 and 4. In A, Fig. 3, the two valves, *a b*, are connected by a rod. By turning the handle, *e*, in one direction, the valve, *a*, is depressed by means of a pin working on an inclined plane, and admits oil to the reservoir. A reverse motion opens the valve, *b*, furnished with a similar contrivance, permitting the oil to flow from the reservoir. The valve, *a*, is kept to its seat by a spiral spring on the rod. In B, steam is admitted through the pipe, *a*, to the oil chamber, *b*, forcing out the lubricating material through an opening to the desired point. The supply of oil from the cup, *c*, is regulated by a cock, and a cock, *d*, at the side of the oil chamber permits accumulating water of condensation to be drawn off. In C, the central tube, *e*, is open, and, when the oil sinks below its lower end, air is admitted through it and the annular passage

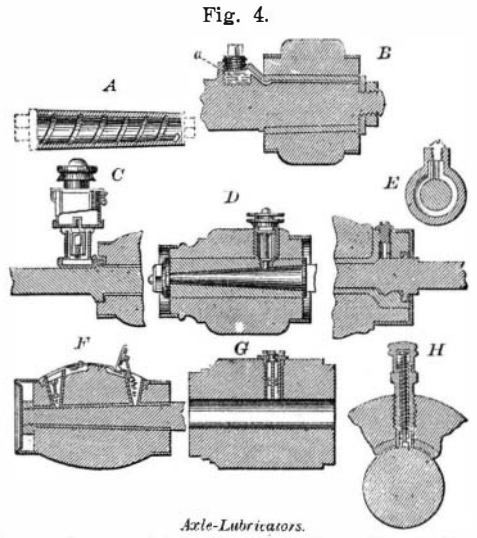
Fig. 3.



Lubricators for Machinery

to the reservoir above, and allows an equivalent amount of oil to descend. The vertical adjustment of the tube regulates the flow by determining the hight of the column of oil resting upon the journal. In D the oil is conducted from the annular reservoir by a wick of fibrous material into the tubular valve stem. This stem has radial holes at its lower end for the discharge of oil, and wire gauze to arrest impurities. Between the upper and lower valve is a spiral spring. When the engine is running, the valves are closed by steam and spring pressure; when stopped, the upper valve is closed by the spring, and when running without steam both valves are sucked open and the oil flows. E is designed for shafting. A pivoted disk in a cup below the lower journal box is revolved by contact with the under side of the shaft, *c*, and carries up oil to lubricate the latter. F has a transparent reservoir with metallic socket, *a*, screwing into the seat, *b*, fitted to the cap of the journal box. Between this and the journal is a slight vacuity, from which air is admitted through the tube, *c*, allowing a greater or less quantity of oil to flow in proportion as the journal turns more or less rapidly. When at rest the flow ceases. The flow of oil from the cup, A, in G, is regulated by an adjustable screw plug. The bearing has ducts for conveying surplus oil from the upper part of the shaft toward the center, and at its lower part is a closed chamber forming a drip cup. In Diller's (A, Fig. 4), a spiral groove is formed around the inner surface of the box, and leads the grease to all parts of the spindle, while the integrity of the bearing surface of the box is not materially interfered with. The reservoir, *a*, in B, is closed

Fig. 4.



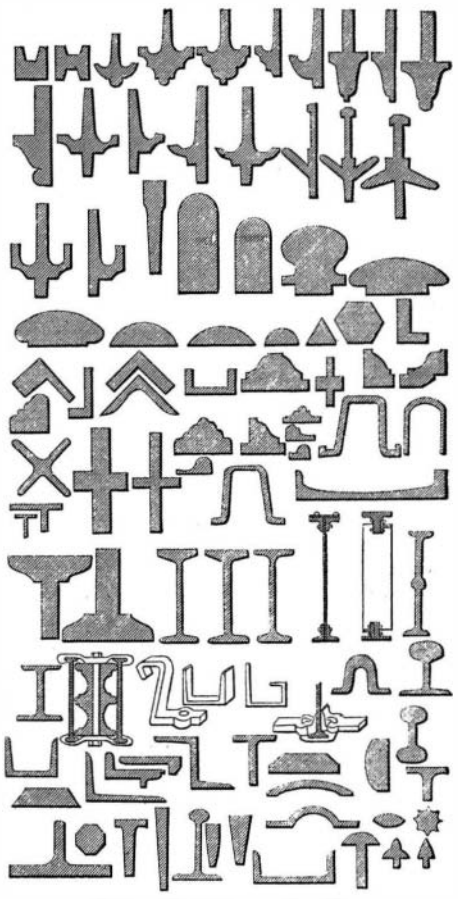
Axle-Lubricators.

by a screw plug, which is turned to force the oil through a duct leading to a groove in the upper part of the spindle. The groove tapers toward the outer end, so as to distribute the oil equally. In C a lantern is attached to the axle of the carriage just inside of the butting ring. The oil reservoir, besides furnishing supply to the wick of the lantern, also supplies oil through a duct to the bearing surfaces. In D a tube passes radially through the hub, its lower end opening into the interior space of the box. The oil reservoir is covered by a screw cap. The inner end of the tube is closed by a valve whose stem is attached to the cap. By turning the screw cap the valve is opened or closed, and the oil is allowed to flow, or is cut off. E has an oil chamber made in the box, which communicates with the bearing surfaces. The reservoir is closed by a screw plug, and the oil passes gradually to the spindle without special attention. In F there are one or more conical openings in the hub, each closed by a spring lid to which a rod and sponge are attached, extending to the axle. The sponge is charged with oil on opening the lid. This is kept shut by the spring when the wheel is in motion. G has an oil cylinder, having a piston on a screw rod which works through the cylinder cap, inserted in the hub. Turning the head of the rod pushes the piston down, forcing the lubricant upon the axle spindle. The piston is kept from rotating with the screw cap by a groove in its edge, into which a feather on the inside of the chamber fits. In H the depression of the spring valve allows oil to flow from the chamber to the spindle of the axle.

THE FORMS OF IRON

are simply sections, as already stated, and are illustrated in

Fig 5.



Angle, Bar, Girder, and Rail Irons

Fig. 6.

Angle, Bar, Girder, and Rail Irons.

Figs. 5 and 6. The shapes are already shown and need no explanation.

*Published in numbers by Messrs. Hurd & Houghton, New York city.