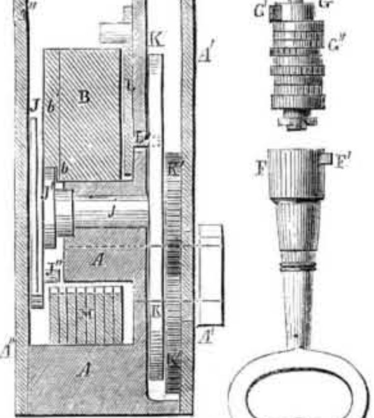
K''' is the first gear wheel, which is mounted in such manner as to surround the key hole, and receives motion from the revolution of the stump of the key. K'' is the second gear wheel, which receives motion from K''', and conveys it to K' This third gear wheel K', is fixed on the shaft *j*, which passes through the inner front plate of the lock, and conveys the motion to the mechanism within. J' is a cam or heart-shaped wheel, fixed on *j*, and which, in addition to the fence C and fence tumblers D, prevents the bolt from being moved in either direction except at the right moment. J'' is a stout pin projecting from J, and which, by catching in the groove

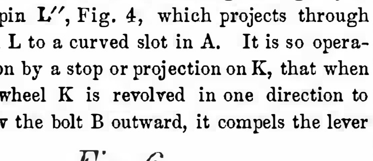
Fig. 4 Fig. 5



b as it rotates, is the medium by which the bolt is thrown. K is a stout disc or wheel of chilled iron or hardened steel fixed on the same shaft *j*, so that it revolves therewith. There is one hole only in K, and this coincides with the key hole when the bolt is fully thrown in either direction, and in that condition of the lock allows the key to be inserted or removed, but in all intermediate conditions it completely stops the passage, isolating the pod of bits from the stump F.

L is a lever mounted on the center L'. It receives motion from K through the agency of the pin L'', Fig. 4, which projects through from L to a curved slot in A. It is so operated on by a stop or projection on K, that when the wheel K is revolved in one direction to throw the bolt B outward, it compels the lever

Fig. 6



or dog L to assume the position shown in Fig. 2 and when revolved in the opposite direction compels it to assume that shown in Fig. 3. This prevents any motion of the tumblers M except while K is partly revolved, and consequently the key hole is entirely stopped. M' are thin racks corresponding in thickness with the gear wheels *d*. They are fixed to the racked tumblers or sliders M as represented, which latter receive motion from the rotation of the key bits G''. M'' are simply the bent extremities of M'. Their office is to receive the dog L and prevent the motion of M' except at the proper time. N is a knife stop operated by the inclined upper and lower edges of B', as represented, and which, by catching in the teeth of M', prevents the parts from moving by any force while the bolt B is being thrown.

Operation.—The bits G'' are all firmly secured by simple means on the core G. The whole is fitted by a spring catch to the stump F in such manner that it can be readily disconnected by giving a quarter revolution thereto. In locking, the key is inserted freely into the key hole to the full depth, so that the bits G'' are each over one of the sliders M, and the horn G' is inserted in a corresponding cavity in the small gear wheel H. The stump F is now turned a quarter revolution, which disconnects it from the bits, and allows it to be drawn outwards sufficiently to be entirely clear of the cut-off plate K. The stump K is now rotated, thereby giving motion by means of the gear wheels K'''; K''. K', to the shaft *j* with all its attachments. The plate J revolves idly until the key hole is covered or for about a quarter of a revolution, and then commences to rotate the gear wheel H, which receives or has received the G or G' end of the pod of bits, and commences to turn the bits G'', and to move the sliders M; but as the bits G'' are each carried only a half of a revolution, and the gears do not coincide each with the other, it follows that the said sliders M are moved to unequal extents. After the gear wheel H, and consequently the bits G'', have performed half a revolution, their motion ceases for a time, and the wheel J continues to revolve. Meanwhile the cam J' has released the bolt B and the pin J'' catching in the groove, *b* commences to throw the bolt B outward. As this movement progresses, the nest of tumblers D is depressed, and the gears *d* are made to lock into the racks M', a connection which they are to maintain until the bolt B is again thrown back to its first position. The continued revolution of J finally gives the remaining half revolution to the small gear wheel H, and consequently to the key bits G'', which moves each of the sliders M the remainder of its motion, and leaves them altogether in the position shown in Fig. 2; the bolt B having previously moved outward so far as to take the fence C entirely out of the notches D, in the circular tumblers D, and allows these circular tumblers to be each partially rotated according to the irregular position of the bits G''. The locking is now complete, and the cam J' is again in such position in the notch *b* that it aids the fence C in preventing any throwing in of the bolt B by any violence. The stump F is now thrust inward (the cut-off plate K having made a complete revolution,) the connection with the bits is again made by the spring catch, and the whole is removed.

The unlocking consists in a repetition of this process performed in the reverse direction, *with the bits G'' in precisely the same relative position.* Any change of these parts, or the introduction of bits faulty in any respect, will fail to adjust the tumblers D in precisely the position they were in at first, and if one only of these be rotated too far, or not far enough to cause their notches D' to coincide exactly with the motion of the fence C, the unlocking cannot be performed. These tumblers D are not accessible by any known means, except through the means described.

For any information, please address Dr. H. Isham, New Britain, Conn., or James Talcott Esq., 57 Liberty street, New York.

Coal.

As a kind of answer to the question "What is it?" published by us last week, we transcribe the following description by J. A. Phillips, an English metallurgical chemist:—

Lignite, or brown coal, is found in that portion of the earth's crust called by geologists the "tertiary formation," and it varies very much in its appearance and composition, and has consequently received from mineralogists several distinct names, such as brown coal, bituminous wood, common lignite, and earthy lignite. Of these, the former very much resembles turf in its nature, consisting of woody matter, which in many instances so far retains its original structure as to admit of the recognition of the class to which the tree belonged. This kind frequently loses about twenty per cent of water at a heat of 212° Fah., and yields from thirty-five to forty per cent of a brittle coke resembling charcoal.

The second variety, or bituminous wood, although it still presents, to a certain degree, its woody texture, is generally of a very dark brown or black color, and more closely resembles in its nature some varieties of mineral pitch than the wood from which it was originally formed.

At Meiszner, in Germany, a deposit of bituminous wood is covered by a stratum of basalt more than three hundred feet in thickness, and occurs in flattened fragments which still retain the laminated structure of wood. Its transverse fracture is conchoidal and glossy, its specific gravity 1·32, and the usual color of the substance either dark brown or black. When burnt, it decrepitates on the fire, giving off a very disagreeable odor, and leaves about fourteen per cent of ash.

Common lignite very much resembles in its appearance coals from the secondary formations. Its usual color is black or brown, with a compact structure and irregular fracture. Sometimes the fracture is conchoidal and brilliant, and in this case the substance is often called *jet*, although the true jet from which ornaments are manufactured is not a variety of lignite. This substance contains a less proportion of water than the variety known by the name of fossil wood, and has an average specific gravity of 1·20. When heated, it gives off inflammable gases, together with acid and tarry matters; but the resulting coke in most instances retains the form of the fragment from which it was produced. Less frequently the lignites may be so far softened by heat as to run together and cake on the fire, or even to assume a tarry consistence; but these specimens are only to be obtained from deposits occurring in the fresh water limestone formations.

The earthy lignites, as their name implies, contain a large proportion of incombustible foreign matter. They have a dark brown color and hackly fracture, and, from the quantities of iron pyrites and clay which they contain, are sometimes burnt, for the purpose of manufacturing alum and copperas from the ashes they thus afford.

Crystallization.

All the metals are capable of assuming, under favorable circumstances, the crystalline form. Many of them—particularly gold, silver, copper and bismuth—occur crystallized in nature, and are found either as cubes or octahedrons, or in some of the derivative forms; antimony is, however, an exception to this rule, and affords rhomboidal crystals.

In order to crystallize a metal artificially, it is sometimes sufficient to melt a few ounces in a crucible, and, having permitted it to cool on the surface, to pierce the crust formed and allow the interior to flow out. By this means very beautiful crystals of bismuth may be obtained; but in the case of some of the less fusible metals larger masses and slower cooling are necessary to produce this effect, and consequently these are never found in a crystalline state unless considerable weights have been fused, and allowed gradually to cool, as sometimes occurs in the furnaces in which their metallurgic treatment is effected.

It also frequently happens that one metal may be precipitated in a crystalline form by placing a strip of another metal in the solution of its salts. In this way silver is deposited by mercury; and a piece of zinc placed in a solution of acetate of lead precipitated the latter in feathery crystals. Gold is occasionally deposited in this form from its ethereal solutions, and a stick of phosphorus produces the same effect. Nearly all the metals yield crystals when deposited from their solutions by electric currents of feeble intensity, and it is doubtless to this action that we are indebted for the many beautiful specimens of the native metals which enrich the cabinets of mineralogists.

Water and Morals.

A very slight declivity suffices to give the running motive to water. Three inches per mile, in a smooth, straight channel, give a velocity of about three miles per hour. Now, what is true of water is equally true of morals. The best of men only need a slight push from adversity to obtain a downhill momentum. Be careful, therefore, how you lose your equilibrium.

To carry a Collins steamship from New York to Liverpool requires eight hundred tons of coal—enough to last an ordinary family forty years.

The Worthlessness of Gold.

It is stated by many of the survivors of the *Central America's* passengers, that there was seldom so large an amount of money owned by passengers as was in the case of those who came by the *Central America.* Many were persons of large means, and there were very few whose immediate wealth did not amount to hundreds, while numbers reckoned their gold by the thousands of dollars. The greater portion of the passengers were returning miners; some coming hither to invest the capital they had realized in hopes to live a life of greater ease as the result of their industry, and others to get their families and once more go to the land of gold. But as the storm continued to rage, less and less of gold was thought of, and when, on Saturday, it became evident that they were likely at any moment to be buried beneath the waves, the wealthy men divested themselves of their treasure belts and scattered the gold upon the cabin floors, telling those to take who would dare to test its weight—as a few ounces or pounds might carry them to death. Full purses, containing in some instances $2,000, were lying untouched on sofas. Carpet-bags were opened by men, and the shining metal was poured out on the floor with the prodigality of death's despair. One of the passengers, who has fortunately been rescued, opened a bag and dashed about the cabin $20,000 in gold dust, and told him who wanted to gratify his greed for gold to take it. But it was passed by untouched as the veriest dross. A few hours before he would have struck down the man who would have attempted to touch a grain of that which he now spurned from him.

Lavas.

Lavas are the mineral substances rendered liquid by heat which flow from volcanos of the present epoch, and are generally found extended in the form of thin strata, or appear as a coating on the declivities of the mountains from which they have been ejected.

The name of "schist" is applied to minerals possessing the property of being easily separated into thin layers, and which present the foliated appearance observed in common roofing slate. The term "sand" is applied to small disconnected particles of quartz. When these grains are united by a siliceous cement, the resulting rock is "grit," or "sandstone." This is sometimes found of a white color, but is more frequently stained by some metallic oxyds, as in the old red sandstone, which owes its color to the presence of peroxyd of iron.

The Great Eastern.

A Canadian paper says:—"We are authorized to state that this steamship will be launched in the first spring tides of next month (October). The day is not as yet absolutely fixed, but this important event will probably take place on Monday, the 5th of that month. The tides will be highest on that day."

Gas from Peat.

The first experiment on this continent of lighting a city with gas made from peat, was tried in Portland, Me., a short time since. The light was clear and brilliant, and few of the citizens were aware that coal was not used as usual.

A New Hampshire correspondent of the Boston *Traveler* tells a story of the discovery of lead, copper, and silver mines in that State, near the town of Warren. The lead vein is said to be 800 feet long and 7 feet wide. Copper and silver are said to exist in considerable quantities.

Letters from Bagdad announce an extraordinary fall of rain on the 14th of June at that place, which, from its reddish hue, gave the surrounding country the appearance of a battle-field.

We are indebted to Hon. C. B. Hoard, M. C., Watertown, N. Y., for three volumes of the Annual Report of the Commissioner of Patents for 1856.