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## A STRONG ROOM FOR VALUABLES.

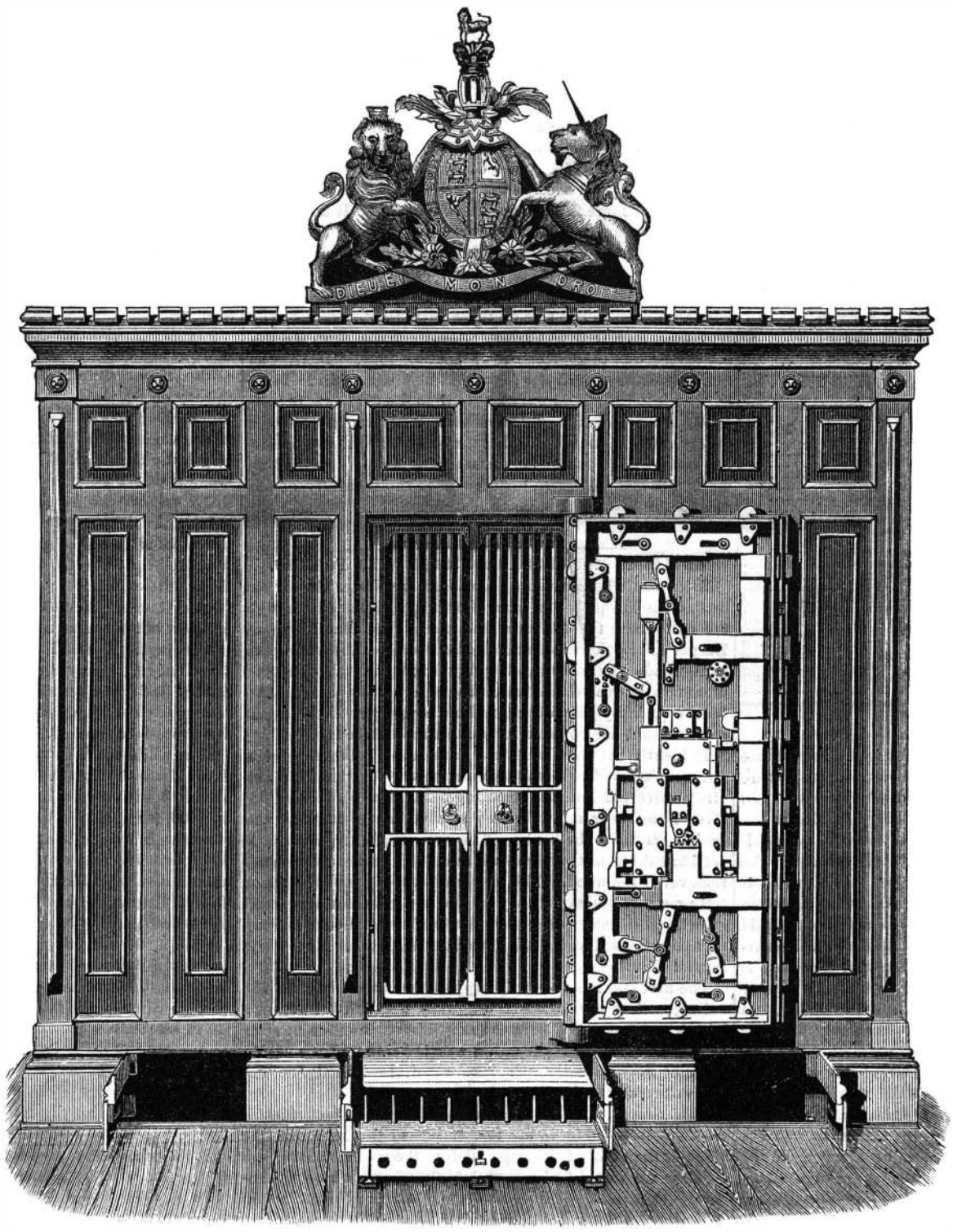
It has been said that, no matter how much ingenuity is exercised by honest men in devising means for the protection of their valuables, there is an equal amount of inventive genius to be found among rogues, devoted to discovering ways for overcoming apparently the safest of safeguards. We have seen some burglars' implements, which have been captured by the police of this city, which show not merely skilled but highly skilled workmanship, certainly indicating that the maker might have gained large wages had he seen fit to earn his livelihood honestly. Besides manual ability, burglars, in many instances, have been proved to possess thorough scientific knowledge in the use of explosives and of the electric current; so that, all things being considered, safe makers of the present day find themselves met by weapons of offense, which compel them constantly to search for new ways of strengthening their defensive structures.

One of the largest safes that has ever been constructed, and one than which probably no stronger exists, is a banker's security room recently built by Messrs. Hobbs, Hart, & Co., the celebrated lock makers of London, the head of the firm being Mr. A. C. Hobbs, of Hartford, Conn. We give an engraving of it, extracted from the *Engineer*.

The dimensions of the room are 12 feet in hight, 14 feet wide, and 7½ feet deep, embodying 476 feet of planed surface. It is constructed of sixty-two divisions, all of which are most accurately fitted, upwards of 32,000 holes having been used. The engraving shows the door open. The exterior decorations of the room are very effective, the design being a modification of that made for the jewel room constructed by the firm for Her Majesty's special use at Windsor Castle. There are 456 feet of molding, forming the panels and supporting the turreted cornice overhanging the top. It will be seen from our illustration that there are no external indications of any of the sixty-two divisions.

The construction of this room is briefly as follows: First, there is an elaborate base or false bottom formed of plates five eighths of an thickness, on which are placed girders to support the room, forming thereby a chamber underneath the safe, designed to prevent the room from being tunneled into. The recent robberies in Baltimore in 1872, and in Russia in 1874, make such means absolutely indispensable for perfect security. The whole of this chamber is inclosed by doors, etc., and steps are formed leading to the bottom of the strong room, providing easy access into the interior. As the floor of the room stands some distance above its base, there is an arrangement of steps running on wheels, which can be drawn out opposite the door, rendering the entrance to the room perfectly easy and convenient. Standing in front of the door we find a series of locks, each having different keys to be retained by independent officers, thus providing against the risk of any single individual having access to the room without the presence of the others. Robberies having been effected abroad by drilling the outer plates of safes and strong room doors for the purpose of screwing in steel plugs, after filling the locks with gunpowder, to meet such mode of attack the locks are filled with solid interior packing and with a movable disk, which entirely precludes all access to the interior of the lock. Hence these locks cannot be affected by any explosive, except such as would blow the entire structure to pieces, and bury the experimenter among the ruins. These locks differ from all others in having a series of holding points, all of which must be destroyed before the safe can be broken into, instead of one point only, as is usually the case. As no strong room, safe, or lock can be regarded as continuously secure, unless the possessor of the key has the means, independently of its manufacturers, of making such alterations in it as will virtually make an entirely new combination of the lock, the firm have invented a lock and key which render the possessor independent of any workman, as he can at any moment change the combination of this key on every change of servants, or on any suspicion that a duplicate key has been made, from the original or from a wax impression.

The door as well as the body of the room is formed of iron and steel welded together. The weight of the door alone is nearly two tuns. By means of equivalents for hinges—namely, 2½ inches pin centers—the working of the door, notwithstanding its weight, is perfectly under control. It is held to the room by a series of clutch bolts, passing through interlacing projections into corresponding recesses in the frame, maintained in position by wedge bolts, thus rendering it mechanically impossible to wrench the door by means of levers, wedges, or screw jacks. The exterior plates forming the body of the room are made of ⅝ of an inch wrought iron Staffordshire plates, attached to which are defences of high and low carbonized welded steel and iron, to prevent drilling without previously softening the plates and maintaining them in a softened condition. Steel and iron in such a combination cannot be easily broken in pieces, as would be the case with slabs of steel only. The various means that have hitherto been adopted against such violence in this and other countries have been slabs of cast iron, interlaced with a network of iron bars to strengthen the cast metal, first patented by Newton in 1853, by Lilly in 1856, and improved on by the introduction of spiegleisen by Herring in 1864. The plan of security adopted in the strong room of Messrs. Hobbs, Hart & Co., first employed by them in 1857, unquestionably surpasses all hitherto devised means of defence against skilled violence. The sixty-two sections of the room are connected by outside and inside angle iron 5 x 5 x ⅝ of an inch thick, and 6 x 6 x 1 inch thick; while that forming the door is made of angle iron 9 x 6 x 1 inch thick, attached to the plates by means of rivets and screws of the thickness of the iron, varying from 1½ inches to 2 inches apart. Beyond the outer body there is an inner chamber 1½ inches between it and the fireproofing, the object of which is to cut off the heat-transmitting power of the metals. By a system peculiar to the firm, the various materials forming the fireproofing are kept separate, thereby preventing any chemical action, either on the metal or on each other, while the outer body plates are arranged vertically, the burglar-resisting appliances are placed horizontally, and the fire-resisting chambers in opposite directions; thus all the joints are overlapped and crosswebbed. In this room a series of safes of great strength will be placed, thus providing against any possible attacks of skilled burglars or dishonest workmen. Viewing the strong room as a whole, it is a marvel of ingenuity and mechanical skill. The weight is nearly 35 tuns, and the price $12,500, delivered on board ship.




BANKER'S STRONG ROOM.

### Power of Gunpowder.

M. De Saint Robert, in an article from his pen in *La Revue Scientifique*, gives the following calculation of the efficiency of a rifled cannon, the diameter of the bore of which is 3 inches, the shell of which weighs about 8·3 lbs., and the firing charge of which is 1¼ lbs. It may thus be estimated: Experiment has shown that the velocity of the shell when it leaves the mouth of the cannon is about 1,300 feet per second. The hight from which the projectile would have to fall to acquire this velocity is 26,800 feet. Consequently the work actually done by the powder is equal to 219,000 foot pounds. On the other hand, Bunson and Schischkoff have found by direct experiment that the heat evolved by the combustion of 2·2 lbs. of gunpowder is equal to 619·5 calories. Hence the heat evolved by the above charge of 1¼ lbs. of powder is equal to 340·7 calories. The mechanical work corresponding to this amount of heat is 1,050,000 foot pounds. Comparing this, which is the possible mechanical work, with the actual work done on the projectile as given above, the ratio is 0 208 for the effectiveness of the cannon, that is to say, about 21 per cent

THE INDUCED CURRENT.—"It appeared as if the current, on its first rush through the primary wire, sought a purchase in the secondary one, and, by a kind of kick, impelled backward through the latter an electric wave, which subsided as soon as the primary current was fully established."—*Tyndall.*