

If there had been no property in the country but 200 millions of money, no issue of Treasury notes, and no other contrivance, would have enabled the Government to support the war for a single season. What is requisite for carrying on the war is a supply of beef, flour, horses, wagons, coffee, gunpowder, harnesses, iron, timber, and the various other forms of property which are required in naval and military operations. The capital of the country is made up of these things; the money, as we have shown, amounting to only two per cent of the whole. When capitalists make a loan to the Government, money is temporarily used to effect the exchange, but the final transaction that really takes place is a transfer of flour, beef, or some other kind of merchandise from the possession of the capitalist to that of the Government.

When one man has a debt due him from another, it is generally an error of speech to say that he has money at interest. In most cases the debtor has but a small proportion of the amount of his debt in money; but, if the debt is good he has the whole amount in some other kind of property. If the debtor sells his wheat and oxen to the Government and pays his debt, and the creditor invests the amount in Government bonds, a portion of the capital of the country is consumed in military operations, while the money in the country remains just the same as it was before. All the use of the money in the transaction was to facilitate the exchange of the property; enabling each man to exchange a given value in the property which he had for an equivalent value in the kind of property that he wanted. And this is the only use of money in human affairs. Wealth, property, capital, in its various forms, has innumerable uses, but money has only this one use. It is a convenient instrument to employ in making exchanges of property.

When a capitalist has loaned his property to the Government, the only way that he can make a further loan is by accumulating more property. Ask any individual capitalist how the issuing of more Treasury notes is going to increase the amount of capital that he has to invest in Government bonds.

THE HECKER AND WATERMAN EXPERIMENTS.

We give this week the results of Mr. Waterman's calculations of the quantity of steam condensed in doing the work that was done. Mr. Joule ascertained that the quantity of heat which will raise the temperature of one pound of water one degree, is just sufficient, if expended in mechanical work, to raise 772 pounds of matter one foot high. This quantity of heat is called a unit. It is found that whenever heat is employed to produce mechanical effect, for every 772 foot-pounds of work done one unit of heat is destroyed. When a portion of the heat in saturated steam is destroyed, a corresponding portion of the steam must be condensed. As the quantity of heat required to evaporate water at given temperatures is known, if the quantity of heat destroyed can be ascertained it is easy to calculate what portion of steam would be condensed in consequence.

Mr. Waterman computes the work performed by the engine by multiplying the mean pressure on the piston into the length of stroke. He then calculates how many units of heat this amount of work would consume, taking 772 foot-pounds to each unit. We accompany the figures with such of those already published as have a bearing on this branch of the subject.

The series tried from May 17th to May 27th; engine worked as a condenser, without steam in the jacket.

Pounds of feed-water pumped into boiler from tank—	
3/4ths cut-off.....	16,622
3/4ds cut-off.....	14,981
1/2 cut-off.....	14,983
1/4th cut-off.....	12,896
Pounds of steam in cylinder at end of stroke—	
3/4ths cut-off.....	10,359
3/4ds cut-off.....	8,334
1/2 cut-off.....	7,912
1/4th cut-off.....	6,313
Percentum of steam condensed in cylinder—	
3/4ths cut-off.....	37.3
3/4ds cut-off.....	44.3
1/2 cut-off.....	46.7
1/4th cut-off.....	49.2
Pounds of steam condensed by doing work, computed from Joule's equivalent—	
3/4ths cut-off.....	943.37
3/4ds cut-off.....	933.46
1/2 cut-off.....	972.09
1/4th cut-off.....	1117.12

Percentum of steam of the whole quantity evaporated condensed by doing work—

3/4ths cut-off.....	67.3
3/4ds cut-off.....	6.24
1/2 cut-off.....	6.68
1/4th cut-off.....	8.71

The series tried from May 12th to June 4th; engine worked as a condenser, steam in jacket.

Pounds of feed-water pumped into boiler from tank—	
3/4ths cut-off.....	12,901
3/4ds cut-off.....	11,267
1/2 cut-off.....	11,183
1/4th cut-off.....	9,632

Percentum of steam condensed in cylinder—	
3/4ths cut-off.....	15.4
3/4ds cut-off.....	21.3
1/2 cut-off.....	23.4
1/4th cut-off.....	10.4

Pounds of steam condensed by doing work, computed from Joule's equivalent—	
3/4ths cut-off.....	913.27
3/4ds cut-off.....	875.9
1/2 cut-off.....	929.67
1/4th cut-off.....	876.19

Percentum of steam of the whole quantity evaporated, condensed by doing work—

3/4ths cut-off.....	7.01
3/4ds cut-off.....	7.78
1/2 cut-off.....	8.22
1/4th cut-off.....	9.32

The series tried from April 1st to April 26th; the engine worked as a non-condenser, steam in jacket.

Pounds of water pumped into boiler from tank —	
3/4ths cut-off.....	15,571
3/4ds cut-off.....	13,056
1/2 cut-off.....	12,604
1/4th cut-off.....	10,394

Percentum of steam condensed in cylinder—	
3/4ths cut-off.....	11.3
3/4ds cut-off.....	11.3
1/2 cut-off.....	7.9
1/4th cut-off.....	9.7

Pounds of steam condensed by doing work, computed from Joule's equivalent—	
3/4ths cut-off.....	14,076
3/4ds cut-off.....	1514.60
1/2 cut-off.....	1335.2
1/4th cut-off.....	1140.37

Pounds of steam of the whole quantity evaporated, condensed by doing work—	
3/4ths cut-off.....	9.45
3/4ds cut-off.....	11.81
1/2 cut-off.....	10.6
1/4th cut-off.....	10.98

These calculations and their results are interesting. Regnault's experiments led him to the conclusion that the power of a steam engine is in proportion to the heat lost by the steam in the part of the engine performing the work. To obtain, therefore, the whole power of the heat, it would be necessary to perform work enough to condense all of the steam; and if only sufficient work is done to condense 10 per cent of the steam, it follows that only one-tenth of the power of the heat is obtained. It will be seen that in these experiments the work was sufficient to condense from 5 3/4ths to 11 1/3rds percent of the steam. The facts will doubtless suggest also many other points for reflection to intelligent engineers.

As statements, however, of the actual condensation of steam in the cylinder by the destruction of heat in doing work, we do not consider them as reliable. While the steam port is open the expansion takes place in the boiler as well as in the cylinder, and the heat destroyed in the boiler is renewed from the furnace. There are so many ways, too, in which work may be done, such as disturbing the atmosphere, in friction of the steam against the walls of the passages, and other modes, that we should consider an ordinary steam engine as a clumsy apparatus for measuring it. We have confidence in the correctness of the calculations, they have been made from approved formulas, and have been carefully checked.

THE NEW LAW FOR MEASURING SHIPS.

The law heretofore in force in this country for measuring ships was very defective, as we have repeatedly pointed out. But three dimensions were taken, one of length, one of breadth, and one of depth, so that the vessel's tonnage was ascertained with no reference to its lines, and with very distant approach to accuracy. It always gave the tonnage much greater than it really was. At its last session Congress passed a new law for the measurement of vessels, which will make the measures much more accurate than those by the old method. But the rules established by the new law are exceedingly complicated and clumsy, and they do not give accurate results.

An approximate estimate is made of the cubic contents of the vessel below the deck in feet, and each 100 cubic feet is called a ton.

The directions for ascertaining the cubic contents of a large vessel (over 250 feet in length) are to divide the length into 16 equal parts, and to measure the area of the cross section at each division. To get the area of the cross section the depth is divided

into four equal parts, and the breadth measured at each division, as well as at the top and bottom, making five measurements of breadth at each transverse section. Commencing at the top, the second and fourth breadths are multiplied by four, and the third by two, the products are added together, and to them are added the first breadth and last. The sum is multiplied by one-third of the common difference between the breadth, and the product—whatever it may be in mathematics—is pronounced in law the transverse area.

Then from the several areas the cubic contents are obtained by a process not less round-about, and equally inaccurate. For smaller vessels the process is the same except that fewer cross sections are measured. It seems to us plain that it would be much easier to teach any person to compute the contents of a vessel with perfect accuracy by dividing the portions between the several cross sections into regular geometric figures, prisms, wedges, and pyramids, as is done in computing earthwork, than it would to teach this complicated and inaccurate rule. A simple enactment that the tonnage of a vessel should be ascertained by dividing the cubic contents below the deck in feet, by 100, would express the intention of Congress with more precision than these clumsy rules, and there would be no difficulty in understanding the law.

A Trip in a Fire Balloon.

M. Eugene Godard, with five companions, made an ascent from Cremorne Gardens, in London, on the 20th July, in an enormous balloon of his own construction, which he styles "The Eagle." In this machine M. Godard discards gas, and goes back to the ordinary original Montgolfier balloon, which is commonly known as a "fire balloon." It is 117 feet 7 inches in height, 95 feet 9 inches in circumference, 300 feet 6 inches superficial, 30,000 feet in area, 2,005 lbs. in weight, 498,556 cubic contents.

In the center of the car is an 18 feet stove, including the chimney, 980 pounds in weight; three cylinders, three inches apart from each other, invented by M. Godard, with a view to counteract the effects of the radiated heat upon the occupants of the car. Inside the flue is a metal colander to intercept sparks. The combustible employed is rye straw, cleaned from the ears and compressed into blocks. The total weight of the balloon (including the grappling-iron cords, 400 lbs. two supplementary pumps, 150 lbs., and combustible 500 lbs.) is 4,620 lbs. The inflation only took forty-five minutes; and M. Godard says that, under favorable circumstances he can fill and start in less than half an hour.

At a quarter to 8 the whole fabric stood up amongst the trees and poles of the ground, and the various ropes that held it to the earth were cut away one by one. M. Godard ran rapidly round the solid wicker car, shouting orders through a speaking trumpet with pardonable excitability. One of M. Godard's companions gives the following account of the voyage:—

"Let the reader imagine that he has been riding in the engine of an express train; let him then conceive that this engine, with the fire roaring in the furnace, has suddenly leaped into the air, and he will get some faint notion of the situation.

"There was not much wind, and the balloon, slowly rising, took its course to the south-eastward of London. At times it seemed becalmed, and during these intervals of quiet those who looked out over the panorama of London owned that the sight was well worth the risk. The red light glared out and was seen afar; the heat was almost painful, but neither amongst Englishmen nor Frenchmen was a murmur heard as steadily, one after one, the trusses of straw were passed into the fire. At no time did the balloon ascend much above half a mile, and at no time did that ugly roaring crackling clamor cease; but M. Godard was bland and brave; his fellow-countrymen were courteous and courageous, and the Englishmen held their tongues.

"At length, after crossing and re-crossing the river, it was determined to descend. Three times already had the balloon passed over the Thames, and when it was resolved to alight, M. Godard was over the Isle of Dogs. He had affixed his eye however, upon the East Greenwich marshes as an open space in which the descent could be safely attempted

Very nicely and skillfully calculated were his manœuvres. Traversing the Thames at an exceedingly low elevation, the balloon just grounded upon the shore, within a dozen yards of the water.

"Distinctly to understand the fierce excitement of the next three minutes, it should be borne in mind that the fire was still roaring merrily away; that the machinery, so admirable for its special purposes, would have caused sad havoc had there been anything like a general upset; and that at this particular moment six men could exert very little control over a balloon capable of containing 460,000 cubic feet of air.

"Touching the shore, the balloon tore away, the big canvas flapping, the bright fire burning; while right in front rose a stone embankment. The shocks were rough, and had the travelers been novices in this particular method of locomotion we might now have some awkward casualties to relate. Just before each bump, however, the men made a little leap, and thus balked its force, as a cricketer to catch a ball draws back his hand instead of protruding it. Still, with all these precautions, it seemed half an hour—and there was a strong inclination to cheer when the threatening stones were passed. On now into a potato-field; another rise; a wild tendency to leap at a chimney; a strong 'exhibition' of restraint in the shape of a hundred sensible Englishmen tugging away at the ropes, and obeying the orders that were given—and the whole thing was over."

RECENT AMERICAN PATENTS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week; the claims may be found in the official list:—

Machine for milking Cows.—Most of the devices heretofore invented for milking cows involve the general idea or principle of suction. Rubber gloves are stretched upon the animal's teats, and suction is produced by working a small pump. In the present improvement all suction is avoided, and by an ingenious arrangement of mechanism each teat is seized and squeezed, first at the neck of the teat, then in the middle, and lastly, at the extremity, thus closely imitating the operation of hand-milking. H. V. Belding, of Oppenheim, Fulton county, N. Y., is the inventor.

Round and Half-round Files.—The ordinary round and half-round files are constructed by first rolling or swaging the steel in the desired form, technically termed blanks, and these blanks are then cut in order to form the file. The flat files may be constructed in this way in a perfect manner, but round and half-round files cannot be perfectly cut, as the cutting tool destroys the rotundity of the surface, which, instead of being round or half-round, is of polygonal form. By this improvement these files can be made with a perfect curved surface, either circular or semi-circular in its transverse section. To effect this the blanks are constructed out of sheet-steel plates of any desired dimensions, according to the size of file required, and said blanks are cut either manually or by a machine, in the same way as the ordinary flat or tri-lateral files. These plates are then heated and bent so as to form a circle or semicircle in their transverse section, and then tempered. The files thus constructed may remain in shell form or in cases where weight and solidity are required, they may be filled with wood or soft metal, a tang to receive a handle being attached to one end of them. By this arrangement a file of the kind specified is obtained with a perfect curved surface, and consequently one which will operate much more perfectly than those constructed in the ordinary way. Besides a saving in metal is effected as well as in the cost of manufacture. J. Nelson Jacobs, of Worcester, Mass., is the inventor.

Breech-loading Fire-arm.—This invention relates to an improvement in that class of breech-loading fire-arms in which the breech is closed by a breech-block sliding transversely across the bore of the barrel. The invention consists in the employment of a valve and screw in combination with the transversely sliding breech-block in such a manner that when the latter is in position, by turning the screw the valve is set up tight against the end of the barrel and a perfect joint between the breech block and bar-

rel is effected; the invention consists, also, in a notched socket in the inner surface of the breech-block in combination with a flanged expansion washer, the stem of which fits into said notched socket and can be locked therein by a suitable bolt or other equivalent device, in such a manner that said flanged expansion washer will move in and out with the breech-block, requiring no separate handling, and when said washer is worn out it can be easily removed and replaced without loss of time. Alfred Krupp, of Essen, Prussia, is the inventor. For further information address Thos. Prosser, No. 28 Platt street, New York.

Improved Cigaretto.—Cigarettes, as usually made, are formed by wrapping a small quantity of fine-cut tobacco in a sheet or piece of paper and folding in the ends. In using these cigarettes it is well known that the tobacco is constantly escaping into the mouth and that an unpleasant odor is caused by the burning paper. This invention obviates both these difficulties; first, the paper is prepared with a view to obviate this disagreeable odor and taste of the paper; and secondly, the end that is inserted in the mouth is so formed that the tobacco cannot escape, and yet a free draught is insured; and to effect this, the invention consists in the employment or use of a mouth-piece made by coiling a short piece or strip of stout paper or thin pasteboard, and inserting the coil in the end designed for the mouth, or, more properly speaking, by winding and pasting the paper tube around this mouth-piece which gives the size to the cigarette. This mouth-piece forms a firm hold for the teeth and is of sufficient length to prevent the fire reaching the lips when the cigarette is nearly consumed. The cigarettes are about the length of an ordinary cigar, and nearly a half-inch in diameter.

We have tried the article and find it to be a very good thing. The filling of those we have used was of the finest Turkish tobacco, thus giving the benefit of the best tobacco in the convenient shape of a cigar, and withal we consider the cigarette a very good, convenient, and economical article for smoking. The inventor of the above is E. Berg, of New York City, and the patent bears date August 2, 1864, and further particulars may be had of Messrs. Berg & Co., manufacturers, 133 Chatham street, New York city.

Zopissa.

Is a composition invented by Mr. Szerelmy of London, which has of late acquired quite a reputation, on account of the manifold uses to which it can be applied. Among specimens that have been exhibited, are pieces of tile, chalk gypsum and soapstone, coated with the zopissa composition. Articles of wood and iron which had been exposed for over a year to the influences of the London atmosphere and to sea water, were found not to have been affected by either rust or decay. A cheap and artistic imitation of leather has been made out of cotton tissue, impregnated with the zopissa, and well dyed, imitating the various colors and shades of water-proof animal leather.

GRAFTING ANIMALS.—The *Intellectual Observer* says:—"Dr. Paul Bert has published a work on the curious subject of animal grafts. He succeeded in making Siamese twins of a couple of rats, and in many other monstrosities. He exclaims, 'it is a surprising spectacle to see a paw cut from one rat, live, grow, finish its ossification, and regenerate its nerves, under the skin of another, and when we plant a plume of feathers under the skin of a dog, what a miracle to see the interrupted vital phenomena resume their course, and the fragment of a bird receive nourishment from the blood of a mammal.'"

SALMON eggs have been successfully transported from England to Australia, although the voyage occupied more than three months. Two or three ova boxes were kept at Melbourne, and others were sent to Tasmania. On being removed to the hatching boxes in the ponds, a large portion of the ova was found to be dead, but those that remained alive amounted to many thousands, and are amply sufficient, if they should all continue to thrive and become living fish, to insure the complete success of the experiment, and stock the waters of Australia with the most delicious known table-fish.



ISSUED FROM THE UNITED STATES PATENT-OFFICE FOR THE WEEK ENDING AUGUST 9, 1864.

Reported Officially for the Scientific American.

Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

43,752.—**Knife and Scissors Sharpener.**—William H. Alcorn, New York City:

I claim the use of a file, C, secured by sleeves, D, or their equivalents to a horizontally swinging lever, B, in combination with guide strips, d, or notch, e, to retain the knife or scissors to be sharpened substantially in the manner and for the purpose shown and described.

[This invention consists in the employment of a three or more sided file, attached to a horizontally-swinging lever by means of sleeves, so that it can be readily removed and turned to bring a fresh side into use, in combination with a suitable socket to hold a knife or a pair of scissors in such a manner that when an oscillating motion is imparted to the lever, and the knife or scissors are placed into their respective sockets, the file will act on the cutting edge and sharpen the same in a simple and easy manner.]

43,753.—**Mode of locking Railroad Car-seats.**—David H. Baker, Jersey City, N. J.:

I claim a movable locking bar extending along the car, the distance of several seats, and fitted with pins, hooks or slots, substantially as specified, in combination with the movable backs of the seats and the locking device whereby said locks can be all locked or unlocked simultaneously, by moving the said bar as set forth.

43,754.—**Milking Machine.**—H. V. Belding, Oppenheim, N. Y.:

I claim the use of one or more pressers, G G', acting substantially in the manner and for the purpose herein shown and described. I also claim the combination of the plates, L L', with the pressers, G G', substantially as herein shown and described for the purpose set forth.

I also claim the combination of the winged shaft, E, with the pressers, G G', substantially in the manner and for the purpose herein shown and described.

I also claim the springs, H H, in combination with the pressers, G G', substantially as herein set forth.

I also claim the adjusting screw-rods, I, in combination with the plates, L L', substantially as and for the purpose herein shown and described.

I also claim the arrangement of the pan, K, with the pressers, G G', and plates, L L', as herein shown and described.

43,755.—**Pump.**—Wm. A. Bemis, Lyndon Center, Vt.:

I claim a pump provided with two plungers, the rods, E E', of which are connected by a lever, G, having rods, H H, and levers, I I, connected to it and all arranged with a platform, F, to operate substantially in the manner as and for the purpose set forth.

I further claim in combination herewith the packing, e, arranged and applied to the plungers, D D', to operate in the manner described.

[This invention relates to a new and improved pump, designed for general use, and it consists in the employment or use of two plungers or pistons, the rods of which are connected by a lever and having other levers applied to them and all arranged with a platform in such a manner that the person in operating the pump may apply his power to it in the most favorable and advantageous manner. The plungers or pistons are also packed in such a manner as to ensure the perfect working of the same with but little friction.]

43,756.—**Bee-hive.**—T. F. Bingham, Gowanda, N. Y.:

I claim, first, A bee-hive constructed with triple walls, a b c, with spaces, d, between them, substantially as and for the purpose specified.

Second, The bee-entrance, composed of two parts, f f', both parts being provided with openings or slots and the inner one, i, made adjustable, substantially as and for the purpose specified.

Third, The comb-frames composed of the horizontal bars, s t, and pendant bars, u u, all arranged and combined as and for the purpose specified.

Fourth, The rim, A, in combination with the cover, B, arranged and applied as and for the purpose specified.

[This invention has for its object the obtaining of a bee-hive which will effectually protect the bees during the winter season, and the providing of the same with an entrance well adapted for it and which will be capable of being adjusted to suit the various circumstances required in bee-culture. The invention also has for its object the constructing of the comb-frames in such a manner that they will economize in space and at the same time effectually support the combs; the invention has further for its object the obtaining of an extension cap to the hive so arranged that supplemental spare, honey-boxes may be added or applied when necessary, and also the employment or use of a box and cap for the proper feeding of the bees when needed.]

43,757.—**Valve Gear for Steam Engines.**—I. W. Bowers, Cincinnati, Ohio. Ante-dated Jan. 27, 1864:

I claim, first, Operating the valve, H, by the lifters or their equivalents when they are arranged within the valve-chamber as shown and for the purpose described.

Second, The combination of the valves, H, rock-shaft, m, and cranks, n, with the weights, m', substantially as described and for the purpose set forth.

Third, The several devices in combination, by which the port or steam-valves and the exhaust or outlet valves are operated, when combined substantially as described and for the purpose set forth.

Fourth, The combination of the forked-sliding bar, L, with the vibrating bar, K, and cam rod, D, when constructed and arranged, substantially as described.

Fifth, The construction and arrangement of the connecting bar, g, and Palls, r r, with the cranks, m' m', when constructed substantially as described and for the purpose set forth.

43,758.—**Soap.**—D. B. Chapman, Hopedale, Mass.:

I claim the compound soap made substantially as hereinbefore described.

43,759.—**Automaton Dancer.**—Isaac S. Clough, Brooklyn, N. Y., and Vincent Fountain, Jr., North Shore, N. Y.:

I claim suspending the figure, A, from an elastic cord, B, stretched between uprights, C, over the sounding disk, E, attached to the platform, D, so that the motion of the figure is produced by the swaying of the cord and the contact of the feet of the figure with the bell or disk produces a musical sound.

[This invention consists in suspending a figure with jointed limbs,