

VERTICAL ENGINES AND BOILERS.

There are certain excellences sought after by nearly every builder of steam engines, namely, economy of fuel, regularity of speed, simplicity of mechanism, durability and freedom from derangement, power with a given size of cylinder and pressure of steam, and, lastly, elegance of design and finish.

In stationary and steam yacht engines we find an infinite variety of construction, some of unsymmetrical form, roughly constructed, with slight finish, and again others having every improvement that is considered really such by the designer, with elaborate finish and beautiful but simple mechanism. As an illustration of the latter class we have selected some engines constructed by the New York Safety Steam Power Company, of New York city. Fig. 2 represents a form of engine they construct for yachts and launches; the engraving is taken from one of ten horse power. Engines of this class are fitted with link motion for reversing, and are furnished with notches for working expansively. The outline of this engine is one of great elegance, and the disposition of the moving parts is compact without being too confined for examination and oiling. Fig. 1 represents the steam launch Barrancas, one of the many built by this company. This one was built for the Quartermaster's Department, U.S.A., and gives a very good idea of this class of boats. She is 61 feet long over all, 10 feet 10 inches beam over the fender strakes, 4 feet 6 inches draught aft. The after cock pit is 20 feet 6 inches long, and the forward one 11 feet long, the average width of both being 8 feet 6 inches. The total length of seating, including thwarts, is 78 feet. Fig. 3 shows a combined vertical engine and boiler which may be properly considered semi-portable. This form is suitable for a great variety of small industries to which motive power can be advantageously applied.

The engine is not fastened to or upon the boiler, and is, therefore, not affected by the expansion, nor are the bearings overheated by conduction or the ascending heat from the boiler. The boiler is a patented vertical tubular one, with internal fire box, and, we are informed, is made of the best material and workmanship. The heating surface and area of grate, it is claimed, are in excess of the quantities usually allowed for the same power. The engine and boiler are placed on a base, which also supports the boiler, forms the ash pit, and contains the feed water heater. A neat arrangement collects all the drip from the stuffing boxes, the bearings, and the pump, into one cup, where it can be conveyed away as desired. The exhaust steam is discharged through a blast pipe in the stack. The fly wheel being at the base secures steadiness under the high speed which is necessary for economy of fuel.

At the rooms of the Company, 30 Cortlandt street, New York city, are a fine stock of engines for various purposes, and numerous models of yachts, fast pleasure boats, and launches, some of them of unusually graceful proportions.

SCHOOL SHOPS.

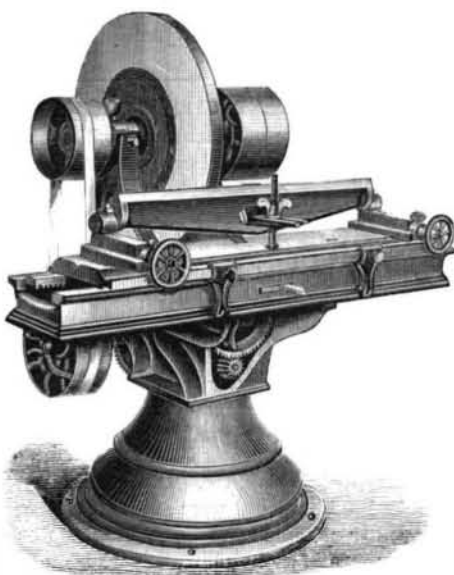
Not merely shops of the nature of the kindergarten for older children, or of affording the rudiments of a knowledge of the trades as now practiced in America, but shops affording a knowledge of the many practical industries not now established in America. Little shops which teach other uses of raw material than those now known, and incite to the establishment of workshops which shall grow to great industries. One crying defect of the eager superficial system of most American teaching, either in books or schools, is that there are no handbooks of practical information from which a knowledge of the production of a great number of articles may be obtained. Since the labor societies and the compulsory school laws keep boys still more from apprenticeships, there should be a series of cheap practical handbooks within the reach of every boy, and, at the same time, so practical that a knowledge of the pursuit may be easily worked out.

Practical common sense shops, where a boy may earn his expenses and learn a trade, or, by paying for his night attendance, may learn the rudiments of any pursuit to such an extent as to be able to put his knowledge to practice. How few people in America know the nature and uses of clay, or know what clay is! Plaster of Paris, or how obtained, to say nothing of working it. Probably not one person in a thousand, in the United States, knows that placing a piece of limestone, so common all over the country, for an hour upon a coal fire, converts it into lime. This is not an isolated instance, but the rule is that the first rudiments of practical knowledge are not provided by books or schools, and until they are children will read trash and be

ignorant of the means by which they may be useful citizens.

IMPROVED AUTOMATIC KNIFE GRINDER.

We illustrate herewith a new grinding machine for grinding and sharpening planer, paper cutter, and other long



AUTOMATIC KNIFE GRINDER.

knives used by belt makers, curriers, rubber and paper workers, etc. It is claimed that a long knife can be fastened to the machine, adjusted, and ground perfectly straight in ten minutes. A solid emery wheel with iron center is used, working at a speed of 225 revolutions. The platen to which

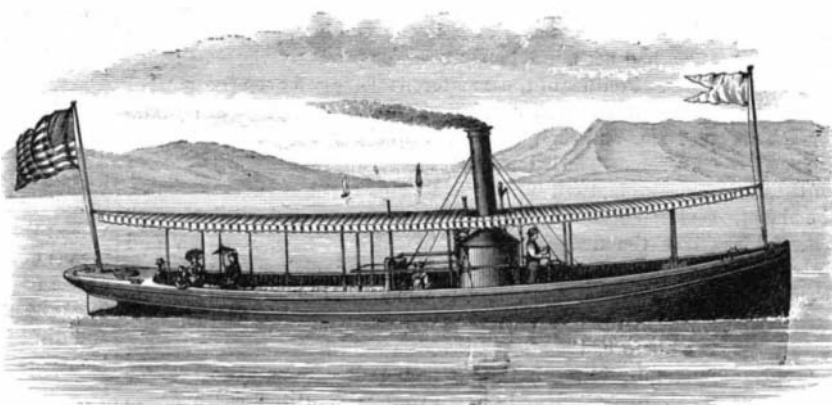


Fig. 1.—STEAM LAUNCH BARRANCAS.

the knife is bolted works similar to that in the metal planer, and can be instantly adjusted to traverse any distance from 2 to 36 inches. The advantage of the iron center is that it can be recovered after the wheel is worn down, thus saving the cost of a wheel of the size of the center. In this way only the emery actually used is lost. The present machine, we are informed, is manufactured with especial care.

All the gears are turned and cut; the spindle boxes are

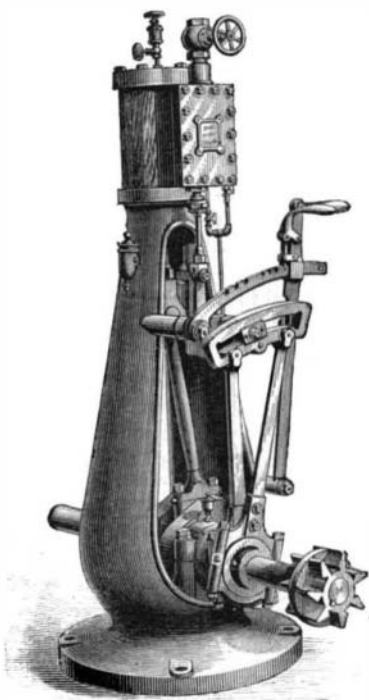


Fig. 2.—10 H.P. LAUNCH ENGINE.

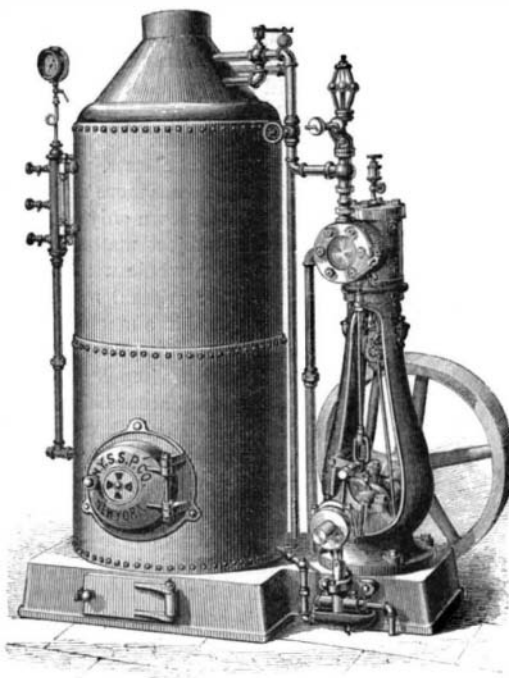


Fig. 3.—VERTICAL ENGINE AND BOILER.

made in halves (same as for engine lathes), and are also fixed and permanent, requiring no adjustment as the wheel wears down. The spindle and all the shafts are made from steel. The bearings are made very long, and all parts of the grinder are interchangeable.

For further particulars address the manufacturers, the American Twist Drill Company, Woonsocket, R. I.

London Water Works.

Nearly all the waterworks companies of the metropolis are actively engaged in providing a constant water supply, and the number of miles of streets which now contain mains constantly charged, and upon which hydrants for fire purposes could at once be fixed, in each district of the metropolis, is given in Mr. Frank Bolton's report for the month of March, as follows: Kent, 80 miles; New River, 196; East London, 85; Southwark and Vauxhall, 112½; West Middlesex, 70; Grand Junction, 41½; Lambeth, 70; Chelsea, 56; making a total length of 711 miles; the water companies are ready to affix hydrants thereon when required by the authorities. The total number of hydrants erected is at present 4,527, of which 2,813 are for private purposes, 542 for street watering, 697 for public use, and 475 in government establishments.

New Mechanical Inventions.

An improved Key for fastening the bosses of wheels and levers to their shafts has been invented by Mr. P. A. Oliver, of Wilkesbarre, Pa. It has a cylindrical threaded head, to which is fitted a sleeve or nut made externally polygonal to receive a wrench, by which it is turned in the operation of extracting the key.

A Spanish inventor, Señor Luis Ybarra, of Madrid, has introduced a novelty in Revolving Firearms, consisting in the addition of a special chamber for receiving from the rear end of the cylinder a portion of the gas resulting from the explosion of the cartridge, and conveying it to one of the discharged chambers, to expel the empty shell.

Mr. L. Murray, of Greensburg, Pa., has invented a Railway Frog, which, in its normal position, keeps the main line open, but yields sufficiently to the side pressure of the wheel flanges to open the side track for a train passing over it on that track. The tongue is pivoted to the bed plate, and its point is held to one of the main rails by a spring, to keep the main track open.

A new Channeling Tool, invented by Mr. C. K. Sharrow, of Detroit, Mich., belongs to that class of machines employed to cut a channel and groove, for the purpose of holding the thread or nails used in uniting the soles and uppers of boots and shoes. The feature of Mr. Sharrow's invention is a casting, adapted to be secured to the machine, having an inclined socket carrying a tubular cutter, which is adjusted by set screws as it becomes worn.

Mr. J. J. Peux, of Brooklyn, N. Y., is the inventor of an improved Crown Push for stem-winding watches, which is claimed to be so constructed as to render the crown entirely dustproof, prevent rattling, and permit the movement being taken out of the case without removing the crown or key pipe.

A novel Rotary Engine, the principle of which is also applicable to a pump, has been invented by Oscar Stenberg, of Helsingfors, Finland. It is based on the differential action

of a number of pistons acted upon successively by steam or water, so as to revolve a common crank coupled to the pistons; and it consists of a casing with four interior cylinders at right angles to each other, and connected by a duct having suitable entrance and discharge valves. The four pistons are coupled to the wrist pin of a crank at the interior end of a shaft turning in a stuffing box of the cylinder casing.

Mr. Nelson McIntyre, of Princeton, Wis., has patented a handy Wagon Lifting Jack, which is self-supporting when the load is raised, and may be closed up in compact form for convenience in storage and transportation.

Mr. C. Palmer, of Springfield, Tenn., has invented a Machine for Sewing Brooms with Wires, consisting of a combination of mechanical devices for clamping the broom, holding the wire bands which surround the brush, guiding the transverse binding wires through it, cutting them, and binding them over the wire bands.

An improved Glove Sewing Machine, invented by Mr. C. M. Bolland, of New York city, belongs to that class of machines for sewing gloves, furs, and similar work, in which are employed two parallel feed disks, a reciprocating needle, and an oscillating looper. Special details are introduced, among which are an adjustable guide arm for laying over the seam one or more ornamental face threads, and a revolving brush to clear the edges of fur from hairs in sewing.

Mr. R. S. Munger, of Mexia, Tex., has invented an improved Cotton Gin Saw Cleaner, consisting of a series of knives supported by a movable frame, which may be thrust between the saws, cleaning them rapidly. The knives are readily detached from their support when it is desired to sharpen them.

A new Nut Lock, patented by Mr. J. L. Hayward, of South Framingham, Mass., is formed of a thick rubber

washer containing several steel pins, which are parallel with the axis of the washer, which, when the washer is compressed by the nut, act as pawls in preventing the nut from unscrewing.

Mr. S. F. Charles, of Cumming, Ga., has patented an Amalgamator of improved construction, intended especially with reference to saving "float" gold, in which the special feature is the use of a new amalgam cloth having silver amalgam and gutta percha in its interstices, claimed to be unusually durable and effective.

ASTRONOMICAL NOTES.

BY BERLIN H. WRIGHT.

PENN YAN, N. Y., Saturday, June 15, 1878.

The following calculations are adapted to the latitude of New York city, and are expressed in true or clock time, being for the date given in the caption when not otherwise stated.

PLANETS.

	H.M.		H.M.
Mercury rises.....	5 29 mo.	Jupiter in meridian.....	3 02 mo.
Venus rises.....	2 21 mo.	Saturn rises.....	0 33 mo.
Mars sets.....	9 37 eve.	Uranus sets.....	11 07 eve.
Jupiter rises.....	10 08 eve.	Neptune rises.....	2 00 mo.

FIRST MAGNITUDE STARS.

	H.M.		H.M.
Alpheratz rises.....	10 34 eve.	Regulus sets.....	11 09 eve.
Algol (var.) rises.....	0 18 mo.	Spica in meridian.....	7 42 eve.
7 stars (Pleiades) rises.....	2 38 mo.	Arcturus in meridian.....	8 33 eve.
Aldebaran rises.....	3 57 mo.	Antares in meridian.....	10 45 eve.
Capella sets.....	9 40 eve.	Vega in meridian.....	0 59 mo.
Rigel rises.....	6 03 eve.	Altair in meridian.....	2 11 mo.
Betelgeuse sets.....	6 38 eve.	Deneb in meridian.....	3 03 mo.
Sirius sets.....	6 04 eve.	Fomalhaut rises.....	1 18 mo.
Procyon sets.....	8 15 eve.		

REMARKS.

The sun attains his greatest northern declination (23° 27' 24") and enters the constellation *Gemini* (sign *Cancer*) June 21, at which time summer begins. Mercury will not be visible until about August 10. Venus and Neptune are in conjunction June 11. At the time Venus rises Neptune will be about ½° northwest of her. This will be a good opportunity to search for Neptune. Jupiter is in conjunction with the moon June 18, 1h. 3m. morning. This is an occultation on this continent between 24° + and 55° — latitude, and here will be almost a contact of limbs, Jupiter being north of the moon. His fourth satellite disappears in an eclipse June 9, 11h. 33m. evening, and reappears at 3h. 43m. morning, 10th, having passed through the planet's shadow in 4h. 10m. This and all other eclipses of his satellites must take place at the west of the planet until July 25. At the moment of the disappearance of this satellite the third one is behind the planet, the second has just appeared from behind the planet, and is close to him upon the east, while the first has recently made a transit and is quite near him upon the west. For an inverting telescope reverse these directions.

Singular Effects of Carbon in a Blast Furnace.

In a communication to the Lafayette Chemical Society of Lafayette College, Easton, Pa., Mr. J. Gayley states that in November, 1877, the blast was taken off No. 4 Furnace at the Crane Iron Works, Catsauqua, Pa., for which he is chemist, in order to place in position a new bell and to repair the arch of the gas flue leading to the boilers. The bricks forming the arch of this flue, from some cause unknown, had become disarranged to a great extent and were apparently ready to drop at any moment, so that it was found necessary to take down a portion of the furnace lining. The inner circle of fire brick in the upper portion of the furnace was protected by a cast iron casing, covering the exposed ends and under surfaces. At a distance of 8 feet from the furnace top, filling in between the iron casings above and the fire brick below, was found a large deposit of carbon. This deposit did not occur in isolated spots, but rather uniformly distributed throughout the layers as far as we had opportunity to observe; whether it extended to a greater depth, or the whole distance round the furnace, I am unable to say. The position of the deposit was on the front, or the side of the furnace receiving no blast, and almost directly underneath the gas flue. The courses of brick on this side of the furnace were distorted to a great extent and elevated several inches above those on the opposite side. Thus it seemed that the carbon had exerted a physical force, causing the displacement in the furnace lining and in the arch of the gas flue. No deposit was found beyond the inner circle of fire brick, as the iron casings only extended this far. When taken from its position the mass of carbon was seen to glow, a partial combustion taking place on the surface, converting the small particles of metallic iron or lower oxides distributed throughout the mass into the peroxide. This is readily seen on examining the lumps, where on the surface small particles of the peroxide of iron are noticed gradually decreasing as we go in and finally disappearing in the interior. The carbon was found principally in the form of a powder, but occasionally aggregated into lumps; it had a uniform black color, and when rubbed on the hands resembled powdered graphite. It absorbed water readily and was slightly attracted by the magnet. The total amount of metallic iron was determined in samples taken from different portions of the mass. Two samples of the fine portion taken from different places yielded, on analysis, 4.23 and 3.23 percent of metallic iron. The interior of one of the lumps was also analyzed; the total amount of metallic iron it contained was 2.56 per cent; 0.35 of this existed as metallic iron, the remainder, 2.21 per cent, was combined as an oxide. The substance was free from cyanogen and chlorine. The cause of this formation was evidently due to the presence of the iron casings, as we do not find the deposit beyond the

point where they extended. In the "Transactions" of the American Institute of Mining Engineers, vol. ii., Mr. Frank Firmstone called attention to a similar deposition of carbon in the blast furnace, but I do not know that the occurrence is usual. The cause of the deposition of the carbon in the furnace at the Crane Works was doubtless the iron casings, which, when partially oxidized, effected the decomposition of the carbonic oxide in the manner first pointed out by Bell, and subsequently investigated by Gruner.

NOTES OF PATENT OFFICE DECISIONS.

In the interference case of Blackman vs. Morray, the subject matter involved was a burial case, the entire top portion of which was formed of glass and the lower portion of cement, the two being joined by tongue-and-groove and cement joints, also flanges and bolts.

Evidently coffins having top and bottom sections, with tongue-and-groove interlock joints, the sections being made wholly of cement, terra-cotta, or glass, were old in the art. The patent of J. R. Cannon, of October 25, 1859, No. 25,883, was for a glass burial case in two parts, upper and lower, which were hermetically joined "by tongue-and-groove and cement joints, also by flanges and bolts." Mention may also be found in nearly every cyclopedia of coffins made of cement, baked clay, etc. Patents for constructing coffins from hydraulic cement were granted as early as 1835, and subsequently patents have been granted for cement coffins, coffins made of asphaltum composition, and for peculiar cements for coating and sealing coffins. David Sholl, March 25, 1855, was granted a patent for "a coffin composed of terra-cotta or pottery ware." Glass lids to coffins were also notoriously old.

It was insisted, however, that by the combination in interference, there had been united for the first time in a coffin the element of strength or indestructibility and the element of transparency—a non-breakable coffin capable of wear and transportation, and at the same time having a transparent lid. The commissioner, however, held that cement and glass employed in the combination in interference had been previously used for precisely the same purposes. Neither of these materials possessed even the merit of being put to a new use, but were simply employed in juxtaposition, and each performed precisely the same functions as before. The result, evidently, was not the product of the combination, but a "mere aggregate of several results, each the complete product of one of the combined elements." Given the desire to unite the elements of strength and transparency in a coffin in the manner claimed by the parties in interference, and the materials and method were at once found in that very art. Compared with what existed before, the alleged invention in interference consisted in simply selecting proper and well known materials for their proper and well known uses, without the least exercise of the inventive faculty. The interference was accordingly dissolved by the commissioner, and the application for a patent rejected.

In the interlocutory appeal from the decision of the primary examiner in the matter of the application of R. W. Hamilton, for "independent condensing mechanism for steam engines," the question at issue related to a division of the application. The examiner decided that each of the combinations separately claimed in this application should be the subject of a distinct application, on the ground that they were distinct inventions relating to well recognized classes.

Such questions are not easy to decide, as the Patent Office, on the one hand, should avoid imposing any hardship upon an applicant by requiring separate applications for what might be included in one, and, on the other hand, must avoid the confusion which would, in the present condition of the arts, necessarily result from indiscriminately including in one patent matters known and recognized as belonging to distinct classes. In an advanced state of the art subdivision becomes more and more necessary, and that which was before known only as a part of a machine may become a distinct subject matter of improvement not relating directly to the whole machine, but specifically confined to a part of the original machine, and applicable to that part, whether used in a machine of one class or another. If such matters are not kept within well defined limits of classification, it becomes impossible either for the Patent Office or the public to keep accurately advised as to the state of the art in any particular class. In the case under consideration the applicant stated that his invention related to an independent condensing mechanism which could be attached to and used in connection with any ordinary steam engine. His first claim was for—

"A combined air pump and condenser for steam engines, in which the air pump, constructed and arranged as set forth, is contained in the base of the condenser, and is operated by an independent steam cylinder."

The second claim was for—

"The water-packing space, Q, around the plunger of the air pump, in combination with the pipe, M, leading from the condensing chamber, or other equivalent device for supplying it with water."

M was the pipe to carry the water from the condenser to the water packing space; but under the phrase "other equivalent device," anything which would bring the water to the packing space might be included.

The examiner therefore held that this claim was for no more than the simple packing, applicable to pistons in va-

rious uses, and belonging to a distinct class of inventions, and this decision of the examiner was affirmed by the commissioner.

Amending the Patent Law.

One of the provisions of the bill pending in Congress to amend the patent laws is that, in a suit by a patentee, "the defendant shall not be charged with any savings he may have made if he shall show that the use of the patent has not enabled him to realize an actual profit in that part of the business connected with the use of the invention."

That is, if a man steals property, or takes it without the owner's permission, he shall not pay for the use of it unless he has made it profitable to his business. This is an illustration of the spirit of the parties who devised the bill. It is a principle of confiscation. Said a prominent superintendent and a member of the Western Railway Association, "When our attention is called to a patent of value we use it, and in a few cases we are made to pay by plucky inventors; but, in the aggregate, we pay much less than if we took licenses at first."

It is most extraordinary that this association is organized to such an extent on the principles which govern the bandit. Calling on the State and national governments with success to protect their property from the confiscation of strikers, the companies in this association turn round and adopt the principle of the strikers' organization, make organized war on the rights of inventors, and cause a bill to be introduced into Congress to help them in their confiscation.

If every feature of their wretched policy cannot be eliminated from the bill, it ought to be defeated. Some small politicians have introduced resolutions into conventions in depreciation of the rights of inventors. They belong to that destructive set of political economists which maintain that the gain of one man or community must be from the robbery of another. It is nearly extinct, but disciples of every absurdity occasionally reappear.—*Brie Morning Dispatch*.

Professor Henry's Successor.

The Board of Regents of the Smithsonian Institution has elected Professor Spencer Fullerton Baird as the successor of the late Professor Henry in his position of secretary to that institution. The new secretary is a member of the National Academy of Sciences, and has been for several years the Assistant Secretary of the Smithsonian Institution, and is perfectly familiar with all the plans and purposes of the late secretary for carrying out the designs of its founder. There was at the beginning considerable discussion as to the best means of conducting the institution so as to meet the wish of the founder, which was, according to the terms of his will, to create at Washington "an establishment for the increase and diffusion of knowledge among men." This Professor Henry understood to mean not merely the increase and diffusion of already existing knowledge, but that it would include the discovery and diffusion of new truths as well. There was some difference of opinion on this point, but Professor Henry's ideas finally prevailed, and the institution has been so conducted as to spread the knowledge obtained through its researches and the aid of its funds over the whole world, rather than to benefit Washington and its surroundings, or even the United States. This policy, it is believed, the new secretary will continue.

Professor Baird was born at Reading, Pa., in 1823, and is consequently fifty-five years of age and in the full vigor and prime of manhood. He is a well versed naturalist, and by talent and experience is eminently qualified for his new post of duty.

American Exports and the Strikers in England.

Consul General Badeau at London has sent to the Department of State a dispatch relating to the disastrous strikes of British operatives and the influence of the competition of American manufacturers in the markets of England. In the discussion between the cotton manufacturers of Lancashire and the weavers now on strike there, and in the comments of the press thereon, it is generally, although unwillingly, conceded that a potential influence has been exerted by American competition in diminishing the English cotton trade at home and abroad. England now sends to this country less than one third the quantity of goods she sent in 1860, while, on the other hand, it is stated that 30,000 pieces of cotton goods have been shipped weekly to England for two or three years from New York and Boston. Some say that these goods have been sold at a loss to realize cash, but this is denied by good authorities, who admit, however, that the profit is but small. The London *Times* attributes the increase of American manufactures at the cost of British industry to the superior quality and equal or cheaper prices of American cotton, besides general domestic advantages in process of manufacture. The *Saturday Review* declares that American products are profitably competing with British goods, not only in the Eastern markets but in England itself, and attributes the decline of the Eastern trade to the "fraudulent folly of English manufacturers, who have lost their customers by palming off on them adulterated goods," as well as to the fact that the American cotton manufacturers can produce at a less cost than the British. General Badeau advocates the policy on the part of American manufacturers of carefully maintaining the superior standard of their wares, and selling at low and comparatively unremunerative rates for a time, by which means, added to our natural advantages, a still greater share in the coveted trade, if not in England, certainly in China and Japan, may be diverted into American channels.