found to be nearly as efficacious as cod-liver oil. A French firm, Messrs. Souffrie, make large quantities of useful tallow or fat out of the pickings and waste of slaughter houses, the dead cats and dogs found floating in the Seine, and the used-up grease of railway wheels; when doctored by means of steam and hydraulic pressure, this fat becomes available for stearine manufacturers. Leather scraps are made into "shoddy leather," by grinding and macerating them into a pulp available for the inner soles of shoes and such-like purposes. There is another leathery composition much used in America under the name of "pancake." Thin bits of leather, the odds and ends cut off by the tanner and currier from whole hides, are interlaid with paste until they accumulate to an inch in thickness, and then heavily squeezed between two iron rollers; the mass comes out as an oblong pancake twelve inches by four, and half an inch thick, looking very much "like a cross between a sheet of gingerbread and a cake of tobacco;" it is used for inner soles, heels, and stiffeners. The albumenized paper used by photographers is subject to much waste in its manufacture; this waste, instead of being consigned to the pulp vat, is now converted into beautiful marbled paper, by a peculiar application of aniline colors to the albumen.

Next, as to the vegetable kingdom. We are told that the using up of what was formerly considered waste, in the textile manufactures, now reaches the enormous quantity of a hundred thousand tuns annually in the three forms of cotton, flax, and hemp waste. If we include animal fibers, such as shoddy wool and silk waste, the aggregates becomes largely increased. The French make firewood or fire lighters of the cones of pine trees and the waste cobs of maize, saturated with any cheap resinous substance. Messrs. Souffrie (already named) buy all the waste and pickings of vegetables from the twenty-five hospitals of Paris, cook them by steam, and feed a piggery of seven hundred head of swine—the vegetables being enriched with the greasy slops from the same hospitals. The same firm also produce beautiful white fat from the black residue left after purifying colza or rape oil; and another residue from the treatment of *this* residue gives them a useful varnish for cheap out-door purposes. The oil retained in olive oil-cake is now extracted by chemical means, and converted into capital stearine; and by this improvement it is expected that seven million pounds of olive oil, now annually wasted at Marseilles, will be utilized. Old account-books, letters, invoices, envelopes, checks, insurance policies, and other kinds of *writing* paper (not *printing*), are now bought at about £12 per tun, and worked up with other materials into pulp for the penny newspapers. Besides linen and cotton rags, cotton waste, old writing paper, straw, and esparto or Spanish grass, wood is also now much used for making into paper. Large factories for this purpose have been established in Italy, Wurtemberg, the United States, and other countries; the wood is rubbed down into dust by friction against rapidly revolving roughened wheels, and then treated by chemical processes until it forms a pulp suitable for paper-making. There is one wood-pulp paper-mill in Pennsylvania that can work up thirty thousand pounds of of wood or of sawdust per day. Nearly all the German newspapers now have a percentage of wood in the paper on which they are printed. The *New York Daily Tribune* is said to be printed on paper made of bamboo; and other American journals are printed on paper made chiefly of a kind of wild cane that is found in vast abundance on the shores of the Mississippi. A German chemist has found a mode of distilling spirit out of a residue left after chemically treating wood-pulp for paper. A French manufacturer converts sawdust, by intense pressure, into beautiful little boxes and other ornamental articles. The seed in the cotton pods or tufts, which used to be an annoyance to the cultivators, is now most usefully employed as a gas fuel, as a source of oil for lamps, as a chief substitute for olive oil, as oil cake for cattle food, and as a source of good hard grease or stearine for soap and candles. The refuse molasses from beet root sugar, formerly used only as pig food, are now distilled to obtain alcohol, and the residue crystallized to obtain potassium salts. Spent dye woods, after the coloring matter has been extracted from them, are sold in France to a large manufacturer, who mixes them with tar refuse, and forms them into compressed cakes for fuel, which has a very large sale. The acicular leaflets of the pine tree are converted into what is called tree wool, in France, Sweden, Holland, and other parts of the continent; this wool is used for wadding, stuffing for mattresses, and other articles of furniture; a cloth made from its fibers is used for inner vests, drawers, hose, shirts, coverlets, and chest-preservers; the membranous fragments and refuse are compressed into blocks for fuel; the resinous matter contained in them is distilled for gas; while by various modes of treatment there are produced an essential oil for rheumatism and skin diseases, an etherial oil useful as a curative agent and as a solvent, and a liquid for a medicated bath—all useful substances from a material which not long ago was utterly disregarded.

And now for the mineral kingdom. Mr. Mill, and other thoughtful men, are cautioning us that, as our stock of coal cannot last for ever, we should do well to utilize the thirty million tuns of small coal and dust which is allowed to go nearly to waste annually at the pit's mouth; and attention is drawn to what Belgium is doing in this matter. Near Charleroi, eight hundred thousand tuns of coal dust had accumulated, a burden to the colliery owners, and an injury to the health of the work people. Whereupon a company was formed expressly to utilize this refuse. The coal dust is sifted, mixed with eight per cent of coal tar, heated to a paste by steam at a temperature of three hundred degrees, and pressed into blocks and cylinders about twenty pounds weight. These blocks form excellent fuel for locomotives and steamboats, productive of great heat and very little ash. In various foreign countries where paving stone is scarce, the slag from iron furnaces is brought into use, by being run into pits eight or nine feet in diameter, and cooled into slabs for paving. The cuttings of tin plate, and worn out tin kettles and saucepans, are subjected to processes which yield pure tin, good weldable iron, ammonia, Prussian blue, and stannate of sodium; and as the make of tin plate in England and Wales amounts to more than half a million tuns annually, there must be a very large store of material available in the old tin plate which is replaced by the new. The waste flux, such as borax, used in galvanizing metals, finds a ready market among refiners and for making paint.

But there are mounds of things still waiting to be utilized, waiting for the day when some clear practical minds will find out what to do with them. The Cleveland iron sells for a comparatively low price in the market, because it is contaminated with phosphorus. Now, the iron would be worth seven shillings per tun additional if the phosphorus were out of it, while phosphorus itself is worth sixty or seventy pounds per tun; what would not be the national gain if the two could be easily and cheaply separated! Nearly a hundred thousand tuns of sulphur a year are wasted in our alkali manufactures; means have been discovered for recovering this sulphur, but the system has not yet been sufficiently adopted to prevent the sad waste of a vast quantity of spent liquor in which the sulphur exists. Cinders from refineries and puddling furnaces, and scale from rollers and hammers, contain from thirty to fifty per cent of good iron; it is known that the metal can be obtained from them, and converted into good iron and steel; and iron masters are now waiting anxiously for chemists to show how such extraction can be managed cheaply. Mr. Frank Buckland has pointed out that we destroy millions of wholesome fish every year, by poisoning the waters of the Tees, the Wear; and the Dovy with lead refuse, the Dee with petroleum refuse, the Usk with sulphuric acid refuse, the Camel and the Fowey with mud from the Cornish clay works, the Exe with chloride of lime from the paper mills, and many of the rivers of the northern counties with waste from the chemical works. As to substances useful for food, there can be no doubt that enormous waste occurs. We will conclude with a few observations by Mr. Warriner (teacher of cookery to the army) concerning this important subject: "The refuse grease and kitchen stuff in Paris is utilized to a great extent; but in London, there is an immense amount of waste. I have been studying this subject for the last three years, and can therefore speak with confidence upon it. I am quite sure that as much material is wasted as would feed one million pigs. There are sanitary laws telling people to burn their potato peelings and cabbage leaves, simply because we lack municipal regulations which would provide for the removal of these things every day. To show the loss which is thus sustained, I may mention that at Aldershot each regiment of about five hundred men get about four pounds per month for their refuse of this description. I calculate that from every family of twelve individuals, living at the rate of £300 a year, there is enough refuse to keep two pigs."

REPAIRED BOILERS.

The dangerous character of steam boilers which have been subjected to repeated mending is notorious to every engineer who has given even the slightest attention to the working of this class of machinery. His list of boiler calamities will contain many conspicuous records of serious disasters resulting from the incapability of many people who have had the practical oversight of boilers at ironworks, and collieries in particular, to detect when a boiler has been sufficiently patched. Those records will likewise strengthen him in his conviction that very many workmen to whom repairs are intrusted are altogether unfit for their duties.

There is hardly any operation connected with the repair of a boiler more productive of danger than that by which rivets are brought into a line. The day is gone by, we hope, when in new boilers the longitudinal seams are made to run in a continuous line from end to end, with the transverse seams also continued completely round the boiler, giving at the corner of each plate four thicknesses of iron. Yet unskillful repairs often produce continuous lines of rivets at the very place in a boiler where it is most desirable that there should be the brick-wall-like arrangement of the seams, which adds much to the strength, and also often prevents a rent from continuing forward to a dangerous point. A large externally fired tube boiler at an ironworks in Wolverhampton some time ago burst its shell. The first rupture took place in a seam over the fire, where frequent repairs had led to a considerable length of longitudinal seam being in one continuous line. The four plates over the fire parted and opened out until they had ripped two seams completely round the boiler. The plates were thrown in one flat piece upon a bank behind, while the main body of the boiler, with the tubes, was turned over and the front end blown away. More recently, at Newcastle-upon-Tyne, a plain cylindrical boiler was much torn up, and all the fragments thrown to the front of their original position. The boiler was very old and much deteriorated, so that it was unable to bear the ordinary pressure, a longitudinal arrangement of the plates contributing to the weakness. Shortly afterwards, in the same town, a similar boiler was much torn and scattered. Here, too, the plates had been arranged longitudinally, and the accident began at a patch lately put on. The boiler had become so deteriorated by nearly thirty years' wear that it was not able to do the moderate duty required of it. Very quickly afterwards, at Durham, another plain cylinder with plates longitudinally arranged, and which had been working twenty-seven years, gave way at an old fracture over the grate, and was torn into four pieces, which fell a great distance off; and on the 18th of October last a plain cylinder with round ends, 40 feet long and 6 feet diameter, made of half-inch plates, and set with a fire-grate at one end, and flash flue, exploded at the works of the Great Bridge Iron and Steel Company, in South Staffordshire. The front end, with three rings of plates, was thrown up to a sufficient hight to clear the buildings, and fell into a pool some distance to the right and slightly to the rear, the remaining part of the boiler being left near to its original position. The boilers on each side were thrown off their seats, that on the left knocking down a new upright boiler which was nearly ready to work. The first rent appears to have taken place at a seam over the left side of the fire-grate, where four new grates and a long patch had been inserted. This rent must have instantly extended across the front of the man-lid above and around the fourth transverse seam, near some patches, thus allowing the shell to open out, the reaction of the issuing contents sending the fragments upwards. There were so many patches in the boiler, especially around the part which gave way, that many seams were made in continuous lines without any break of joint, and a great number of rivets must have been removed from some of the seams more than once, thereby very much reducing their strength. "I believe," said Mr. E. B. Marten, from whose evidence at the inquest we have been quoting, "the cause of the explosion was simply that this frequent repair had so reduced the strength of the boiler that it was unable to bear even the usual working pressure. It is often difficult," he adds, "to convince those who have the repair of boilers, that the putting of patch upon patch reduces the strength of the boiler, until it is completely untrustworthy, although it may not leak; but several explosions this year, and very many in past years, have proved the fact beyond dispute. The great havoc caused by such an explosion as that now under investigation leads many casual observers to suppose they are caused by some sudden accession of force within the boiler; but the enormous force pent up within any high-pressure boiler is quite sufficient to account for all the mischief, when the balance of strain in the fabric is destroyed by the sudden giving way of a weak seam."

It is as true now as it was eighteen hundred years ago that an effectual way of destroying that which is old, is to patch it with that which is new. The danger is more in the patching than in the repairing. True, a boiler, any more than a garment, is as strong after repair as when new, even though not a patch but a new breadth be inserted; still the new breadth, properly put in, is much less likely to bring about destruction than the patch. Very little capital and hardly more ability is needed in the coal and iron districts to enable a man to pass muster as a "boiler maker." He should rather be termed a boiler mender. A portable forge, a few hammers and drifts, and he is set up. Small colliery proprietors, and sometimes ironworks-people, instead of sending for help to a boiler-making firm of standing, too often call in these small masters. When an accident happens the evidence of empirics of this class is too often gravely taken as the evidence of "practical" men. Invariably the proprietor of the boiler is able to say that he has given orders for everything to be done to the boiler the maker considered necessary. The boiler mender, knowing that because of its lesser first cost a patch would be far more in consonance with the proprietor's views than a whole plate, had patched, and not effectually repaired, the boiler; and he is always ready to declare to a coroner and jury that, in his opinion, all had been done that was necessary. Yet how frequently it turns out that the accident has happened almost immediately after the repairs have been done. In the case of a cylinder boiler at Dudley, not long since, this frequent patching over the fire had brought the longitudinal seams for several plates without break of joint. A patch had been put on a few days before the explosion, and as the rivet holes had badly fitted there had been much strain caused by drifting, and the rivets were much distorted. The frequent and badly executed repairs over the fireplace had so weakened the structure as to make it unable to bear the very high ordinary pressure. In the case at Great Bridge, which has called forth this article, the boiler maker had only at four o'clock finished putting in some sixteen rivets over the fire to stop a leakage, and at half past seven, half an hour after steam had been got up in it, the explosion occurred, killing three people. In this case the boiler maker acted up to the light which he promised, and the proprietors of the boiler had no reason to believe that it was not as much light as was needed. His evidence is that when called in he found the boiler in good repair with the exception of a few rivets over the fire, which were leaking. How should it be otherwise than in good repair, for during the past two years he had frequently mended it over the part where the fire was placed. He had never any idea that the boiler was rendered unsafe in consequence of these frequent repairs; and their instructions always were to do all repairs required. This man had no notion that the patching, in the manner in which it had been performed in this case, was the chief immediate cause of mischief. Mr. Marten, however, testifies—as every other competent engineer would have testified under similar circumstances—that "the rivets, which were put into the boiler in the very line of the seam where they gave way, had proved the great point of weakness. Immediately that the fire was put under, and the steam got up, the openings extended from rivet-hole to rivet-hole, and the boiler exploded."

A very practical view suggested itself to one of the jurors. If the putting of patch upon patch had reduced the strength of the boiler till it had become completely untrustworthy, although it might not leak, "some one ought to know whether it was worn out." Mr. Marten responded that "the experience of engineers, who saw so many cases of this kind was that, though boilers in such a condition as the one in question might last for many years, sometimes they burst at once after being repaired. The question was, whether those who saw the boiler thought it was safe or not." One of the managers of the works, it transpired, who had been there eight years, had never had any reason to believe it was unsafe; the boiler maker believed it safe; and the engine-tender, who had the charge of the six boilers at the works, believed the same—indeed, did not see that it leaked until his son pointed out that defect. At the testimony of these work-people no reader of the *Engineer* will be surprised. But the evidence of the secretary of the company was that all the boilers used by the company were insured with the Manchester Boiler Insurance and Steam Power Company, whose agents were accustomed to visit the works once in six months. On the 6th of October an external examination was made on behalf of the Manchester Company. "From that inspection he was led to believe that the boilers were in good condition." In May last the agent of the boiler company made an internal inspection, and suggested certain repairs, which it was not disputed were carried out. The secretary added, in reply to the coroner, that in May nothing was said as to the boiler being unfit for use, "or they should have condemned it." Yet, to replace this very exploded boiler, and also "any other which most required to be replaced," orders had been given for two new boilers. One of these Mr. Marten speaks of above. Even a Black Country juryman, when this last fact came out, wanted to know why, if the boiler was safe, it was to be replaced? The reply he obtained was, that "boilers, when they got to a certain point, might be considered safe, and yet want replacing."

The moral of all this must be tolerably patent to the reader. (1) When boilers need repair those repairs should be put into the hands of boiler-making firms who have a reputation to sustain. (2) The surest way to ascertain the true condition of a boiler is to examine it at frequent intervals in every part, both inside and outside. (3) When, as in this case such intimation has been conveyed to proprietors—whether by boiler insurance agents or others—that the time has come when a boiler should be replaced, it is the truest economy to lay it off at once. (4) It cannot be too strongly urged upon users of steam power that it is far safer and cheaper to renew a boiler than to resort to continual, expensive, and unsatisfactory patching.—*Engineer.*

For the Scientific American.

TO WASH LEATHER GLOVES.

BY DR. REIMANN.

Washing leather gloves, when rationally performed, is no laborious operation, being of so simple a nature, that it can be effected by any one. The principle is to remove the grease which has become deposited on the gloves by usage, and at the same time the dust which is incorporated with the grease. It must be observed, however, that the gloves are not to be treated with any liquid likely to destroy their color, or prove injurious to the leather when too long immersed in it.

Soap and solutions of carbonate of soda, or of caustic soda, are self-evidently unsuitable in this operation, because these substances must be dissolved in water, which evaporates so slowly that the shape of the gloves would be destroyed, while the caustic solution would exercise an injurious influence on the color of the leather.

It is necessary therefore to employ a liquid which, though able to dissolve the grease, does not yet contain water.

Substances possessing this property we have in benzine, petroleum-essence, ether, and other allied bodies.

Formerly, gloves used to be rubbed with a rag which had been wetted with one or other of the above liquids, particularly benzine. They were finally cleaned, but the surface of the leather was often injuriously affected in those places where there was more dirt than elsewhere. Then the washing could never be carried out quite regularly, so that gloves cleaned in this way were often unfit to wear again, or if worn again they soon began to smell of benzine, when brought in contact with the warm hand, and often indeed, so strongly, that it was quite impossible to go into society with such gloves, because every one was immediately aware that some one had entered the room, whose gloves had been cleaned.

The cause of this inconvenient circumstance was as follows: The glove makers, after cleaning the gloves, allowed them to hang some time in the air, whereupon all the benzine volatile at ordinary temperatures was certainly removed, but another portion less volatile than the former, could not be volatilized at ordinary temperatures, and was therefore retained in the gloves. When this retained benzine is afterwards warmed by the hand, it begins to volatilize in minute quantities, which are, however, sufficient to give annoyance to a large party.

But not only were the public sufferers by this simple but irrational method of washing gloves, but the glove maker himself was also a sufferer. He consumes large quantities of the volatile substances, which were entirely lost in the process of volatilization. Besides which, the vapor of the hydrocarbons caused headache, and proved highly injurious to his health.

All this inconvenience can be obviated by washing the gloves in a larger quantity of liquid, and in a closed vessel.

To effect this, the following process is resorted to:

A bottle, 2 feet high, and 1 to 1½ feet wide, the stopper of which is also made of glass, is filled with two pounds of benzine, petroleum-essence, etc. Then the gloves which are to be washed are put also into the bottle. On this account the neck of the bottle must be very wide, perhaps from ½ to ¾ foot in diameter. Such bottles are easily obtained, being much used in pharmacy. As many gloves may be introduced into the bottle as the liquid will cover. The bottle is then closed, well shaken, and allowed to stand some minutes. The shaking is then repeated, the bottle opened, and the gloves taken out with a pair of iron forceps.

To prevent the possibility of there being any smell, it is a good plan to open the bottle under a good chimney, which thus carries off all the vapor that escapes.

The gloves, when brought by the forceps to the mouth of the bottle, are taken out, one after the other by the hand, and wrung out, care being taken that the superfluous liquid runs back again into the bottle. It is highly advisable to perform this operation under a chimney, or the workman will soon suffer from the injurious influence of the volatile hydrocarbon.

Under the chimney is placed a cord stretched between two pins, and the gloves are hung upon this by means of small S-shaped hooks. After hanging a short time they will be dry.

The benzine contained in the bottle dissolves all the grease which adheres to the gloves, and the dirt which had been combined with the grease is consequently removed at the same time. The benzine remaining in the bottle assumes a dirty gray color during the process of washing.

When the benzine has become too dirty, it is put into a distilling apparatus, and distilled over. In this way the benzine is restored to its original purity and whiteness, so that it can be used again in further operations.

If the operation of distilling the benzine is disagreeable to the glove maker, he can have it purified at the apothecary's or chemist's. It is, however, an operation which he can readily perform himself.

The apparatus is neither complicated nor expensive. A small wooden pail, such as is used in every establishment, is furnished with two holes. The first of these is drilled near the upper margin of the pail, so that, when the pail is filled with water, the water runs out through the hole, until the surface of the water within the pail is on a level with the lowest portion of the hole, that is to say, just below the upper margin of the vessel.

On the opposite side of the pail another hole is made, but this time near its bottom, so that water would run through this hole, until the surplus of the contained water with-in a short distance of the bottom.

A leaden tube, the thickness of which equals the diameter of the hole, is bent so as to form a distilling worm, the upper end of which is inserted into the upper opening, and the lower end into the lower hole.

The tube is tightly inserted into both holes, so that no water can run through the space between the tube and the hole.

The pail is then filled with cold water.

The upper and lower ends of the leaden tube must project a little beyond the outer surface of the pail, perhaps two inches.

The lower end is bent downward a little. The upper end is a little enlarged, so that the tube forms a sort of funnel above.

In this is inserted a glass retort, conveniently fixed in a holder

The space between the neck of the retort and the enlarged end of the leaden tube, is conveniently filled with moistened cotton, so that no vapors can escape through it.

It is a good plan to employ a glass retort with a tube, so that any fluid can be poured into it when the apparatus is already fixed.

Having placed the retort on a vapor bath, where it can be heated at 100° C., the pail is connected with the neck of the retort, as above mentioned, and in this way filled with cold water. The retort is then filled with the impure benzine or petroleum-essence which has been used in washing gloves.

After pouring in the benzine, the tube of the retort is closed by a stopper, and then the apparatus is completed by a bottle placed under the lower end of the leaden tube, which projects beyond the outer surface of the pail, so that the liquid running down this flows directly into the bottle.

The vapor bath is now heated, the retort soon becomes warm, and the volatile liquid begins to distil over, either quickly, or slowly, according to the way in which the heating process is conducted.

The vapor of the hydrocarbon condenses in the worm, and a stream of liquid flows out of its mouth. In a short time there remains behind in the retort only the grease which the benzine has extracted from the gloves.

The gloves when taken out of the bottle are often not quite clean, in which case it is necessary to rub them with a rag, moistened with benzine, in all places where they are still dirty.

Thus the last traces of dirt are removed, and the gloves become perfectly clean. In this state they may be hung on a cord under the chimney.

The gloves soon become dry, but a part of the benzine still remains behind, which is less volatile, and which, when the glove is in contact with the warm hand, causes a strong odor of benzine to be evolved.

To remove this also, the gloves are placed on a common plate, which is put upon an iron pot containing boiling water. The first plate is covered with a second, and the gloves between the two plates are heated at the boiling temperature of water, until the last traces of the unvolatilized benzine have escaped.

The gloves are now removed from the plate, and put upon a wooden glove-stretcher, or shape. In this way they are made to resume their original form, and are now ready for use.

The whole operation must be so conducted that no smell of benzine is perceptible. The smell of benzine is always a sign of carelessness on the part of the workman, who can readily conduct all the benzine vapors up the chimney.

Railroads in the United States.

It is difficult, with all our accumulated facilities to reach every part of our vast country, and ascertain the exact condition of the railroad interest in each State or section. And during the last year the development of this great interest of the nation has been so immense and so rapid, as to make it impossible to keep pace with its growth. The construction of the Pacific Railroads, indeed, has forced all parts of the country to railroad extension, and hence we find that the extent of mileage constructed, and improvement on old lines has been greater in 1869 than in any former year of our railroad history. When we state that there have been brought into use during the year no less than 6,588·37 miles of new road, this fact is fully proven. This is more than one eighth part of the total mileage in the country, the other seven eighths having taken forty years of varied fortune to establish. Yet still we are progressing, and the year now commencing promises to eclipse even the year just closed. We have now in use an estimated mileage of 48,860·55 miles, and also projected and in progress a mileage of 27 605·83 miles. Take all the world without the United States, and this is not equaled. Truly we are progressive, and see in all this development a destiny as grand as insured. With our railroads we scale mountains and span the uninhabited plains, which are still in possession of the Indian, and open up vast territories for human habitation, which, without the railroad, must forever have been closed against civilization. If we are going fast, we are going in the right direction, and the day is not far off which will give us the great benefits we seek in our headlong course. The railroad will unite us, and make us the great nation of the world, free and indissoluble.

The following tabulation shows the distribution of mileage and cost to the several States and Territories:

States, etc.	Miles of road—Total.	Miles of road—Open.	Cost of road and equipment.
Maine	940·79	672·07	$21,[illegible]
New Hampshire	785·32	685·32	22,642,[illegible]
Vermont	658·09	618·09	28,787,926
Massachusetts	1,569·75	1,468·70	74,[illegible]
Rhode Island	121·47	171·47	6,132,[illegible]
Connecticut	806·94	698 57	27,350,017
New York	4,735·91	8,636·22	209,001,671
New Jersey	1,028·65	989·65	74,602,785
Pennsylvania	6,878·86	5,014·45	300,556,508
Delaware and E. Maryland	455·50	292·50	8,778,687
Maryland other than above	7[illegible]0·02	493·52	31,814,659
West Virginia	723·75	364·75	27,[illegible]
Virginia	2 049·11	1,482 94	49,886,481
North Carolina	1,552·97	1,129·67	29,505,425
South Carolina	1,439·17	1,089·97	2[illegible]
Georgia	2,095·41	1,694·70	36,875,552
Florida	618·20	440·20	[illegible]
Alabama	2,039·80	1,036·00	[illegible]
Mississippi	900·20	900·20	24,91[illegible]
Louisiana	928·30	414 60	17,385,223
Texas	2,529·25	572·25	17,006,000
Arkansas	897·00	86·00	4,[illegible]
Tennessee	1,876·53	1,485·53	46,918,448
Kentucky	1,402·85	[illegible]	33,511,746
Ohio	4 613·96	3,7[illegible]	190 424,517
Michigan	2,293·26	1,[illegible]	48,793,418
Indiana	5,331·10	2,977·10	121 162,[illegible]
Illinois	7,186·45	4,707·95	217,[illegible]
Wisconsin	2,779·60	1,490·60	60,[illegible]
Minnesota	1,800·00	8[illegible]3 00	27,800,000
Iowa	3,219·28	2,140·83	85,[illegible]
Nebraska	449·00	449·00	26,450,000
Wyoming Territory	500·00	560·00	43,300,000
Missouri	3,261·79	1,827·00	88,572,[illegible]
Kansas	1,601·50	930·50	39,628,600
Colorado	350·00	150·00	6,000,000
Utah Territory	365·00	865·00	18,000,000
Nevada	390·00	390·00	19,500,000
California	2,397·60	[illegible]0·60	46,650,000
Oregon	2,019·50	119·50	5,700,000

The annual progress of railroad building since in 1827 the commencement was made in the construction of the Granite Railroad at Quincy, Mass., to the present time is shown in the following table:

Year.	Miles.	Year.	Miles.	Year.	Miles.	Year.	Miles
1828	3	1839	1,920	1850	7,475	1861	[illegible]
1829	28	1840	2,197	1851	8,589	1862	[illegible]
1830	41	1841	3,319	1852	11,0[illegible]7	1863	[illegible]
1831	54	1842	3,[illegible]77	1853	13,497	1864	[illegible]
1832	131	1843	4,174	1854	15,672	1865	34,442
1833	576	1844	4,311	1855	17,398	1866	35,351
1834	762	1845	4,522	1856	19,25[illegible]	1867	36 896
1835	918	1846	4,870	1857	22,625	1868	38,822
1836	1,102	1847	5,336	1858	25,090	1869	42,272
1837	1,431	1848	5,682	1859	26,755	1870	48,860
1838	1,843	1849	6,350	1860	28,771		

City passenger railroads are not included in the above summary. These are now in general use in all considerable cities, and in numerous instances in places where population is less dense. Their economical bearings are fully recognized, and their popularity is increasing. Boston New York, Brooklyn, and Philadelphia count their street railroad tracks by hundreds of miles. Probably the total is not less than 3,500 to 4,000 miles.

Nor have we included in our statement any account of the second tracks with which most of the leading lines are supplied, nor the sidings and turnouts on all the lines. These may be estimated at 25 per cent of the length of road, and are being added to yearly. Adding these supplementary tracks to the tabulated mileage, we find that the total length of equivalent single track in use is about 60,000 miles, and if we add to this the equivalent for the city passenger tracks to nearly 65,000 miles.

It is now about forty years since we began to build railroads, and in that time, as before intimated, we have built a greater length than is to be found in the whole of Europe. Progress leads but to new demands and new enterprises.—*American Railroad Journal.*

IF Dr. Livingstone has really discovered that one of the sources of the Nile rises ten degrees south of the equator, that river becomes the longest in the world. The distance from such a southern latitude to Cairo is about equal, in an air line, to the distance from the mouth of the Mississippi to Sitka, in Alaska, or to Uppernavik, in Greenland, or from the Isthmus of Panama to the mouth of the St. Lawrence river.

THE plans of the new Steam Flying Ship *Avitor* have been submitted to a thoroughly competent engineer who, it is said, has pronounced favorably upon them.