

the saw by means of a coil spring, under the swing frame. The frame is pressed down, bringing the wheel in contact with the saw with one hand, and the saw turned on the arbor with the other—thus the slightest touch can be given to the tooth of the saw without injury. The position of the operator is such that he can look directly across the tooth of the saw, and judge correctly when it has received the finishing touch.

The same firm exhibit a set of self oiling saw arbors with patent self-oiling boxes, by the use of which sufficient oil can be applied to run a saw for months, and all waste of lubricators is obviated.

A large variety of

CIRCULAR, SCROLL, GIG, AND ENDLESS BAND SAWS ARE EXHIBITED,

among which we notice Grosvenor's adjustable saw bench, with both cross-cut and slitting circular saws, exhibited by J. P. Grosvenor, of Lowell, Mass., and a combined gig and circular saw, by Hassenpflug Brothers, of New York, to be worked by hand power

Beach's Patent Scroll Saw, exhibited by C. B. Rogers & Co., of New York, is one of the best scroll saws we have ever seen. Perfect tension of the saw is attained and maintained, this tension being secured by direct connection, and equalizing the power on both halves of the stroke. The saw may be run at great speed, and should either pin in the saw break, the saw stops instantly and can, in no case, be either doubled or broken.

McChesney's Gig or Scroll Saw, exhibited by Thos. L. Cornell, Birmingham, Conn., is also a very convenient machine and well made.

We were very much pleased with the Talpey's Self-feeding Hand-slitting Saw Machine, exhibited by the sole manufacturer, William H. Hoag, of New York, a most perfect-working, effective machine, requiring very little power. The power is applied from a winch, through a very simple and compact system of gearing, forming a very unique and ingenious device. This is one of the best things shown.

The Safety Band Saw, exhibited by the inventor and manufacturer, J. T. Plass, of New York, attracts much attention. It obviates all danger of injury to the operator in case of breakage. The details of its construction may be found, with illustration, on page 129, current volume, of this journal.

First & Prybil, of New York, also exhibit an endless band saw machine, made entirely of iron except the table; a very well made and elegant machine. They also exhibit an improved gig saw machine, which for all kinds of work is probably one of the best machines constructed.

In conclusion, we may express our conviction that in the perfection of wood-working machinery, this country ranks first in the world. The machines exhibited show a commendable regard for perfect workmanship, so essential to durability in all rapid-running machines, and the display is a credit, not only to the exhibitors, but to the institution under whose auspices this exhibition is held.

ANNUAL REPORT OF THE PRESIDENT OF THE WESTERN UNION TELEGRAPH COMPANY.

In some respects, this is a remarkable document. This Company have a capital stock of \$41,063,100, including sinking fund, amounting to \$494,800, which deducted from the total capital stock, leaves a balance of \$40,568,300, on which a dividend was paid last July. The net profits of the year ending July 1, 1869, were \$2,801,457.48, less than seven per cent on this capital.

During three years, from the commencement of 1866, the net profits of the company have been \$8,015,432.06. Out of these profits, \$4,134,879.10 have been expended in the construction of new lines, purchase of telegraph property, redemption of bonds, purchase of real estate, interest on bonds, sinking fund, and miscellaneous expenditures, leaving a balance for dividends of \$4,044,595.34.

No one will be disposed to think these profits too large; but we have no doubt that the profits on all telegraph property in the United States might be made much larger by a general and large reduction of tariff. The present rates, while they do not afford the companies, on an average, seven per cent interest on the capital invested,—many of the smaller companies netting far less than this,—are still so high that the telegraph is not, as it ought to be, a rival to the postal system, in the transmission of messages. Until such a consummation can be approximated, large profits on telegraph property cannot be expected.

Another obstacle to progress has been, want of uniformity in the tariff of charges in different sections of the country. On this head, the Report under consideration gives us information, not only as to the cause of non-uniformity, but the influences which tend to perpetuate it. It says:

"This peculiarity was the result of the great number of separate organizations, having tariffs upon various bases, which required adding together at the termini of two or more lines, so that, upon a dispatch, which was transmitted a few hundred miles, two or three rates were sometimes charged. For instance, a few years since, there were five telegraph companies owning the lines connecting Portland, Maine, with Cleveland, Ohio, and the tariff between these two places was ascertained by the addition of the local rates from Portland to Boston, Boston to Springfield, Springfield to Albany, Albany to Buffalo, and from Buffalo to Cleveland. The same system prevailed through out the United States until after the consolidation of the lines made it possible to transmit messages between places thousands of miles apart without the necessity of booking or re-checking at intermediate points. This result necessitated a remodeling of the tariffs, and the work has

been going on uninterruptedly ever since; but when it is considered that a complete revision of the system required a separate tariff book to be made out for over three thousand other offices, changing and equalizing the rates to more than three thousand other offices, the immense labor and responsibility incurred in the undertaking may be imagined.

"Various plans have been considered for simplifying and equalizing the tariffs, but some practical difficulties developed in all of them. The existence of rival lines, built by speculators, whose profit is in their construction, and which essay to do business at rates less than the cost of the service; necessitates the reduction of our rates upon certain routes disproportionately, and prevents the adoption of a general rate strictly proportioned to distance.

"Considerable reductions in the rates for both private and press dispatches have been made within the past year, amounting in some cases to fifty per cent, and while these abatements have taken place to the greatest extent in those sections of the country where there are rival lines, the tolls over some of these routes being less than the cost of service, yet they have not been confined to these points, the rates having been decreased at more than one thousand offices where there is no opposition. A new tariff of rates is now preparing and will shortly go into operation, based upon air-line distances, irrespective of the routes over which the lines run.

"The following inventory shows the number of stations, miles of line and wire, and amount of machinery belonging to the Company:

"The Western Union Telegraph Company has 3,469 stations; 52,099 miles of line; 104,534 miles of wire; 103 miles of submarine cables; 2,607 instruments for reading by sound; 1,334 recording instruments; 3,807 relay magnets; 4,180 transmitting keys; 132 repeaters; 19 printing instruments; 710 switch boards; 1,887 cut-offs; 1,666 lightning arresters; 14,929 cups of main battery; 7,210 cups of local battery; 9 punching machines for the 'Fast' system, not in use."

A peculiarity of this apparatus will be observed to be, that it nearly all belongs to the Morse system; but we cannot believe, with this report, that "the time will probably never come when this system will cease to be the leading system of the world." We grant that no device yet designed to supersede it has done so, and that it still is used on "95 per cent of all the telegraph lines in existence." We grant its simplicity and "peculiar adaptability to the telegraphic traffic of the country," but the man who hazards a prediction of permanency in regard to any mechanism employed in any department of industry or science in the 19th century, is certainly a bold prophet.

But we have not space to review this report further at this time. Some interesting remarks upon fast methods of telegraphy we reserve for a future number.

RETURN OF C. F. HALL, THE ARCTIC EXPLORER.

On the 26th of September, Mr. C. F. Hall returned to New Bedford, after completing the second of the Arctic explorations which were undertaken by him, for the purpose of ascertaining the ultimate fate and collecting the relics of Sir John Franklin's expedition. The method adopted by Mr. Hall in prosecuting the search, though at first sight it might appear extravagant, was, in reality, about the most likely to lead to success. Discarding the use of strongly built ships and costly equipments, he determined on a land search, trusting mainly to sledges as a sufficient means of transit, and to such food as might be had among the natives, for subsistence. He seems to have had, in early life, received no special training for an enterprise of this kind, and, it is said, that he had not even been to sea; yet, with indefatigable zeal and with an adequate conception of the magnitude, difficulties, and perils of his self-imposed task, he went to work manfully, systematically, and patiently, to qualify himself for it. He departed from New London on his first journey, which was rather of a tentative character, on the 29th of May, 1860, and returned to the same port on the 13th of September, 1862. The result was satisfactory. Besides making some geographical corrections, he found that he could endure the rigorous climate and live as the Esquimaux lived; he acquired their language and became familiar with their character and customs and, moreover, from information he then received, he was enabled to limit his field of inquiry, and even had grounds for believing that some of the crews might be still alive. In 1864 he published an account of this journey, and in the same year he set out on his second expedition, now completed.

The latest account made public of his recent exploration is a letter written by himself while at Repulse Bay, to his friend, Mr. Henry Grinnell, and is dated June 20th, 1869; the leading facts in which may be thus briefly stated:

There now can remain no doubt of the fate of Franklin's companions; none of them reached even Montreal Island. Their bones lie scattered along the coast of King William's Land. Now a solitary grave was found, and again a place of encampment showed that whole companies fell and died there. What adds peculiar horror to this part of the narrative is the fact that were it not for the inhospitable and cruel character of the natives, some, at least, of Franklin's company might have been restored to civilized society. They were starved to death. The explorer considers that a summer search by a strong expedition, in King William's Land, would probably be rewarded by the discovery of the manuscript records which had accumulated during the Franklin expedition. He says that he had been informed by the natives that the records were deposited in a vault a little inward or to the eastward of Cape Victory. The refusal of his companions to abide by him, and the great probability of his meeting the fate of the gallant Crozier, alone prevented his making the summer search him-

self. About 150 articles, which belonged to the lost voyagers, were brought home by him, and there are hundreds of relics still in the hands of the natives. This letter closed with an account of a mutiny, on which unfortunate occasion he was obliged to shoot the ringleader.

THE NATURAL ADVANTAGES OF TENNESSEE FOR THE PRODUCTION OF IRON.

It has been the practice of many writers on political economy to regard pig iron as representing aggregated labor more than almost any other industrial product; a view which is probably correct, although superficial thinkers might be led by such a statement to overlook the importance of certain natural advantages essential to the profitable production of this most valuable material. These advantages are the existence of ore of the right quality, fuel, and limestone, so situated that they can be brought together at little cost.

Pittsburgh lies in the center of enormous beds of coal, of which her extensive iron works consume much, and waste a great deal. Limestone can be quarried and placed at the mouths of her furnaces, at small cost, but a large proportion of the ore used is brought from Lake Superior in the crude state. An air-line distance of about six hundred miles, increased by the tortuous routes of transportation to an average of, say, a thousand miles. This, notwithstanding the country all about abounds in ores of various qualities, but many of which can only be worked to advantage by the admixture of the Lake Superior ore.

If ore could now be discovered at Pittsburgh of precisely the quality brought from Lake Superior, and in an inexhaustible supply, it would largely add to the already immense mineral wealth of that locality.

It is also evident that there must be a brilliant future in store for any locality in this country, combining all the advantages named, with open avenues of communication by water or rail to the commercial centers of the United States.

Such advantages are claimed for sections in Tennessee, Northern Georgia, and Southern Alabama. A letter from George T. Lewis, Esq., published in the *Republican Banner*, of Nashville, Tenn., sets forth minutely the natural advantages of these regions, more particularly, however, of the vicinage of Nashville, and on the line of the Nashville and Chattanooga Railroad; and it must be confessed that he makes out a good case.

Assuming that the figures given by Mr. Lewis are reliable, the entire cost at which a ton of pig iron can be produced on the line of the above-named railroad, and delivered at Nashville, is \$19, or \$10.50 less than the same quality of iron can be made at Pittsburgh.

The following estimate of the cost of manufacturing, assuming cost of furnace to be \$100,000, and its capacity to be 6,000 tons per annum, is submitted:

Mining, loading, and transportation of 2 tons ore.....	\$4.00
Mining, loading, and transportation of 80 bushels coal..	6.40
Quarrying, loading, and transportation of 1,000 pounds limestone.....	50
Superintendence, labor, etc., per ton.....	4.00
Wear and tear per ton.....	50
Interest on investment per ton.....	1.00
Incidentals per ton.....	50
	\$16.90

The item \$4 per ton embraces employes, viz.:

	Per annum.
1 Superintendent.....	\$3,000
1 furnace manager.....	1,200
1 bookkeeper.....	1,500
1 engineer.....	1,200
1 assistant engineer.....	800
1 blacksmith.....	1,200
1 assistant blacksmith.....	600
1 founder.....	1,200
4 fliers.....	2,400
4 keepers.....	2,400
2 guttermen.....	1,000
2 cindermen.....	1,000
2 weighers.....	1,000
6 yardmen.....	3,000
Extra labor.....	2,500
	\$24,000

Or \$4 per ton.

The great advantage claimed by Mr. Lewis is the quality of the ores (hematite and fossil ores) while the coals he affirms show by analysis seventy per cent of carbon with less earthy matter and sulphur than the bituminous or "furnace coals" of Wales, Newcastle, Western Pennsylvania, and Ohio, and the limestone is of a quality unsurpassed for use as a flux.

By his showing the cost of a ton of pig iron at Steubenville, Ohio, from Lake Superior ore is \$29.

The cost of a ton of pig metal made at Brazil, Northern Indiana (the ores from Iron Mountain and Pilot Knob, Missouri, and Lake Superior) is.....	\$28.45
The cost of a ton of pig metal made at Pittsburgh, the Birmingham of America (ores from Lake Champlain and Lake Superior) is.....	29.50

On the other hand, the cost of a ton of pig metal in Nashville is as follows:

Mining, loading, and transportation of 2 tons ore.....	\$6.00
Mining, loading, and transportation of 80 bushels coal..	9.60
Quarrying, loading, and transportation of 1,000 pounds limestone.....	1.00
Superintendence, labor, etc., per ton.....	4.00
Interest on investment per ton.....	1.00
Wear and tear per ton.....	50
Incidentals.....	50

Total.....\$22.60

These statements are certainly worthy of serious attention. The mineral wealth of this region has long been known, in