

The following table gives the distances, fall, and rate of fall per mile, of the Yellowstone:

Stretch of river.	Distance in miles.	Total fall in feet.	Fall per mile in feet.
Ferry at Keogh to head Buffalo Rapids.....	12.38	48.937	3.95
Head Buffalo Rapids to foot Buffalo Rapids.....	.7803	7.699	9.87
Foot Buffalo Rapids to head Baker's Rapids.....	18.0602	69.262	3.83
Head Baker's Rapids to foot Baker's Rapids.....	.712	5.162	7.25
Foot Baker's Rapids to head Wolf Rapids.....	6.767	21.526	3.18
Head Wolf Rapids to foot Wolf Rapids.....	.42	4.226	10.06
Foot Wolf Rapids to head McEwen's Rapids.....	3.9	13.873	3.55
Head McEwen's Rapids to foot McEwen's Rapids.....	.25	2.262	9.048
Foot McEwen's Rapids to 300 feet below head White Sand Rapids.....	9.227	20.674	2.24
300 feet below head White Sand Rapids to foot White Sand Rapids.....	.1534	1.519	9.928
Foot White Sand Rapids to head De Russey's Rapids.....	10.0303	24.596	2.452
Head De Russey's Rapids to foot De Russey's Rapids.....	.5985	2.288	3.83
Foot De Russey's Rapids to 930 feet below head Walker's Island Shoal.....	4.1316	7.467	1.807
930 feet below head Walker's Island Shoal to foot Walker's Island Shoal.....	.57	2.85	4.965
Foot Walker's Island Shoal to head Monroe Rapids.....	7.4917	23.301	3.11
Head Monroe Rapids to foot Monroe Rapids.....	.309	1.248	4.04
Foot Monroe Rapids to head Reno's Bend.....	38.7708	104.397	2.69
Head Reno's Bend to foot Reno's Bend.....	.8958	5.174	5.77
Foot Reno's Bend to head Beef Slough.....	12.522	34.852	3.29
Head Beef Slough to foot Beef Slough.....	1.15	5.316	4.622
Foot Beef Slough to foot Diamond Island.....	16.137	31.881	1.976
Total.....	145.2566	438.49	.....
River, excluding rapids.....	139.4176	400.766	2.875
Rapids.....	5.839	37.724	6.461
Total as above.....	145.2566	438.49	.....

In accordance with my instructions to them, the parties ceased work October 28, and arrived in Saint Paul November 4.

On November 5 all of the men, with the exception of assistant engineers Towar, Lightner, and Spalding, were paid off and discharged. These 3 assistants were retained on the work until the close of the fiscal year, when, the appropriation having been exhausted, they were discharged.

The office work during the year consisted of the necessary computations and plotting. A map of the river in 42 sheets, on a scale of  $\frac{1}{8600}$ , with an index sheet, is forwarded herewith. A map in 16 sheets, on a scale of  $1=4800$ , with an index sheet, was made for use in this office.

My thanks are due to the assistant engineers engaged upon the survey, for the efficient manner in which they performed their work.

I would respectfully recommend a continuance of the survey, not only on account of the general value of the information to be obtained, but because such a survey is necessary in order to supply the data required for an estimate of the cost and nature of the improvement of navigation.

For the completion of the work the sum of \$10,000 will be required.

As I have stated before, the scene of operations is so distant from depots of supplies that the items of transportation and subsistence alone are great, and, consequently, the cost per mile of the survey is largely in excess of that for a river east of the Mississippi. Men and material both must be sent from this city.

Very respectfully, your obedient servant,

EDWARD MAGUIRE,

First Lieutenant, Corps of Engineers.

The CHIEF OF ENGINEERS, U. S. A.

## APPENDIX Q.

### ANNUAL REPORT OF MAJOR F. U. FARQUHAR, CORPS OF ENGINEERS, FOR THE FISCAL YEAR ENDING JUNE 30, 1879.

WASHINGTON, D. C., July 21, 1879.

GENERAL: I have the honor to transmit herewith the annual reports of operations under my charge during the fiscal year ending June 30, 1879.

The statistics of the commerce of the Upper Mississippi River are appended to the report on improvement of Upper Mississippi River.

To the following gentlemen I am much indebted for the intelligence and energy they have displayed in carrying on the works assigned to their local charge:

Capt. B. D. Greene, Corps of Engineers, in local charge from foot of Rock Island Rapids to mouth of Illinois River.

Mr. M. Meigs, United States civil engineer, in local charge from 5 miles above Fountain City, Wis., to head of Rock Island Rapids and Galena River.

Maj. E. F. Hoffman, assistant engineer, in local charge of Rock Island Rapids.

Mr. J. L. Gillespie, assistant engineer, in local charge from Saint Paul to Alma, Wis.

I am also under obligations to the Ordnance Department, United States Army, which, through the commanding officer, Rock Island Arsenal, Maj. D. W. Flagler, much facilitated the works under my charge, by doing work in the arsenal shops of great excellence and dispatch, and at much less rates than elsewhere.

Hoping this may meet with your approval,

I am, very respectfully, your obedient servant,

F. U. FARQUHAR,  
Major of Engineers.

The CHIEF OF ENGINEERS, U. S. A.

## Q 1.

### OPERATIONS OF SNAGBOAT IN IMPROVEMENT OF UPPER MISSISSIPPI RIVER.

The old snag-boat *Montana* worked as usual during the season of 1878. The stage of water was very low and lasted for almost the entire season. The deep draught of the *Montana* rendered her useless for scraping the bars, and so the principal work was snag pulling. The rottenness of her hull prevented any great strain being brought upon it, and some very large snags were not pulled in consequence.

A new steamer, the General Barnard, was built by contract by David S. Barmore, Jeffersonville, Ind., during the past winter. The dimen-



sions of the boat are 218½ feet long, 37 feet beam, and 5½ feet depth of hold.

The motive machinery of the *Montana* was repaired and put upon the new boat, and such parts of her upper works as were fit were also used.

The accompanying report of Assistant C. D. Durham gives many interesting details. The boat will be used in scraping down bars, removing snags and overhanging trees, during the present season. This work of removing snags will always be necessary each year, for the floods of the tributaries constantly bring into the river fresh snags.

The annual running expenses of the boat are about \$25,000, and this will be required for the fiscal year ending June 30, 1881.

STATEMENT OF WORK DONE DURING FISCAL YEAR ENDING JUNE 30, 1879, FOR IMPROVEMENT OF UPPER MISSISSIPPI RIVER.

Snags extracted.....	423
Overhanging trees pulled back.....	135
Overhanging trees felled and removed.....	6,668
Channel-marks established.....	2
Water-gauges established.....	29
Bench-marks established.....	29
Wrecks removed.....	1
Number of scrapes made with Long's scraper.....	107
Steamboats assisted.....	10
Miles of survey lines.....	12
Number of soundings recorded and plotted.....	11,330
Number of examinations and surveys.....	8
Boulders removed.....	3
Rock put on dams (cubic yards).....	85
Rock blasted and removed (cubic yards).....	23
Miles run in accomplishment of above work.....	7,752

ABSTRACT OF APPROPRIATIONS MADE FOR IMPROVEMENT OF UPPER MISSISSIPPI RIVER.

By act approved March 2, 1867.....	\$96,000
By allotment from appropriation of July 25, 1868.....	23,000
By act approved July 11, 1870.....	36,000
By act approved March 3, 1871.....	42,000
By act approved June 10, 1872.....	42,000
By act approved March 3, 1873.....	25,000
By act approved June 23, 1874.....	25,000
By act approved March 3, 1875.....	25,000
By act approved August 14, 1876.....	30,000
By act approved June 18, 1878.....	41,000
By act approved March 3, 1879.....	20,000

403,500

Money statement.

July 1, 1878, amount available.....	\$42,738 97
Amount appropriated by act approved March 3, 1879.....	20,000 00
July 1, 1879, amount expended during fiscal year.....	\$62,738 97
July 1, 1879, amount available.....	45,031 19
July 1, 1879, amount available.....	17,707 78
Amount that can be profitably expended in fiscal year ending June 30, 1881.....	25,000 00

Abstract of proposals received and opened September 30, 1878, by Maj. F. U. Farquhar, Corps of Engineers, U. S. A., for the construction and painting of a steambot hull.

Names.	Residence.	For furnishing all material and doing the work of building and painting a steambot hull in full accordance with the specifications and subject to the conditions therein contained.	Remarks.
Salem Town Lamb.....	New Albany.....	\$9,975 00	Informal; no seals.
Bernard W. Nadal.....	Louisville, Ky.....	11,250 00	Contract awarded.
David S. Barmore.....	Jeffersonville, Ind.....	9,590 00	Informal; no witnesses or seals.
William Knox & Son ..	Harmar, Ohio.....	12,000 00	

REPORT OF MR. C. W. DURHAM, ASSISTANT ENGINEER.

UNITED STATES STEAMER GENERAL BARNARD,  
Wabasha, Minn., July 1, 1879.

MAJOR: I have the honor to present my report on the "improvement of the Upper Mississippi River," for the fiscal year ending June 30, 1879.

OPERATIONS OF THE UNITED STATES STEAMER MONTANA.

In accordance with your instructions, the *Montana* was put in commission, and on the morning of July 5, 1878, left Rock Island and operated between that point and Grafton, Ill., until July 23, removing snags, overhanging trees, and other obstructions, establishing bench-marks, water-gauges, and channel-marks, and making examinations with reference to the permanent improvement of the river.

On July 23, got under way from Rock Island for above, working up river to Saint Paul and returning to Rock Island September 13.

From September 14 to October 8, at work between Rock Island and the mouth of Illinois River.

Between October 9 and 22, made a survey of the river from Sand Prairie to Savanna.

On the morning of October 24, started for Jeffersonville, Ind., arriving at that place November 5, when the boat was laid up and dismantled and afterwards condemned and sold at public sale, after fourteen years' service, such parts of her as could be utilized having been used in the construction of the *General Barnard*.

SUMMARY OF OPERATIONS OF THE MONTANA FOR THE SEASON OF 1878.

Snags extracted.....	152
Overhanging trees pulled back.....	36
Overhanging trees felled and removed.....	3,944
Channel-marks established.....	2
Water-gauges established.....	28
Bench-marks established.....	29
Number of scrapes made.....	69
Steamboats assisted.....	7
Miles of survey lines.....	12
Number of soundings recorded and plotted.....	11,300
Number of examinations and surveys.....	8
Boulders removed.....	3
Rock put in dams (cubic yards).....	85
Rock blasted and removed (cubic yards).....	23
Miles run.....	4,997

CONSTRUCTION OF THE GENERAL BARNARD.

Work on the *General Barnard* was begun early in November, 1878, and completed April 11, 1879, on which day she made her trial-trip.

The hull, boiler-deck, cabin, and other wood work were built by D. S. Barmore, of Jeffersonville, Ind.; the shafts, machinery, and greater part of the pipe-work by M.



A. Sweeney & Bro., of the same city, and the boilers and sheet-iron work by Thomas Mitchell, of Louisville, Ky. The engines, cylinders, and doctor of the *Montana* were repaired and placed on the General Barnard.

## DIMENSIONS, ETC.

Length of hull, 218 feet 6 inches; beam, 37 feet; width over all, 65 feet.  
Side-wheels, 25 feet diameter, with 12-foot buckets.  
Steel boilers, 3 in number, 42 inches diameter, 22 feet long, with 10 6-inch return-flues in each.  
Cylinder, 20 inches diameter, 6 feet stroke.  
Draft, light, 31 inches.

## COST OF BOAT AND OUTFIT.

Hull, boiler, deck, wheels, &c .....	\$9,636 25
Cabin and other wood work .....	3,648 10
Boilers, machinery, and repairs .....	5,386 06
Outfit, including cabin and kitchen furniture, linen, &c .....	960 81
Labor of men employed by the government, superintendence, &c .....	1,282 00
<b>Total cost .....</b>	<b>20,963 22</b>

She is of very strong construction, furnished with two steam-capstans, derricks, and other appliances, fitting her for the service in which she is engaged.

## OPERATIONS OF THE GENERAL BARNARD.

Left Jeffersonville, Ind., April 12, 1879, and arrived at Rock Island on the 22d. From April 23 to May 5, worked between Rock Island and Quincy; from May 6 to 10, between Rock Island and Dubuque; from May 11 to June 19, between Rock Island and the mouth of Illinois River.

On the morning of June 20, left Rock Island and operated between that point and Saint Paul until July 1.

## SUMMARY OF OPERATIONS FOR IMPROVING UPPER MISSISSIPPI RIVER FOR THE FISCAL YEAR ENDING JUNE 30, 1879.

Snags extracted .....	428
Overhanging trees pulled back .....	135
Overhanging trees felled and removed .....	6,668
Channel-marks established .....	2
Water-gauges established .....	29
Bench-marks established .....	29
Wrecks removed .....	1
Number of scrapes made .....	170
Steamboats assisted .....	10
Miles of survey lines .....	12
Number of soundings recorded and plotted .....	11,300
Number of examinations and surveys .....	8
Boulders removed .....	3
Rock put in dams (cubic yards) .....	85
Rock blasted and removed (cubic yards) .....	23
Miles run in accomplishment of above work .....	7,752

In conclusion, I have the honor to state that the *General Barnard*, built under your instructions, has fulfilled my most sanguine expectations, and is admirably fitted for her work.

Very respectfully, your most obedient servant,

C. W. DURHAM,  
Assistant Engineer.

Maj. F. U. FARQUHAR,  
Corps of Engineers, U. S. A.

## STATISTICS OF COMMERCE AND NAVIGATION.

## Lumber.

The most important business interest on the Upper Mississippi and its tributaries is the lumber trade, giving employment to great numbers of men and upwards of 100 steamboats, which are used guiding and propelling rafts.

Between the mouth of the Chippewa and Saint Louis there are 73 mills on the main river, with an annual day-sawing capacity of 600,000,000 feet, employing 12,000 men, and representing \$12,000,000 of capital.

The estimated product of white pine floated into the Mississippi River in 1878 was 826,000,000 feet of lumber, 218,000,000 shingles, and 109,000,000 laths. In 1877 the total amount was 750,000,000 feet, and in 1876 1,350,000,000 feet. The diminished quantity of the last two years is owing to the unusually low stage of water.

The following table shows the amount of lumber manufactured on the Upper Mississippi and its tributaries during the season of 1878, as reported by the Mississippi Valley Lumberman and Manufacturer of Minneapolis, Minn.:

Localities.	Number of mills.	Lumber manufactured.		
		Lumber.	Shingles.	Laths.
The Saint Croix River .....	8	58,320,000		
Anoka, Minn. ....	2	23,139,055	7,102,250	4,531,050
Minneapolis, Minn. ....	17	115,774,075	42,094,500	16,403,750
Mississippi, above La Crosse .....	6	37,300,000	13,000,000	2,700,000
La Crosse, Wis. ....	8	36,702,000	7,700,000	4,500,000
Lansing, Iowa .....	1	12,000,000		
McGregor, Iowa .....	2	8,050,000		
Dubuque, Iowa .....	5	20,225,000	3,300,000	1,000,000
Bellevue, Iowa .....	1	1,000,000		
Sabula, Iowa .....	1	892,563		
Fulton, Iowa .....	1	1,600,000		
Lyons, Iowa .....	2	16,200,000	2,276,000	
Clinton, Iowa .....	3	45,897,915	18,547,000	4,705,350
Moline, Ill. ....	2	18,000,000	3,500,000	15,000,000
Davenport, Iowa .....	4	27,615,000	3,283,000	6,050,000
Rock Island, Ill. ....	2	19,000,000		
Muscatine, Iowa .....	3	20,771,996		
Burlington, Iowa .....	1	11,000,000		
Fort Madison, Iowa .....	1	11,000,000	14,000,000	3,500,000
Montrose, Iowa .....	1	900,000		
Keokuk, Iowa .....	1	4,500,000		1,500,000
Quincy, Ill. ....	1	4,578,557	2,512,000	1,865,650
Hannibal, Mo. ....	1	11,000,000		
Eau Claire, Wis. ....	9	100,569,866	33,360,000	32,555,000
Chippewa Falls, Wis. ....	3	7,550,000		585,000
Menomonee, Wis. ....	1	44,147,935	21,913,000	5,837,650
Stevens Point, Wis. ....	5	12,664,000	4,100,000	1,100,000
Wausau, Wis. ....	6	18,700,000	13,500,000	1,950,000
Other Wisconsin points .....	23	117,527,379	39,810,000	2,650,000
<b>Total .....</b>		<b>826,525,341</b>	<b>217,652,750</b>	<b>108,925,450</b>

## Lumber received at Saint Louis from Upper Mississippi River.

	1876.	1877.	1878.
White-pine lumber and logs .....	165,889,702	163,304,150	129,806,733
Shingles .....	59,981,000	64,919,000	88,059,500
Laths .....	15,380,750	15,973,200	29,414,500

## STEAMBOATS AND FREIGHT.

The principal steamboat lines on the river above Saint Louis are the Keokuk Northern Line and the Diamond Jo Line. Besides these there are numerous independent boats carrying freight and passengers.

The following table shows the amount of freight and number of passengers carried by the two principal lines. No records of the business of the other boats are obtained, but it probably amounts to about one-third as much as the two main lines.



Statement of the two principal steamboat lines, Upper Mississippi River.

Name.	1876.		1877.		1878.	
	Freight.	Passen- gers.	Freight.	Passen- gers.	Freight.	Passen- gers.
Keokuk Northern Line Company	Tons. 258,244		Tons. 204,098	84,981	Tons. 440,000	128,000
Diamond Jo	93,676	6,824	75,000	18,365	90,000	
	351,920		279,098	103,346	530,000	

Statement of amount of freights received at and shipped from Saint Louis by the Upper Mississippi River for seven years.

	1872.	1873.	1874.	1875.	1876.	1877.	1878.
Received	Tons. 242,584	Tons. 281,175	Tons. 231,060	Tons. 198,100	Tons. 224,860	Tons. 136,715	Tons. 174,065
Shipped	55,235	61,966	95,800	96,225	93,360	68,565	67,320
Total carried	297,819	343,141	326,860	294,325	318,220	205,280	241,385

Table showing the aggregate receipts at Saint Louis from the Upper Mississippi River in 1878.

Articles.	Designation.	Quantity.	Articles.	Designation.	Quantity.
Apples	Barrels	27,412	Hops	Bales	39
Barley	Sacks	43,258	Iron and steel	Tons	16
Beans	Sacks and barrels	290	Lard	Pounds	392,885
Beef	Barrels and tierces	36	Lead	Pigs	3,000
Bran	Sacks	2,634	Leather	Rolls	32
Butter	Pounds	148,800	Malt	Sacks	9,601
Buckwheat	Sacks	125	Merchandise and sundries.	Packages	166,539
Buckwheat-flour	Barrels	70	Do.	Cars	50
Cattle	Head	13,263	Oats	Sacks	248,802
Castor-beans	Sacks	24	Oils	Barrels	1,366
Cement	Barrels	1,231	Onions	Packages	26,553
Cheese	Boxes	923	Peltries, furs	do	992
Cooperage	Flour	60	Pork	Barrels	7,460
Do.	Pork	4,071	Pork, hams	Pounds	355,834
Do.	Whisky	429	do	do	1,557,975
Do.	Lard, tierces	13,497	Potatoes	Sacks and barrels.	36,426
Do.	Lard, kegs	43	do	Bushels	1,500
Do.	Meat, casks	5,991	Rye	Sacks	20,607
Corn	Sacks	77,271	Seeds	Sacks and barrels.	4,473
Corn-meal	Barrels	179	Sheep	Head	11,105
Cranberries	Packages	363	Staves	M	40
Dried fruit	do	714	Tallow	Pounds	940,330
Eggs	do	2,898	Tar and pitch	Barrels	335
Flaxseed	Sacks	20	Tobacco	Hogsheads.	1,279
Fish	Packages	958	do	Packages	31,024
Flour	Barrels	39,946	Wheat	Sacks	226,057
Grease	Pounds	130,820	do	Bushels	23,094
Hay	Bales	81,931	Wines and liquors.	Barrels	814
Horses and mules	Head	3,423	do	Boxes and cases	329
Hemp	Bales	208	Wool	Pounds	253,915
Hides	Pounds	618,549			
Hogs	Head	54,970			

The following table affords a comparative view of the relative amount of navigation at various localities on the Upper Mississippi for the last four seasons:

Statement of steamers, barges, and rafts passing various bridges.

Locality of bridge.	Steamboats.				Barges.				Rafts.			
	1875.	1876.	1877.	1878.	1875.	1876.	1877.	1878.	1875.	1876.	1877.	1878.
Winona				2,948				1,115				863
La Crosse				2,095				842				594
Dubuque	2,771	2,647	1,801		776	1,339	816		1,136	1,090	642	
Clinton	2,471	2,925	2,174	1,950	600	455	633	913	930	*261	*352	383
Rock Island	1,830	1,976	1,560		630	696	790		618	627	413	
Burlington	1,412	1,820	1,139	1,318	495	806	431	624	*164	*209	*155	254
Keokuk	1,347	1,590	1,294	1,519	704	944	572	781	(†)	(†)	(†)	
Quincy		2,320		1,450		650		524				191
Hannibal	1,370	1,863	1,467	1,393	447	739	585	549	168	183	181	156
Louisiana	1,496	1,793	1,331	1,390	412	638	425	545	109	150	106	89

\* Partial record.

† No record of rafts.

Arrivals and departures of Upper Mississippi River steamboats at Saint Louis for the year 1878.

Month.	Arriv- als.	Depart- ures.	Month.	Arriv- als.	Depart- ures.
January	15	17	July	121	123
February	22	21	August	117	125
March	59	70	September	100	94
April	101	100	October	96	98
May	103	104	November	97	95
June	101	96	December	33	31
			Total	965	974

LIST OF DISASTERS AND ACCIDENTS IN THE UPPER MISSISSIPPI RIVER BETWEEN SAINT PAUL AND THE MOUTH OF THE ILLINOIS RIVER, FOR THE YEAR 1878.

[From report of Saint Louis Merchants' Exchange.]

April 13.—The towboat Wild Boy with two iceboats in tow sunk them both on Rock Island Rapids at Hampton.

October 21.—Raftboat J. W. Van Sant struck a snag and sunk above Keokuk; was raised.

November 4.—Raftboat Le Clair Belle blew out both of her cylinder-heads, broke her shaft, and lost her wheel above Davenport.

November 22.—While steamer War Eagle was backing out from Saverton she struck some rocks and sunk; she was raised.

November 25.—Steamer Itaska was destroyed by fire while lying at the bank at La Crosse.

Statement of receipts and shipments at various points on the Upper Mississippi River during the season of 1878, as given by city authorities and boards of trade.

Name of place.	Receipts.	Shipments.
Saint Paul, Minn.	35,325,674 pounds	11,401,867 pounds.
Hastings, Minn.		6,000,000 pounds.
Red Wing, Minn.		52,595 bushels wheat.
		30,000 bushels barley.
		3,500 barrels flour.
		10 cars wagon-wood.
		650,000 pounds merchandise.
		20,000 bushels grain.
Fulton, Ill.	885,100 bushels grain	15,900,000 pounds merchandise.
	2,565,600 pounds merchandise, &c.	
	2,000,000 feet logs	
Wabasha, Minn.		173 tons merchandise, &c.
		23,900 bushels wheat and barley.
		26,300 barrels flour.
		1,000 cars grain.
Keithsburg, Ill.	150 cars coal	200 head cattle.
	25 cars flour	10 cars merchandise.
	50 cars merchandise	



Statement of receipts and shipments, &c.—Continued.

Name of place.	Receipts.	Shipments.
Warsaw, Ill.		40,800 bales hay. 8,475 barrels apples. 5,045 sacks oats. 7,000 sacks corn. 1,650 sacks potatoes. 1,970 sacks rye. 300 crates grapes. 195 barrels cider. 22,291 tierces and pork-barrels. 500 head live-stock. 1,050 packages merchandise. 5,000 barrels sweet-potatoes. 2,000 boxes sweet-potatoes. 325 barrels apples. 300 baskets grapes. 2,000 boxes tomatoes. 1,000 barrels melons. 2,500 bundles wagon-brakes. 100,000 pounds butter. 500 barrels mess-pork. 100 tierces hams. 5,000 hams (loose).
Muscatine, Iowa	2 cars lumber 10 cars stones 1,000 barrels flour 800 barrels salt 800 barrels apples 700 barrels vinegar and oils 5,000 kegs lard 2 thrashers 500 agricultural implements 10,000 drain-tile 5,000 kegs nails 20 head stock 40,000 pounds sundries 5,000 boxes fruit 500 pounds sugar 5,000 packages iron 4,700 boxes tobacco 1,000 boxes fruit-jars	120,000 tons. 13,938 agricultural implements. 1,018 packages crackers. 113 head horses. 13,022 packages sundries. 410 barrels flour and meal. 3,574 castings. 1,070 packages cotton goods. 10 cars coal. 2,738 boxes glass. 2,300 bars iron. 21 cars lumber. 9,680 kegs nails. 7,921 packages paper. 320 barrels pork. 796 barrels whisky. 2,122 packages pumps. 113 saws. 850 barrels salt. 2,500 packages shingles. 1,180 packages soap. 142 wagons. 22,889 packages beer.
La Crosse, Wis. Rock Island, Ill.	120,000 tons 125 cars lumber 7 cars stones 2,087 barrels flour 220 barrels apples 325 barrels vinegar 1,000 kegs lead 300 pigs lead 1,802 packages agricultural implements. 4,980 drain-tile 2,027 kegs nails 4,106 boxes fruit 480 carboys acid 210 arsenal implements 394 ammunition-boxes 7 cannon 150 barrels marble-dust 550 barrels rosin 113 barrels sirup 15,146 sacks grain 127 bales hops 204 bales cotton 320 barrels rice 20,898 packages sundries	3,607 agricultural implements. 1,038 packages crackers. 61 head horses. 6,640 packages sundries. 516 arsenal implements. 2 cannon. 24,287 packages grain. 366 packages sash, &c. 788 packages flour. 561 barrels flour. 239 head hogs. 259 barrels vinegar. 13,743 packages potatoes. 974 packages household goods.
Davenport, Iowa	107 cars lumber 35 cars stones 425 barrels flour 637 barrels apples 872 barrels vinegar and oil 3,228 kegs lead 635 agricultural implements 6,316 drain-tile 4,055 kegs nails 2,316 boxes fruit 5,232 sacks grain 29,689 packages sundries 7 thrashers 30 head stock 1,216 barrels salt	

CUSTOMS REVENUE AND TONNAGE.

That portion of the Mississippi between Saint Paul and the mouth of the Illinois River lies partly in the customs district of Minnesota and partly in the customs district of New Orleans. Surveyors of customs are located at Burlington and Dubuque, Iowa, Galena, Ill., Saint Paul, Minn., and La Crosse, Wis.

Customs revenue and tonnage for fiscal year ending June 30, 1879.

Port.	Collections.	Tonnage enrolled.	No. of vessels.
Saint Paul, Minn.	\$11,195 62	3,001 29	37
Burlington, Iowa	563 37	841 45	11
La Crosse, Wis.	2,955 84	3,913 58	34
Galena, Ill.	6,185 79	8,360 89	54

INTERNAL REVENUE.

There are ten internal-revenue districts bordering on the Mississippi River between Saint Paul and the mouth of the Illinois River. Each of these districts is composed of a large number of counties the greater portion of which do not touch the river, but the bulk of the business receipts and revenue of the government comes from the sections bordering upon the river and tributary to its navigation and commerce.

The following table gives the designation of the districts touching the river between the points above named, the residence of the collector, and the amount of collections for the fiscal year ending June 30, 1878.

Internal revenue.

District.	Residence of collector.	Amount collected year ending June 30, 1878.
First Minnesota	Rochester	\$99,569 03
Second Minnesota	Saint Paul	175,433 72
Second Wisconsin	Madison	142,657 44
Sixth Wisconsin	Sparta	92,606 25
Second Iowa	Davenport	182,075 17
Third Iowa	Dubuque	326,682 60
Fourth Iowa	Burlington	192,427 33
Third Illinois	Mount Carroll	857,227 95
Fourth Illinois	Quincy	1,105,932 44
Fourth Missouri	Louisiana	314,274 08
Aggregate		3,488,886 01

Q 2.

IMPROVEMENT OF THE MISSISSIPPI RIVER FROM SAINT PAUL TO DES MOINES RAPIDS.

The first works undertaken were at those localities where the greatest difficulties to navigation had been experienced, and while the unprecedented low water of the season of 1878 developed many equally bad places, still it is believed that the work done was of great permanent benefit to the river. It is hoped that when the present high water subsides that their usefulness will be fully demonstrated.

The dams were constructed of mattresses of brush weighted down with stone. The lower layer of brush extends 10 feet down stream beyond the layer above, and the succeeding layers are stepped back up stream 3 feet each. Except on the apron and top covering, where stone as heavy as a man could lift was used, the ballast was composed in part of stone as small as coarse gravel.



## I. PIG'S EYE BARS.

These bars extend from the foot of Pig's Eye Island (3 miles below Saint Paul) to Kaposia. Ten spur-dams were built, six from the left bank, and four from the right bank. The effect of these dams is shown on the accompanying tracing marked I.

It may be necessary to protect the left bank between the second and third dams on left bank, but no cutting has shown itself yet.

This work was done by hired labor, and the brush and stone used in the dams was purchased in open market after a general notification had been given.

The following is a detailed statement of the cost of this work:

*Pig's Eye and Kaposia Bars.*

Description of work.	Number linear feet.	Rock.	Brush.
Dams .....	3,575	Cubic yds. 6,643	Cubic yds. 3,930
Shore protections .....	1,200	1,740	1,700
Total .....	4,775	8,383	5,630

Total cost of 14,013 cubic yards in place.

Description.	Average cost per cubic yard of work.	Total cost.
Materials .....	\$1 05	\$14,706 05
Labor .....	16	2,301 21
Tools and hire of plant .....	03.5	505 19
Superintendence and office expenses .....	07.5	1,060 87
Total .....	1 32	18,573 32

## II. NEWPORT BARS.

The chute to the right of the island was closed, and one spur-dam built out from the right bank above the island to protect the head of the island and to send the water through the left-hand channel below.

The bar at the head of the island is cutting slowly, and it is believed that when the present high water subsides that a good channel will be found across it.

Mr. Gillespie, the assistant in charge, reports as follows, as to the use of Captain Bell's machine for constructing dams:

This machine consists of a set of inclined ways supported at the upper end by a scow, the lower end resting upon the bottom of the stream.

A continuous mat of fascines is built upon the ways and loaded with stone, the scow and ways being hauled out from under the mat as the work progresses.

The advantages of this machine are that it affords facilities for building continuous mats, and allows the work to be done without wetting the laborers, which is a matter of importance in cold weather.

The obstacles to its use are that it requires strong anchorage and tackle to pull it forward on the work, and it is difficult to keep the dams on a proper line, as the machine constantly tends to work down stream.

The spuds and iron disks furnished with this machine are quite insufficient to check this tendency.

The machine might perhaps be used to advantage in slack water of 2 to 4 feet depth, where the whole height of dam required could be laid at one operation.

I do not think it adapted to deep-water dams, as it would be almost impossible to haul the machine over a rough surface of riprap already in place, and in a strong current it would be utterly unmanageable.

In general practice I do not think that the machine will be found as economical as the methods in ordinary use.

The following is the detailed cost of the work:

*Newport Bar.*

Description of work.	No. linear feet.	Rock.	Brush.
Dams .....	775	Cub. yds. 2,454	Cub. yds. 827
Shore protection .....	350	480	450
Total .....	1,125	2,934	1,277

Cost of 4,211 cubic yards in place.

Description.	Average cost per cubic yard of work.	Total cost.
Materials .....	\$1 10	\$4,628 53
Labor .....	20	834 35
Tools and hire of plant .....	04	151 20
Superintendence and office expenses .....	08	338 53
Total .....	1 42	5,952 61

## III. HASTINGS AND PRESCOTT BARS.

The work here consisted in building 4 spurs from the left bank below the bridge at Hastings, 2 spurs from the right bank just above Prescott Island, and closing the channel to the right of Prescott Island; 50 snags and a portion of a wreck were also removed from the channel near Prescott.

There remains to be done a little shore protection of the right bank just below Hastings and the left bank opposite Prescott Island.

There has been a decided improvement of the channel.

Contracts have already been made for the constructing of some small shore protections on the right bank opposite the spur-dams just below Hastings, and on the left bank at Point Douglass.

The detailed cost of this work was as follows:

*Hastings Bar.*

Description of work.	No. linear feet.	Rock.	Brush.
Dams .....	1,700	Cub. yds. 4,092	Cub. yds. 2,982
Shore protection .....	400	589	587
Total .....	2,100	4,681	3,569