OSBORN'S TABLES.

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OF

MOMENTS OF INERTIA

AND

SQUARES OF RADII OF GYRATION

TO WHICH HAVE BEEN ADDED TABLES OF

THE WORKING STRENGTHS OF STEEL COLUMNS,

THE WORKING STRENGTHS OF TIMBER BEAMS AND COLUMNS,

STANDARD LOADS AND UNIT STRESSES,

AND CONSTANTS FOR DETERMINING STRESSES IN SWING BRIDGES.

FIFTH EDITION

REVISED BY

THE OSBORN ENGINEERING CO.

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PREFACE TO FIFTH EDITION.

"Osborn's Tables" are now too well known among engineers and designers to require further introduction. The first edition, by Mr. Frank C. Osborn, appeared in 1886, and was followed in turn by three others in the next eight years. Since the publication of the fourth edition in 1894, the various mills have adopted uniform standards of shapes which nearly all varied somewhat from those used in the tables. This considerably decreased the usefulness of the tables as they then existed.

Believing, however, that the work still fills a want among designing engineers, the present edition has been prepared. The tables of moments of inertia and squares of radii of gyration have all been completely refigured, using the present standard mill sections and shapes, and combining them in accordance with present designing practice. It is believed that these tables will prove much more convenient than the earlier ones in this respect.

The tables of $\frac{L^2}{r^2}$, square root, swing bridges, rivets, web plates and timber beams, have all been preserved in the present edition. Some of the other matter, now obsolete, has been omitted and instead there have been included tables of the safe working strengths of soft steel and medium steel columns, of standard loads and unit stresses for bridges, of timber columns and of bridge weights.

There have also been included a few pages of historical and other statistics concerning the bridges of the world that it is hoped may prove of interest. Such information is not easily obtainable elsewhere.

It is earnestly hoped that this new work may have the same kind reception and may prove as useful a companion to the designing engineer as have its preceding editions.

THE OSBORN ENGINEERING COMPANY.

CLEVELAND, MARCH, 1905.

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EXPLANATION.

The shapes used in the following tables are those manufactured by the Carnegie Steel Co., Pittsburg Pa. The moments of inertia will not, however, vary materially for shapes of same size and weight made by other manufacturers.

In all cases calculations have been based on the gross area, and if it is desired to use the sections as beams to resist direct bending, due allowance should be made for loss of section from rivet holes in tension flanges.

The following example will illustrate the general method pursued in obtaining the moment of inertia and square of radius of gyration for sections composed of two plates and four angles riveted as shown on page 43:

2 plates $12 \times \frac{1}{4} = 6.00$ sq. ins.	$\div 12 \times 12^2 = 72.00$
4 angles $3\frac{1}{2} \times 2\frac{1}{2} \times \frac{3}{8} = 8.44$	$\times 5.34^2 = 240.71$
Total, 14.44 sq. ins.	$4 \times 1.09 = 4.36$
	$I = 317.07$

$$317.07 \div 14.44 = 21.96 = r^2$$

The moment of inertia of the plates being $\frac{1}{12} bd^3 = \frac{1}{12} Ad^2$ in which b=breadth, d=depth, and A the area of the plates; and the moment of inertia of each angle being ad^2+i, in which a equals the area of the angle, d the distance of its center of gravity from the neutral axis of the section, and i, its moment of inertia about an axis through its own center of gravity parallel to that neutral axis. In the above example, 5.34 inches is the distance from center of gravity of angle to the neutral axis, and 1.09 is the moment of inertia of one angle about an axis through its center of gravity, as given in Carnegie's Pocket Companion.

For trough-shaped sections it is convenient to first determine the position of the neutral axis, which is done as follows; Multiply the area of the top plate, top angles, webs and bottom angles, each by the distance of its center of gravity from the lower edge of web. Divide the sum of these products by the total area of the section, and the result will be the distance of the neutral axis above the lower edge of the web:

Top plate 17 × $\frac{3}{8}$ = 6.38 × 14.19 = 90.53	6.38 × 7.19^2 = 329.82
2 top angles 3 × 3 × $\frac{3}{8}$ = 4.22 × 13.11 = 55.32	4.22 × 6.11^2 = 157.54
2 web plates 14 × $\frac{3}{8}$ = 10.50 × 7.00 = 73.50	10.50 ÷ 12 × 14^2 = 171.50
2 bot. angles 4 × 3 × $\frac{5}{8}$ = 7.96 × 0.87 = 6.92	7.96 × 6.13^2 = 299.11
29.06 × 7.79 = 226.27	957.97
	+ 9.36
7.00	967.33
deduct, 29.06 × 0.79^2	− 17.99
	I = 949.34

$r^2 = 949.34 \div 29.06 = 32.7$

Find the moment of inertia of the section about an axis through the center of the web, as follows: Multiply the area of the top plate, top angles and bottom angles, each by the square of the distance of its center of gravity from the center of web; add to these results the moment of inertia of the webs, which may be taken from the table on page 12, and the moment of inertia of each angle about an axis through its center of gravity. From the result subtract the product of the area of the section by the square of the distance from the neutral axis to the center of the web, and the result will be the required moment of inertia of the section about an axis through the center of gravity perpendicular to the web.

The moment of inertia of the top plate about an axis through its center of gravity should, strictly speaking, be added to the above, but its value in the present instance is so small that the final result is not materially affected.

A somewhat easier method, especially when the operation has to be performed without the aid of a slide rule is the following:

Top plate 17 × $\frac{3}{8}$ = 6.38 × 7.19 = 45.87	× 7.19 = 329.82
2 top angles 3 × 3 × $\frac{3}{8}$ = 4.22 × 6.11 = 25.78	× 6.11 = 157.54
71.65	
2 web plates 14 × $\frac{3}{8}$ = 10.50	171.50
2 bot. angles 4 × 3 × $\frac{5}{8}$ = 7.96 × 6.13 = 48.79	× 6.13 = 299.11
29.06 × 0.79 = 22.86	957.97
	+ 9.36
	967.33
deduct, 29.06 × 0.79^2	− 17.99
	I = 949.34

This plan avoids the use of squares in getting the moment of inertia and saves one multiplication in getting the position of the neutral axis.

The word *eccentricity* is used in the tables to denote the distance of the neutral axis of the section from the center of the web.

In the calculation of these sections for moments of inertia sideways, the distance out to out of webs was assumed equal to the width of top plates, less twice the nominal length of leg of top angle.

The table for two angles, page 14, is based on the assumption that the angles are attached to each other securely enough to act as one member; if the angles are not so connected, then the least value of r^2 for one angle should be used, and the column considered as two separate members.

STRENGTH OF COLUMNS.

By means of the table of values of $\frac{L^2}{r^2}$ the working strength of any column for which r^2 is known, can be readily obtained.

EXAMPLE: Required the working strength of a medium steel column 18 feet long, square at both ends, made up as section 81 on page 61.

The value of r^2 is 37.0 and the area 38.72 square inches.

Referring to the table of $\frac{L^2}{r^2}$, look down the column headed r^2 until we come to 37.0; then in the same horizontal line, under 18, find 9 for the value of $\frac{L^2}{r^2}$; referring now to the tables of working strength of medium steel columns we find opposite 9 the working strength per square inch of 14479 lbs. The total working strength of the column will then be:

$$14479 \times 38.72 = 560626.82 \text{ lbs.}$$

BEARING AND SHEARING VALUE OF RIVETS.

This table is designed to facilitate the calculation of pitch and diameter of rivets uniting flanges and web at the ends of stringers and beams. Assuming the shear as acting in lines of 45 degrees the total stress is transferred from web to flanges in a distance equal to the effective depth of the stringer or beam. If, therefore, we divide the total stress by the effective depth of beam we will obtain the shear per vertical foot of beam or its equivalents, the shear per horizontal running foot of beam. Dividing this *shear per foot run* by the allowed unit stress for bearing or shearing we obtain the required bearing or shearing area of rivets to be provided for each running foot, and an inspection of the table will show at once the necessary pitch, size of rivet and thickness of web required to give this area.

EXAMPLE: Given a stringer or beam with an effective depth of 3 feet and a shear at the end of 45,000 pounds. What pitch and diameter of rivet will be required to transmit the shear to the flanges without exceeding a bearing pressure of 12,000 pounds per square inch or a shearing strain of 8,000 pounds per square inch on the rivets?

45,000 lbs. ÷ 3 = 15,000 lbs. per foot run.
÷ 12,000 = 1.25 bearing area required.
÷ 8,000 = 1.88 shearing area required.

Referring now to the table we find that for a ⅜″ web ⅞″ rivets would require a pitch of 3″, giving a bearing area of 1.31 square inches and 2.41 square inches for single shear, or 4.81 for double shear. With a $\frac{7}{16}$″ web 3½″ pitch would give the same bearing area and would give 2.06 square inches for single shear or 4.12 square inches for double shear.

Using ¾″ rivets, a ⅜″ web would require a pitch of 2½″ giving 1.35 square inches for bearing and 2.12 square inches for single and 4.24 square inches for double shear. A $\frac{7}{16}$" web would permit 3" pitch and give 1.31 square inches for bearing and 1.77 square inches for single or 3.53 square inches for double shear.

RESISTANCE OF GIRDER WEBS AGAINST BUCKLING.

This table will indicate, when the shear per foot run is known, whether stiffeners are necessary or not. If stiffeners are required the table will show the proper clear distance between them. The application of the table will be illustrated by the following;

EXAMPLE: Given a stringer or beam with an effective depth of 3 feet and a shear at the end of 45,000 pounds. Will stiffeners be required, and if so, how far apart should they be placed?

The shear per foot run equals
45,000 lbs. ÷ 3 = 15,000 lbs.

Referring now to the table and assuming that a ⅜" web has been adopted we find that in the column headed "t equals ⅜," that 15,000 falls between 14,360 and 16,500, corresponding to a spacing of stiffeners of 2 feet 6 inches and 2 feet 3 inches. This spacing being less than the clear vertical distance between horizontal angles indicates that stiffeners are necessary, and indicates, also, that the end stiffeners should be spaced apart a distance not exceeding 2 feet 3 inches.

Should this shear be produced by a concentrated load on the girder, then this spacing of stiffeners should be made uniform from the end of the girder to the point of application of the load. If this shear is produced by a uniformly distributed load the total shear, and consequently the shear per foot run, diminishes toward the center of the girder and consequently the stiffeners may be spaced farther apart until the clear distance between them equals the clear vertical distance between the horizontal angles of the girder. When the table shows a distance apart between stiffeners greater than the distance apart of the flange angles, stiffeners will not be required to prevent buckling of the webs. By referring to the column headed "t equals $\frac{7}{16}$" it appears that if a $\frac{7}{16}$ web is used stiffeners would not be required, as their distance apart would just equal the clear vertical distance between flange angles. If a $\frac{5}{16}$ web were used stiffeners would be required 1 foot and 9 inches apart in the clear.

The several formulæ in use have for the numerator constants varying from 8,000 to 15,000. 10,000 has been adopted in the present case, partly because it will in ordinary cases give fair results and partly because in case it is desired to use another formula the present formula may be readily adapted to another constant by a ready percentage comparison.

CENTRIFUGAL FORCE.

This table shows, for various velocities and degrees of curvature, the amount of centrifugal force, expressed in the form of per cent. of weight. It will be found useful in determining the stresses in lateral bracing due to moving loads on bridges located on curves, and its application is as follows:

Obtain in the usual manner the maximum shearing stresses in the various panels of the truss, due to the specified rolling load, and in the same manner as if the truss were on a tangent. Multiply these shearing stresses by the tabular coefficient corresponding to the degrees of curvature and desired velocity and the results will be the shearing stresses due to the centrifugal force.

STRENGTH OF TIMBER BEAMS.

The use of the tables of bending moments and capacities of timber beams will be, perhaps, best illustrated by the following:

EXAMPLE: Required the size of joist to support a load of 100 lbs. per square foot, the length of span being 18 feet, the joists to be spaced 2 feet center to center and the unit stress not to exceed 1000 lbs. per square inch.

Assume the weight of joists and flooring to be 20 lbs. per square foot.

From the table of bending moments we find—

For 20 lbs. per square foot and 18 foot span, 1620 foot lbs.
" 100 " " " " " 18 " " 8100

Total bending moment = 9720

Referring now to the table of capacities for 1000 lbs. fiber strain we find that 3" × 16", 3½" × 15" or 4" × 14" will answer the purpose, the 3" × 16" being the most economical in material.

For other spacing of joists than 24 inches, obtain the load per lineal foot of joist and then select the corresponding bending moments and proceed as above. If, in the above example, the spacing of joists was 18 inches instead of 24, the operation would be as follows:

20 lbs. per square foot × 1½ = 30 lbs. per lineal foot,
And 100 " " " × 1½ = 150 " " "

For 30 lbs. per lineal foot, and 18 ft. span the bending moment - - - - - - - = 1215 ft. lbs.

For 158 lbs per lineal foot, and 18 foot span the bending moment - - - - - - - = 6075 "

Total bending moment = 7290 "

This bending moment on the basis of 1000 lbs. fiber strain, would call for joists 2½" × 15", 3" × 14" or 4" × 12", the deepest one being the stiffest as well as the most economical in material.

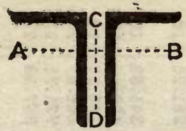
MOMENTS OF INERTIA. RECTANGLES.

Depth in Inches	Width of Rectangle in Inches						
	1/4	5/16	3/8	7/16	1/2	9/16	5/8
3	0.56	0.70	0.84	0.98	1.13	1.27	1.41
4	1.33	1.67	2.00	2.33	2.67	3.00	3.33
5	2.60	3.26	3.91	4·56	5.21	5.86	6.51
6	4.50	5.63	6.75	7.88	9.00	10.13	11.25
7	7.15	8.93	10.72	12.51	14.29	16.08	17 86
8	10.67	13.33	16.00	18.67	21.33	24·00	26.67
9	15.19	18.98	22.78	26.58	30.38	34.17	37.97
10	20.83	26.04	31.25	36.46	41.67	46.87	52.08
12	36.00	45.00	54.00	63.00	72.00	81.00	90.00
13	45.77	57.21	68.66	80.10	91.54	102.98	114.43
14	57.17	71.46	85.75	100.04	114.33	128.63	142.92
15	70.31	87.89	105.47	123.05	140.63	158.20	175.78
16	85.33	106.67	128.00	149.33	170.67	192.00	213.33
17	102.35	127.94	153.53	179.12	204.71	230.30	255.89
18	121.50	151.88	182.25	212.63	243.00	273.38	303.75
20	166.67	208.33	250.00	291.67	333.33	375.00	416.67
21	192.94	241.17	289.41	337.64	385.88	434.11	482.34
22	221.83	277.29	332.75	388.21	443.67	499.13	554.58
23	253.48	316.85	380.22	443.59	506.96	570.33	633.70
24	288.00	360.00	432.00	504.00	576.00	648.00	720.00
25	325.52	406.90	488.28	569.66	651.04	732.42	813.80
26	366.17	457.71	549.25	640.79	732.33	823.88	915.42
27	410.06	512.58	615.09	717.61	820.13	922.64	1025.16
28	457.33	571.67	686.00	800.33	914.67	1029.00	1143.33
29	508.10	635.13	762.16	889.18	1016.21	1143.23	1270.26
30	562.50	703.13	843.75	984.38	1125.00	1265.63	1406.25
32	682.67	853.33	1024.00	1194.67	1365.33	1536.00	1706.67
34	818.83	1023.54	1228.25	1432.96	1637.67	1842.38	2047.08
36	972.00	1215.00	1458.00	1701.00	1944.00	2187.00	2430.00
38	1143.17	1428.96	1714.75	2000.54	2286.33	2572.13	2857.92
40	1333.33	1666.67	2000.00	2333.33	2666.67	3000.00	3333.33
44	1774.67	2218.33	2662.00	3105.67	3549.33	3993.00	4436.67
46	2027.83	2534.79	3041.75	3548.71	4055.67	4562.63	5069.58
48	2304.00	2880.00	3456.00	4032.00	4608.00	5184.00	5760.00
50	2604.17	3255.21	3906.25	4557.29	5208.33	5859.38	6510.42
60	4500.00	5625.00	6750.00	7875.00	9000.00	10125.00	11250.00

MOMENTS OF INERTIA.—RECTANGLES.

(CONTINUED.)

Width of Rectangle in Inches						Depth in Inches
11/16	3/4	13/16	7/8	15/16	1	
1.55	1.69	1.83	1.97	2.11	2.25	3
3.67	4.00	4.33	4.67	5.00	5.33	4
7.16	7.81	8.46	9.11	9.77	10.42	5
12.38	13.50	14.63	15.75	16.88	18.00	6
19.65	21.44	23.22	25.01	26.80	28.58	7
29.33	32.00	34.67	37.33	40.00	42.67	8
41.77	45.56	49.36	53.16	56.95	60.75	9
57.29	62.50	67.71	72.92	78.13	83.33	10
99.00	108.00	117.00	126.00	135.00	144.00	12
125.87	137.31	148.75	160.20	171.64	183.08	13
157.21	171.50	185.79	200.08	214.38	228.67	14
193.36	210.94	228.52	246.09	263.67	281.25	15
234.67	256.00	277.33	298.67	320.00	341.33	16
281.47	307.06	332.65	358.24	383.83	409.42	17
334.13	364.50	394.88	425.25	455.63	486.00	18
458.33	500.00	541.67	583.33	625.00	666.67	20
530.58	578.81	627.05	675.28	723.52	771.75	21
610.04	665.50	720.96	776.42	831.87	887.33	22
697.07	760.44	823.81	887.18	950.55	1013.92	23
792.00	864.00	936.00	1008.00	1080.00	1152.00	24
895.18	976.56	1057.94	1139.32	1220.70	1302.08	25
1006.96	1098.50	1190.04	1281.58	1373.13	1464.67	26
1127.67	1230.19	1332.70	1435.22	1537.73	1640.25	27
1257.67	1372.00	1486.33	1600.67	1715.00	1829.33	28
1397.29	1524.31	1651.34	1778.36	1905.39	2032.42	29
1546.88	1687.50	1828.13	1968.75	2109.38	2250.00	30
1877.33	2048.00	2218.67	2389.33	2560.00	2730.67	32
2251.79	2456.50	2661.21	2865.92	3070.63	3275.33	34
2673.00	2916.00	3159.00	3402.00	3645.00	3888.00	36
3143.71	3429.50	3715.29	4001.08	4286.88	4572.67	38
3666.67	4000.00	4333.33	4666.67	5000.00	5333.33	40
4880.33	5324.00	5767.67	6211.33	6655.00	7098.67	44
5576.54	6083.50	6590.46	7097.42	7604.38	8111.33	46
6336.00	6912.00	7488.00	8064.00	8640.00	9216.00	48
7161.46	7812.50	8463.54	9114.58	9765.63	10416.67	50
12375.00	13500.00	14625.00	15750.00	16875.00	18000.00	60

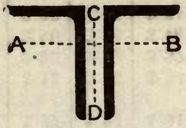
TWO  ANGLES

Number	Two Angles: Size in Inches	Two Angles: Thickness	Two Angles: Lbs. per Foot	Total Area in Square Inches	Axis A. B. r^2	Axis C. D. Values of r^2 for Distances in Inches back to back of— 0	¼	5/16	⅜	7/16	½	¾	1	6	8	10	12
1	2½×2	¼	3.7	2.12	0.61	0.64	0.79	0.83	0.88	0.93	0.97	1.19	1.43	12.9	21.0	31.1	43.1
2		⅜	5.3	3.10	0.59	0.67	0.83	0.87	0.92	0.97	1.02	1.24	1.50	13.2	21.3	31.5	43.6
3	2½×2½	¼	4.1	2.38	0.59	1.11	1.30	1.36	1.41	1.47	1.53	1.79	2.08	14.4	22.9	33.3	45.8
4		⅜	5.9	3.46	0.57	1.15	1.35	1.41	1.47	1.53	1.59	1.86	2.16	14.7	23.2	33.8	46.3
5	3×2½	¼	4.5	2.62	0.89	1.00	1.18	1.23	1.28	1.33	1.39	1.63	1.91	14.0	22.3	32.6	44.9
6		⅜	6.6	3.84	0.86	1.04	1.24	1.29	1.35	1.40	1.46	1.72	2.00	14.3	22.7	33.1	45.6
7		½	8.5	5.00	0.83	1.08	1.29	1.34	1.40	1.46	1.52	1.79	2.08	14.6	23.1	33.6	46.1
8	3×3	¼	4.9	2.88	0.86	1.57	1.79	1.85	1.96	1.98	2.05	2.34	2.66	15.6	24.3	35.0	47.7
9		⅜	7.2	4.22	0.83	1.62	1.86	1.92	1.99	2.06	2.13	2.43	2.76	16.0	24.7	35.5	48.3
10		½	9.4	5.50	0.81	1.67	1.92	1.99	2.06	2.13	2.20	2.51	2.85	16.3	25.1	36.0	48.8
11	3½×2½	¼	4.9	2.88	1.25	0.91	1.08	1.13	1.18	1.23	1.28	1.51	1.77	13.6	21.8	32.0	44.2
12		⅜	7.2	4.22	1.21	0.96	1.14	1.19	1.24	1.29	1.35	1.59	1.87	13.9	22.4	32.6	44.9
13		½	9.4	5.50	1.18	0.99	1.18	1.23	1.29	1.34	1.40	1.66	1.94	14.2	22.6	33.0	45.4

TWO ANGLES—CONTINUED.

Number	Two Angles: Size in Inches	Thickness	Lbs. per Foot	Total Area in Square Inches	Axis A. B. r^2	Axis C. D. Values of r^2 for Distances in Inches back to back of— 0	1/4	5/16	3/8	7/16	1/2	3/4	1	6	8	10	12
14	3 1/2×3	5/16	6.6	3.86	1.21	1.48	1.69	1.75	1.82	1.88	1.94	2.22	2.54	15.3	24.0	34.6	47.2
15		3/8	7.8	4.60	1.18	1.49	1.71	1.77	1.84	1.90	1.97	2.25	2.57	15.5	24.1	34.8	47.5
16		1/2	10.2	6.00	1.15	1.55	1.79	1.85	1.92	1.99	2.06	2.36	2.68	15.8	24.6	35.4	48.1
17		5/8	12.5	7.34	1.12	1.60	1.84	1.91	1.98	2.05	2.12	2.43	2.77	16.1	25.0	35.8	48.6
18	3 1/2×3 1/2	3/8	8.5	4.96	1.16	2.18	2.45	2.52	2.60	2.67	2.75	3.08	3.44	17.2	26.3	37.3	50.3
19		1/2	11.1	6.50	1.12	2.24	2.52	2.60	2.68	2.76	2.84	3.18	3.55	17.6	26.7	37.8	51.0
20		5/8	13.6	7.96	1.09	2.30	2.59	2.67	2.75	2.83	2.91	3.27	3.65	17.9	27.1	38.3	51.5
21	4×3	5/16	7.1	4.18	1.62	1.37	1.57	1.63	1.69	1.75	1.81	2.08	2.38	14.9	23.5	34.0	46.5
22		3/8	8.5	4.96	1.60	1.38	1.59	1.65	1.71	1.77	1.83	2.10	2.41	15.1	23.6	34.2	46.7
23		1/2	11.1	6.50	1.55	1.43	1.65	1.71	1.78	1.84	1.91	2.19	2.51	15.4	24.1	34.7	47.4
24		5/8	13.6	7.96	1.52	1.48	1.71	1.77	1.84	1.91	1.97	2.27	2.60	15.7	24.4	35.2	47.9
25	4×4	5/16	8.2	4.80	1.55	2.80	3.10	3.18	3.26	3.34	3.43	3.79	4.17	18.5	27.8	39.0	52.2
26		3/8	7.8	5.72	1.52	2.82	3.12	3:20	3.28	3.37	3.45	3.82	4.21	18.7	27.9	39.2	52.5
27		1/2	12.8	7.50	1.48	2.87	3.18	3.26	3.35	3.44	3.52	3.90	4.30	19.0	28.3	39.7	53.0
28		5/8	15.7	9.22	1.44	2.95	3.28	3.36	3.45	3.54	3.63	4.02	4.43	19.3	28.8	40.3	53.7

TWO ANGLES

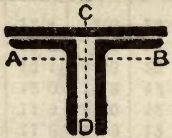


Number	Two Angles: Size in Inches	Thickness	Lbs. per Foot	Total Area in Square Inches	Axis A. B. r^2	Axis C. D. Values of r^2 for Distances in Inches back to back of— 0	¼	5/16	⅜	7/16	½	¾	1	6	8	10	12
29	5×3	5/16	8.2	4.80	2.61	1.19	1.38	1.43	1.48	1.54	1.59	1.84	2.12	14.3	22.6	33.0	45.4
30		⅜	9.8	5.72	2.58	1.20	1.39	1.44	1.50	1.55	1.61	1.87	2.15	14.4	22.8	33.2	45.6
31		½	12.8	7.50	2.52	1.25	1.46	1.51	1.57	1.63	1.69	1.96	2.25	14.8	23.3	33.8	46.3
32		⅝	15.7	9.22	2.47	1.30	1.52	1.57	1.64	1.70	1.76	2.04	2.35	15.1	23.7	34.3	46.9
33	5×3½	⅜	10.4	6.10	2.55	1.78	2.01	2.07	2.14	2.20	2.27	2.57	2.89	15.9	24.7	35.4	48.1
34		½	13.6	8.00	2.50	1.84	2.08	2.15	2.22	2.28	2.36	2.66	3.00	16.3	25.1	35.9	48.8
35		⅝	16.8	9.84	2.45	1.88	2.14	2.20	2.28	2.35	2.42	2.74	3.08	16.6	25.5	36.4	49.3
36	6×3½	⅜	11.7	6.84	3.76	1.60	1.82	1.87	1.94	2.00	2.06	2.34	2.64	15.3	23.9	34.5	47.1
37		½	15.3	9.00	3.69	1.63	1.85	1.91	1.98	2.04	2.11	2.39	2.71	15.6	24.3	34.9	47.6
38		⅝	18.9	11.10	3.62	1.69	1.93	1.99	2.06	2.13	2.20	2.50	2.82	16.0	24.7	35.5	48.3
39	6×4	⅜	12.3	7.22	3.73	2.24	2.49	2.56	2.63	2.70	2.78	3.09	3.43	16.9	25.8	36.6	49.5
40		½	16.2	9.50	3.66	2.30	2.56	2.63	2.71	2.78	2.86	3.18	3.54	17.2	26.2	37.2	50.2
41		⅝	20.0	11.72	3.60	2.34	2.61	2.69	2.76	2.84	2.92	3.25	3.62	17.5	26.6	37.6	50.7

TWO ANGLES—CONTINUED.

Number	Two Angles			Total Area in Square Inches	Axis A. B. r^2	Axis C. D. Values of r^2 for Distances in Inches back to back of—											
	Size in Inches	Thickness	Lbs. per Foot			0	¼	$\frac{5}{16}$	⅜	$\frac{7}{16}$	½	¾	1	6	8	10	12
42	6×6	$\frac{7}{16}$	17.2	10.12	3.49	6.25	6.68	6.78	6.91	7.02	7.14	7.63	8.16	25.2	35.5	47.9	62.2
43		½	19.6	11.50	3.46	6.28	6.72	6.83	6.95	7.07	7.18	7.68	8.21	25.4	35.7	48.1	62.4
44		⅝	24.2	14.22	3.40	6.39	6.84	6.96	7.08	7.20	7.32	7.83	8.37	25.8	36.2	48.7	63.2
45		¾	28.7	16.88	3.34	6.51	6.97	7.09	7.21	7.34	7.46	7.98	8.54	26.2	36.8	49.3	63.9
46		⅞	33.1	19.48	3.28	6.59	7.06	7.19	7.31	7.44	7.56	8.10	8.66	26.5	37.2	49.8	64.4
47	8×6	½	23.0	13.52	6.57	5.37	5.75	5.85	5.96	6.06	6.17	6.61	7.09	23.2	33.1	45.1	59.0
48		⅝	28.7	16.88	6.48	5.51	5.91	6.01	6.12	6.23	6.34	6.80	7.29	23.7	33.8	45.8	59.9
49		¾	33.8	19.88	6.43	5.68	6.09	6.19	6.31	6.42	6.54	7.01	7.52	24.2	34.4	46.6	60.8
50		⅞	39.5	23.24	6.39	5.84	6.27	6.38	6.50	6.61	6.73	7.22	7.74	24.7	35.0	47.3	61.6
51		1	45.6	26.82	6.36	6.07	6.51	6.63	6.75	6.87	6.99	7.50	8.04	25.4	35.8	48.3	62.7
52	8×8	½	26.4	15.50	6.27	11.1	11.6	11.8	11.9	12 1	12.2	12.9	13.5	33.2	44.6	58.0	73.4
53		⅝	32.7	19.22	6.18	11.2	11.7	11.9	12.0	12.2	12.3	13.0	13.6	33.5	45.0	58.5	73.9
54		¾	38.9	22.88	6.10	11.3	11.9	12.0	12.2	12.4	12.5	13.2	13.8	34.0	45.5	59.1	74.7
55		⅞	45.0	26.46	6.02	11.4	12.0	12.1	12.3	12.5	12.6	13.3	14.0	34.3	46.0	59.6	75.2
56		1	51.0	30.00	5.93	11.6	12.2	12.3	12.5	12.6	12.8	13.5	14.2	34.8	46.5	60.3	76.0
57		1⅛	56.9	33.46	5.86	11.7	12.3	12.4	12.6	12.8	12.9	13.6	14.3	35.1	46.9	60.8	76.6

TWO ANGLES. ONE TOP PLATE.

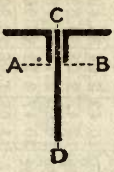


No.	Size of Angles	Size of Plate	Thickness	Total Area Square Inches	r^2 Axis A. B.	Axis C D Value of r^2 — For Distance Back to Back of Angles in Inches of O	¼	⅜	½	¾	1	6 In. Back to Back of Ls — Size of Plate	Total Area	Axis A. B. r^2	Axis C. D. r^2	12 In. Back to Back of Ls — Size of Plate	Total Area	Axis A. B. r^2	Axis C. D. r^2
1	3 ×2½	6″	¼	4.12	0.82	1.73	1.84	1.91	1.98	2.13	2.31	11×¼	5.37	0.71	11.98	17×¼	6.87	0.60	32.03
2			⅜	6.09	0.86	1.76	1.89	1.96	2.03	2.19	2.37	⅜	7.97	0.78	12.10	⅜	10.22	0.64	32.14
3			½	8.00	0 89	1.80	1.93	2.00	2.08	2.24	2.43	½	10.50	0.80	12.23	½	13.50	0.68	32.23
4	3½×2½	6″	¼	4.38	1.17	1.63	1.74	1.80	1.87	2.02	2.19	11×¼	5.63	1.03	11.87	17×¼	7.13	0.88	32.22
5			⅜	6.47	1.21	1.67	1.78	1.85	1.92	2.08	2.25	⅜	8.35	1.08	12.02	⅜	10.60	0.93	32.37
6			½	8.50	1·25	1.70	1.82	1.89	1.96	2,13	2.31	½	11.00	1.12	12.14	½	14.00	0.98	32.45
7	3½×3½	8″	5/16	6.68	1.05	3.35	3.51	3.60	3.69	3.90	4.12	13×5/16	8.24	0.93	15.61	19×5/16	10.12	0.81	38.32
8			⅜	7.96	1.06	3.37	3.53	3.63	3.72	3.93	4.15	⅜	9.84	0.95	15.67	⅜	12.09	0.83	38.36
9			½	10.50	1.11	3.42	3.59	3.69	3.79	4.00	4.23	½	13.00	1.00	15.84	½	16.00	0.87	38.56
10			⅝	12.96	1.15	3.47	3.65	3.75	3.85	4.06	4.30	⅝	16.09	1.05	15.97	⅝	19.84	0.93	38.67
11	4 ×3	7″	5/16	6.37	1.52	2.30	2.43	2.51	2.59	2.76	2.96	12×5/16	7.93	1.33	13.54	18×5/16	9.81	1.19	35.29
12			⅜	7.59	1.54	2.31	2.45	2.53	2.61	2.79	2.99	⅜	9.46	1.38	13.61	⅜	11.71	1.21	35.36
13			½	10.00	1.59	2.36	2.51	2.59	2.67	2.86	3.06	½	12.50	1.45	13.78	½	15.50	1.27	35.56
14			⅝	12.34	1.64	2.40	2.55	2.63	2.72	2.91	3.12	⅝	15.46	1.50	13.91	⅝	19.21	1.33	35.67

TWO ANGLES. ONE TOP PLATE.

(CONTINUED.)

No.	Size of Angles	Size of Plate	Thickness	Total Area Square Inches	r^2 Axis A. B.	Axis C D Value of r^2 — For Distance Back to Back of Angles in Inches of 0	¼	⅜	½	¾	1	6 in. Back to Back of Ls — Size of Plate	Total Area	Axis A. B. r^2	Axis C. D. r^2	12 in. Back to Back of Ls — Size of Plate	Total Area	Axis A. B. r^2	Axis C. D. r^2
15	4×4	9″	5/16	7.61	1.36	4.26	4.45	4.55	4.65	4.88	5.13	14×5/16	9.18	1.22	17.47	20×5/16	11.05	1.08	41.54
16			⅜	9.10	1.38	4.28	4.48	4.57	4.68	4.91	5.15	⅜	10.97	1.24	17.55	⅜	13.22	1.10	41.65
17			½	12.00	1.41	4.33	4.52	4.63	4.74	4.97	5.22	½	14.50	1.29	17.69	½	17.50	1.15	41.77
18			⅝	14.85	1.47	4.39	4.60	4.71	4.81	5.06	5.31	⅝	17.97	1.35	17.88	⅝	21.72	1.21	41.99
19	5×3	7″	5/16	6.99	2.52	2.10	2.22	2.29	2.37	2.54	2.73	12×5/16	8.55	2.30	13.27	18×5/16	10.43	2.04	35.43
20			⅜	8.35	2.54	2.11	2.24	2.31	2.39	2.56	2.76	⅜	10.22	2.33	13.35	⅜	12.47	2.08	35.53
21			½	11.00	2.60	2.15	2.29	2.37	2.45	2.63	2.83	½	13.50	2.39	13.55	½	16.50	2.15	35.75
22			⅝	13.60	2.65	2.19	2.34	2.43	2.51	2.70	2.91	⅝	16.72	2.48	13.71	⅝	20.47	2.23	35.96
23	5×3½	8″	5/16	7.62	2.41	2.94	3.10	3.18	3.26	3.46	3.67	13×5/16	9.18	2.20	15.05	19×5/16	11.06	1.96	38.30
24			⅜	9.10	2.43	2.95	3.11	3.19	3.28	3.48	3.70	⅜	10.98	2.22	15.09	⅜	13.23	1.99	38.38
25			½	12.00	2.49	3.00	3.17	3.26	3.35	3.55	3.78	½	14.50	2.29	15.31	½	17.50	2.06	38.62
26			⅝	14.84	2.54	3.18	3.21	3.31	3.40	3.61	3.84	⅝	17.97	2.36	15.45	⅝	21.72	2.13	38.78
27	6×3½	8″	⅜	9.84	3.67	2.74	2.89	2.97	3.06	3.25	3.46	13×⅜	11.72	3.41	14.81	19×⅜	13.97	3.09	38.39
28			½	13.00	3.71	2.77	2.93	3.01	3.10	3.30	3.52	½	15.50	3.47	14.97	½	18.50	3.16	38.60
29			⅝	16.10	3.78	2.82	2.98	3.07	3.17	3.37	3.60	⅝	19.23	3.56	15.17	⅝	22.98	3.25	38.85
30			¾	19.12	3.99	2.87	3.05	3.14	3.24	3.46	3.69	¾	22.87	3.77	15.37	¾	27.37	3.45	39.11
31	6×4	9″	⅜	10.60	3.54	3.68	3.85	3.94	4.04	4.25	4.49	14×⅜	12.47	3.27	16.65	20×⅜	14.72	2.97	41.27
32			½	14.00	3.59	3.73	3.91	4.01	4.11	4.33	4.57	½	16.50	3.34	16.85	½	19.50	3.05	41.54
33			⅝	17.35	3.64	3.77	3.96	4.06	4.16	4.39	4.64	⅝	20.47	3.41	17.02	⅝	24.22	3.12	41.71
34			¾	20.63	3.72	3.84	4.03	4.13	4.24	4.48	4.73	¾	24.38	3.51	17.23	¾	28.88	3.23	42.01

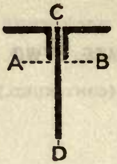
ONE PLATE  **TWO ANGLES.**

No.	One Plate, Size in Inches	TWO ANGLES		Total Area, Square Inches	AXIS A B		Eccentricity	Axis C D r^2
		Size in Inches	Thickness		I	r^2		
1	6×¼	2½×2	¼	3.62	10.6	2.93	1.44	0.86
2			5/16	4.12	11.1	2.69	1.55	0.95
3		3 ×2½	¼	4.12	11.2	2.72	1.49	1.26
4		3½×2½	5/16	5.06	12.3	2.43	1.66	2.00
5	6×⅜	2½×2	¼	4.37	14.1	3.23	1.19	0.78
6			5/16	4.87	14.9	3.06	1.31	0.86
7		3 ×2½	¼	4.87	14.9	3.06	1.26	1.13
8		3½×2½	5/16	5.81	16.2	2.79	1.45	1.84
9	7×¼	2½×2	¼	3.87	16.3	4.21	1.62	0.80
10			5/16	4.37	17.2	3.94	1.76	0.89
11		3 ×2½	¼	4.37	17.1	3.91	1.70	1.19
12		3½×2½	5/16	5.31	18.6	3.50	1.92	1.90
13	7×⅜	2½×2	¼	4.75	21.8	4.59	1.32	0.72
14			5/16	5.25	22.9	4.36	1.47	0.80
15		3 ×2½	¼	5.25	22.8	4.34	1.42	1.05
16		3½×2½	5/16	6.19	25.1	4.05	1.64	1.73
17	8×¼	2½×2	5/16	4.62	25.0	5.41	1.95	0.84
18		3 ×2½	¼	4.62	24.9	5.39	1.89	1.13
19		3½×2½	5/16	5.56	27.0	4.86	2.15	1.82
20		4 ×3	⅜	6.96	29.4	4.22	2.29	2.56
21	8×⅜	2½×2	5/16	5.62	33.5	5.96	1.60	0.75
22		3 ×2½	¼	5.62	33.0	5.87	1.56	0.98
23		3½×2½	5/16	6.56	36.3	5.53	1.82	1.63
24		4 ×3	⅜	7.96	39.1	4.91	2.01	2.35
25	9×¼	3 ×2½	¼	4.87	34.4	7.06	2.07	1.07
26		3½×2½	5/16	5.81	37.7	6.49	2.36	1.74
27		4 ×3	⅜	7.21	40.4	5.60	2.56	2.47
28			7/16	7.99	41.6	5.21	2.66	2.60

ONE PLATE. TWO ANGLES.

(CONTINUED.)

No.	One Plate, Size in Inches	Two Angles: Size in Inches	Two Angles: Thickness	Total Area, Square Inches	Axis A B: I	Axis A B: r^2	Eccentricity	Axis C D r^2
29	9×3/8	3 ×2½	1/4	6.00	46.0	7.67	1.68	0.92
30		3½×2½	5/16	6.94	50.5	7.28	1.98	1.54
31		4 ×3	3/8	8.34	54.5	6.53	2.21	2.24
32			7/16	9.12	56.2	6.16	2.33	2.39
33	10×1/4	3 ×2½	1/4	5.12	46.4	9.06	2.22	1.02
34		3½×2½	5/16	6.06	50.7	8.37	2.56	1.67
35		4 ×3	3/8	7.46	54.1	7.25	2.81	2.38
36			7/16	8.24	57.6	6.99	2.93	2.52
37	10×3/8	3 ×2½	1/4	6.37	61.7	9.69	1.79	0.88
38		3½×2½	5/16	7.31	68.0	9.30	2.12	1.46
39		4 ×3	3/8	8.71	73.3	8.42	2.40	2.15
40			7/16	9.49	75.7	7.98	2.54	2.30
41	12×1/4	3½×2½	5/16	6 56	84.6	12.90	2.91	1.54
42		4 ×3	3/8	7.96	90.9	11.42	3.25	2.24
43		5 ×3	3/8	8.72	95.2	10.92	3.48	3.89
44		5 ×3½	3/8	9.10	95.2	10.46	3.45	3.75
45	12×3/8	3½×2½	5/16	8.06	112.9	14.01	2.37	1.33
46		4 ×3	3/8	9.46	122.0	12.90	2.74	1.98
47		5 ×3	3/8	10.22	128.6	12.58	2.97	3.44
48		5 ×3½	3/8	10.60	128.7	12.14	2.96	3.34
49	14×5/16	3½×2½	5/16	7.94	152.9	19.26	2.85	1.31
50		4 ×3	3/8	9.34	165.5	17.72	3.30	1.95
51		5 ×3	3/8	10.10	173.9	17.22	3.57	3.43
52		5 ×3½	3/8	10.48	173.9	16.59	3.57	3.31
53	14×3/8	3½×2½	5/16	8.81	173.4	19.68	2.57	1.21
54		4 ×3	3/8	10.21	188.4	18.45	3.02	1.83
55		5 ×3	3/8	10.97	198.5	18.10	3.28	3.21
56		5 ×3½	3/8	11.35	198.5	17.49	3.30	3.12

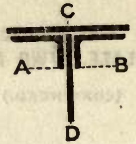
ONE PLATE.  TWO ANGLES.

No.	One Plate, Size in Inches	TWO ANGLES		Total Area, Square Inches	AXIS A B		Eccentricity	Axis C D r^2
		Size in Inches	Thickness		I	r^2		
57	15×5/16	3×3	5/16	8.25	179.9	21.81	2.86	0.82
58		4×3	3/8	9.65	200.9	20.82	3.45	1.89
59		5×3	3/8	10.41	210.8	20.25	3.74	3.32
60		5×3½	3/8	10.79	211.4	19.59	3.75	3.22
61	15×3/8	3×3	5/16	9.19	204.3	22.23	2.57	0.77
62		4×3	3/8	10.59	228.2	21.55	3.15	1.77
63		5×3	3/8	11.35	240.5	21.19	3.43	3.10
64		5×3½	3/8	11.73	241.1	20.55	3.45	3.02
65	16×5/16	4×3	3/8	9.96	240.0	24.10	3.60	1.83
66		5×3	3/8	10.72	253.4	23.64	3.89	3.23
67		5×3½	7/16	12.06	262.1	21.74	4.17	3.36
68		6×4	7/16	13.36	272.4	20.39	4.41	5.13
69	16×3/8	4×3	3/8	10.96	273.2	24.93	3.27	1.71
70		5×3	3/8	11.72	288.4	24.61	3.56	3.00
71		5×3½	7/16	13.06	299.6	22.94	3.85	3.16
72		6×4	7/16	14.36	312.1	21.74	4.10	4.85
73	16×½	4×3	3/8	12.96	334.4	25.80	2.76	1.52
74		5×3	3/8	13.72	352.8	25.72	3.04	2.67
75		5×3½	½	16.00	379.3	23.71	3.55	3.08
76		6×4	½	17.50	396.0	22.63	3.81	4.72
77	16×5/8	4×3	½	16.50	421.2	25.53	2.82	1.69
78		5×3	½	17.50	443.4	25.34	3.11	2.86
79		5×3½	5/8	19.84	469.0	23.64	3.50	3.24
80		6×4	5/8	21.72	490.7	22.59	3.76	4.91
81	18×5/16	4×3	3/8	10.59	333.9	31.53	3.85	1.73
82		5×3	3/8	11.35	351.7	30.99	4.18	3.05
83		5×3½	7/16	12.69	365.3	28.79	4.52	3.19
84		6×4	7/16	13.99	381.2	27.25	4.80	4.90

ONE PLATE. TWO ANGLES.

(CONTINUED.)

No.	One Plate, Size in Inches	TWO ANGLES Size in Inches	TWO ANGLES Thickness	Total Area, Square Inches	AXIS A B I	AXIS A B r^2	Eccentricity	Axis C D r^2
85	18×3/8	4 ×3	3/8	11.77	379.4	32.40	3.48	1.60
86		5 ×3	3/8	12.47	399.4	32.03	3.81	2.83
87		5 ×3½	7/16	13.81	417.2	30,21	4.15	2.99
88		6 ×4	7/16	15.11	434.7	28.77	4.45	3.48
89	18×½	4 ×3	½	15.50	499.2	32.21	3.43	1.71
90		5 ×3	½	16.50	526.7	31.92	3.75	2.98
91		5 ×3½	½	17.00	527.9	31.05	3.81	2.91
92		6 ×4	½	18.50	552.5	29.87	4.11	4.47
93	18×5/8	4 ×3	5/8	19.21	617.5	32.15	3.37	1.82
94		5 ×3	5/8	20.47	651.2	31.81	3.69	3.14
95		5 ×3½	5/8	21.09	652.8	30.95	3.76	3.04
96		6 ×4	5/8	22.97	682.7	29.72	4.07	4.65
97	20×3/8	3½×3½	3/8	12.46	496.9	39.88	3.58	1.04
98		5 ×3½	3/8	13·60	537.4	39.51	4.10	2.60
99		6 ×4	.3/8	14.72	562.2	38.19	4.44	4.06
100	20×½	3½×3½	½	16.50	655.6	39.73	3.52	1.13
101		5 ×3½	½	18.00	708.6	39.37	4.04	2.74
102		6 ×4	½	19.50	741.4	38.02	4.39	4.24
103		8 ×6	½	23.52	795.9	33.84	4.90	8.04
104	20×5/8	3½×3½	5/8	20.46	810.8	39.63	3.46	1.22
105		5 ×3½	5/8	22.34	876.5	39.23	3.99	2.87
106		6 ×4	5/8	24.22	918.4	37.92	4.34	4.41
107		8 ×6	5/8	29.38	984.4	33.51	4.87	8.37
108	20×¾	3½×3½	¾	24.38	961.1	39.42	3.41	1.34
109		5 ×3½	¾	26.62	1041.0	39.11	3.93	3.05
110		6 ×4	¾	28.88	1090.0	37.75	4.29	4.63
111		8 ×6	¾	34.88	1168.0	33.49	4.79	8.71

TWO PLATES  **TWO ANGLES**

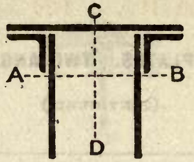
No.	Web Plate Size in Inches	Top Plate Size in Inches	TWO ANGLES Size in Inches	Total Area Square Inches	AXIS A B I	AXIS A B r^2	Eccentricity	Axis C D r^2
1	6×¼	7×¼	3×2½×¼	5.87	14.8	2.52	1.98	2.19
2		⅜	⅜	7.97	16.5	2.06	2.16	2.34
3		½	½	10.00	18.3	1.83	2.26	2.48
4	6×⅜	8×⅜	3×2½×¼	7.87	22.1	2.81	2.00	2.80
5		½	⅜	10.09	24.2	2.44	2.16	2.95
6		⅝	½	12.25	26.5	2.17	2.27	3.10
7	7×¼	7×¼	3×3 ×5/16	7.06	22.9	3.24	2.23	1.95
8		⅜	⅜	8.60	25.3	2.94	2.41	2.17
9		½	½	10.75	27.8	2.59	2.54	2.32
10	7×⅜	8×⅜	3×3 ×5/16	9.19	33.9	3.69	2.22	2.51
11		½	⅜	10.85	36.8	3.39	2.40	2.75
12		⅝	½	13.13	40.2	3.06	2.53	2.90
13	8×¼	8×¼	3×3 ×5/16	7.56	32.8	4.34	2.57	2.28
14		⅜	⅜	9.22	35.0	3.90	2.79	2.59
15		½	½	11.50	39.3	3.42	2.95	2.78
16	8×⅜	9×⅜	3×3 ×5/16	9.94	48.7	4.90	2.55	3.00
17		½	⅜	11.72	53.1	4.53	2.75	3.32
18		⅝	½	14.13	57.3	4.06	2.91	3.49
19	9×5/16	9×⅜	4×3 ×⅜	11.15	60 0	5.38	3.08	3.68
20		½	½	13.81	65.3	4.73	3.27	3.98
21		⅝	⅝	16.40	69.3	4.23	3.41	4.19
22	9×⅜	10×⅜	4×3 ×⅜	12 09	70.5	5.83	2.98	4.13
23		½	½	14.88	75.7	5.09	3.20	4.49
24		⅝	⅝	17.59	80.8	4.59	3.35	4.75
25	10×5/16	10×⅜	4×3 ×⅜	11.84	81.6	6.89	3.41	4.18
26		½	½	14.63	86.9	5.94	3.65	4.53
27		⅝	⅝	17.34	92.1	5.31	3.81	4.78
28	10×⅜	12×⅜	4×3 ×⅜	13.21	96.4	7.30	3.35	5.50
29		½	½	16.25	102.8	6.33	3.61	5.98
30		⅝	⅝	19.21	109.9	5.72	3.78	6.32
31	10×½	12×½	4×3 ×⅜	15.96	127.6	8.00	3.28	5.74
32		⅝	½	19.00	135.8	7.15	3.52	6.13
33		¾	⅝	21.96	143.4	6.53	3.70	6.42

TWO PLATES. TWO ANGLES.

(CONTINUED.)

No.	Web Plate Size in Inches	Top Plate Size in Inches	TWO ANGLES Size in Inches	Total Area Square Inches	AXIS A B I	AXIS A B r^2	Eccentricity	Axis C D r^2
34	12×5/16	12× 3/8	5×3 ×3/8	13.97	139.2	9.97	4.17	6.31
35		1/2	1/2	17.25	148.3	8.59	4.46	6.86
36	3/8	5/8	5/8	20.47	156.8	7.66	4.65	7.24
37	12×3/8	14× 3/8	5×3½×3/8	15.85	165.3	10.43	4.03	7.64
38		1/2	1/2	19.50	177.3	9.09	4.33	8.29
39		5/8	5/8	23.09	187.4	8.12	4.54	8.76
40		3/4	3/4	26.62	195.5	7.34	4.70	9.13
41	12×½	14×1	5×3½×3/8	26.10	257.9	9.88	4.69	10.17
42		1½	1/2	35.00	298.3	8.52	5.21	11.21
43		2	5/8	43.84	339.1	7.74	5.60	11.84
44	14×3/8	14× 3/8	6×3½×3/8	17.34	255.9	14.76	4.63	8.39
45		1/2	1/2	21.25	273.7	12.88	5.00	9.13
46		5/8	5/8	25.10	287.7	11.46	5.25	9.68
47		3/4	3/4	28.87	299 0	10.36	5.44	10.11
48	14×½	14×1	6×3½×3/8	27.84	391.5	14.06	5.30	10.43
49		1½	1/2	37.00	442.7	11.96	5.90	11.49
50		2	5/8	46.10	494.5	10.73	6.33	12.16
51	16×3/8	14× 3/8	6×4 ×3/8	18.47	371.3	20.11	5.09	7.88
52		1/2	1/2	22.50	395.9	17.60	5.53	8.64
53		5/8	5/8	26.47	417.1	15.76	5.83	9.18
54		3/4	3/4	30.38	428.8	14.12	6.07	9.62
55	16×½	1	6×4 ×3/8	29.22	563.2	19.28	5.82	9.94
56		1½	1/2	38.50	634.1	16.50	6.50	11.05
57		2	5/8	47.72	700.9	14.69	6.99	11.75
58	18×3/8	14× 3/8	6×4 ×3/8	19.22	514.7	26.78	5.54	7.57
59		1/2	1/2	23.25	550.9	23.70	6.06	8.36
60		5/8	5/8	27.22	575.3	21.15	6.43	8.92
61		3/4	3/4	31.13	601.4	19.30	6.69	9.38
62	18×½	14×1	6×4 ×3/8	30.22	775.7	25.67	6.33	9.61
63		1½	1/2	39.50	868.6	21.99	7.11	10.77
64		2	5/8	48.72	952.9	19.56	7.66	11.51
65	18×5/8	14×1	6×4 ×3/8	32.47	920.8	28.36	5.89	9.01
66		1½	1/2	41.75	985.2	23.60	6.73	10.26
67		2	5/8	50.97	1134.1	22.25	7.33	11.07

THREE PLATES. TWO ANGLES.

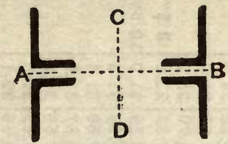


No.	Two Web Plates, Size in Inches	Top Plate, Size in Inches	TWO ANGLES Size in Inches	TWO ANGLES Thickness	Total Area, Square Inches	AXIS A. B. I	AXIS A. B. r^2	Eccentricity	Axis C. D. r^2	Distance Betw'n Webs
1	9×¼	12×¼	2½×2½	5/16	10.44	78.3	7.50	2.39	12.3	6.0″
2		12×5/16			11.19	82.3	7.36	2.55	12.3	
3	9×5/16				12.32	96.5	7.84	2.31	12.3	
4		12×⅜		⅜	13.59	102.0	7.51	2.51	12.5	
5	9×⅜				14.71	116.1	7.89	2.31	12.5	
6		12×7/16		7/16	16.00	121.8	7.61	2.48	12.7	
7	9×7/16				17.13	135.9	7.94	2.32	12.7	
8		12×½		½	18.38	141.7	7.71	2.45	12.9	
9	9×½				19.50	155.7	7.98	2.31	13.0	
10	10×¼	12×¼	2½×2½	5/16	10.94	104.4	9.54	2.55	12.2	
11		12×5/16			11.69	109.6	9.38	2.73	12.2	
12	10×5/16				12.94	128.4	9.92	2.46	12.2	
13		12×⅜		⅜	14.21	135.7	9.55	2.68	12.4	
14	10×⅜				15.46	154.3	9.98	2.46	12.4	
15		12×7/16		7/16	16.75	162.0	9.68	2.64	12.6	
16	10×7/16				18.00	180.5	10.0	2.46	12.6	
17		12×½		½	19.25	188.2	9.78	2.62	12.8	
18	10×½				20.50	206.6	10.1	2.46	12.9	
19	10×¼	14×¼	3 ×3	5/16	12.06	109.0	9.04	2.71	16.7	7.0″
20		14×5/16			12.94	114.4	8.84	2.88	16.7	
21	10×5/16				14.19	134.3	9.47	2.63	16.6	
22		14×⅜		⅜	15.72	141.8	9.02	2.84	16.9	
23	10×⅜				16.97	161.6	9.52	2.63	16.9	
24		14×7/16		7/16	18.49	169.3	9.16	2.81	17.2	
25	10×7/16				19.74	189.0	9.57	2.63	17.2	
26		14×½		½	21.25	197.0	9.27	2.78	17.4	
27	10×½				22.50	216.5	9.62	2.63	17.5	
28		14×⅝		⅝	25.47	232.3	9.12	2.89	17.9	
29	12×¼	15×¼	3 ×3	5/16	13.31	181.7	13.7	3.10	20.3	8.0″
30		15×5/16			14.25	190.7	13.4	3.31	20.1	
31	12×5/16				15.75	223.4	14.2	2.99	20.1	
32		15×⅜		⅜	17.35	236.0	13.6	3.25	20.3	

THREE PLATES. TWO ANGLES.

(CONTINUED.)

No.	Two Web Plates, Size in Inches	Top Plate, Size in Inches	TWO ANGLES		Total Area, Square Inches	AXIS A. B.		Eccentricity	Axis C. D. r^2	Distance Betw'n Webs
			Size in Inches	Thickness		I	r^2			
33	12×3/8	15×3/8	3 ×3	3/8	18.85	268.6	14.3	2.99	20.4	8.0″
34		15×7/16		7/16	20.42	281.4	13.8	3.21	20.6	
35	12×7/16			7/16	21.92	313.8	14.3	2.99	20.7	
36		15×1/2		1/2	23.50	327.1	13.9	3.18	20.9	
37	12×1/2				25.00	359.4	14.4	2.99	21.0	
38		15×5/8		5/8	28.10	385.2	13.7	3.31	21.4	
39	14×5/16	16×5/16	3 ×3	5/16	17.31	344.1	19.9	3.33	23.9	9.0″
40		16×3/8		3/8	18.97	363.7	19.2	3.63	24.2	
41	14×3/8				20.72	413.4	20.0	3.33	24.3	
42		16×7/16		7/16	22.36	433.5	19.4	3.58	24.5	
43	14×7/16				24.11	482.9	20.0	3.32	24.6	
44		16×1/2		1/2	25.75	503.5	19.6	3.55	24.8	
45	14×1/2				27.50	552.7	20.1	3.32	24.9	
46		16×5/8		5/8	30.72	592.6	19.3	3.70	25.2	
47	14×5/8				34.22	692.7	20.2	3.32	23.8	8.5″
48	15×5/16	18×5/16	3 ×3	5/16	18.57	425.6	22.9	3.59	31.0	10.5″
49		18×3/8		3/8	20.35	449.9	22.1	3.92	31.2	
50	15×3/8				22.22	511.4	23.0	3.59	31.4	
51		18×7/16		7/16	23.99	536.2	22.4	3.87	31.6	
52	15×7/16				25.87	597.3	23.1	3.59	31.7	
53		18×1/2		1/2	27.63	622.8	22.5	3.83	31.9	
54	15×1/2				29.50	683.8	23.2	3.59	32.1	
55		18×5/8		5/8	32.97	733.1	22.2	4.00	32.4	
56	15×5/8				36.72	857.2	23.3	3 59	32.8	
57	16×5/16	20×5/16	3½×3½	5/16	20.43	524.0	25.6	3.93	37.7	11.5″
58		20×3/8		3/8	22.46	553.3	24.6	4.28	38.0	
59	16×3/8				24.46	629.6	25.7	3.93	38.1	
60		20×7/16		7/16	26.49	659.4	24.9	4.22	38.4	
61	16×7/16				28.49	735.2	25.8	3.93	38.5	
62		20×1/2		1/2	30.50	765.9	25.1	4.18	38.7	
63	16×1/2				32.50	841.5	25.9	3.92	38.9	
64		20×5/8		5/8	36.46	901.2	24.7	4.36	39.3	
65	16×5/8				40.46	1055.	26.1	3.93	39.7	
66	18×3/8	24×3/8	4 ×4	3/8	28.22	909.1	32.1	4.52	55.0	14.0″
67		24×7/16		7/16	30.62	951.7	31.1	4.86	55.3	
68	18×7/16				32.87	1062.	32.3	4.52	55.5	
69		24×1/2		1/2	35.25	1106.	31.4	4.81	55.8	
70	18×1/2				37.50	1215.	32.4	4.53	56.0	
71		24×5/8		5/8	42.22	1300.	30.8	5.01	56.4	
72	18×5/8				46.72	1523.	32.6	4.53	56.9	
73		24×3/4		3/4	51.38	1611.	31.4	4.92	57.3	

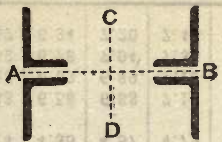
FOUR  ANGLES

Number	Four Angles: Size in Inches	Lbs. per Foot	Total Area in Square Inches	Axis A. B. — Values of r^2 for Distances in Inches back to back of— 0	3/8	1/2	5/8	3/4	7/8	1	Axis C. D. — Values of r^2 for Distances in Inches back to back of— 7	8	9	10	12	14
1	2 ×2 ×1/4	3.2	3.76	0.72	0.98	1.08	1.19	1.30	1.43	1.56	8.84	12.0	15.7	19.8	29.6	41.5
2	5/16	4.0	4.60	0.74	1.01	1.11	1.22	1.34	1.47	1.60	8.72	11.9	15.5	19.6	29.4	41.2
3	7/16	5.3	6.24	0.79	1.07	1.18	1.30	1.42	1.56	1.70	8.42	11.5	15.1	19.2	28.9	40.6
4	2 1/2×2 ×1/4	3.7	4.24	1.23	1.57	1.69	1.83	1.97	2.12	2.27	9.11	12.3	16.0	20.2	30.2	42.1
5	3/8	5.3	6.20	1.28	1.63	1.76	1.90	2.04	2.20	2.36	8.86	12.0	15.7	19.9	29.7	41.6
6	1/2	6.8	8.00	1.34	1.71	1.85	1.99	2.15	2.31	2.47	8.56	11.7	15.3	19.4	29.2	40.9
7	2 1/2×2 1/2×1/4	4.1	4.76	1.11	1.41	1.53	1.66	1.79	1.93	2.08	8.32	11.4	14.9	18.9	28.5	40.0
8	3/8	5.9	6.92	1.15	1.47	1.59	1.72	1.86	2.01	2.16	8.08	11.1	14.6	18.6	28.0	39.5
9	1/2	7.7	9.00	1.21	1.55	1.67	1.81	1.95	2.11	2.27	7.79	10.7	14.2	18.1	27.5	38.9
10	3 ×2 1/2×1/4	4.5	5.24	1.72	2.10	2.24	2.39	2.54	2.71	2.88	8.63	11.7	15.3	19.4	29.1	40.8
11	3/8	6.6	7.68	1.78	2.18	2.32	2.48	2.64	2.81	2.99	8.32	11.4	14.9	18.9	28.5	40.1
12	1/2	8.5	10.00	1.83	2.24	2.39	2.55	2.72	2.90	3.08	8.08	11.1	14.6	18.6	28.1	39.6
13	3 1/2×2 1/2×1/4	4.9	5.76	2.48	2.93	3.10	3.27	3.46	3.65	3.84	8.89	12.0	15.7	19.8	29.6	41.4
14	3/8	7.2	8.44	2.56	3.03	3.20	3.38	3.57	3.76	3.97	8.59	11.7	15.3	19.4	29.0	40.7
15	1/2	9.4	11.00	2.62	3.11	3.28	3.47	3.66	3.86	4.07	8.33	11.4	14.9	19.0	28.6	40.2
16	5/8	11.4	13.44	2.71	3.22	3.40	3.59	3.79	4.00	4.21	8.04	11.0	14.5	18.5	28.0	39.5

FOUR ANGLES—CONTINUED.

Number	Four Angles: Size in Inches	Four Angles: Lbs. per Foot	Total Area in Square Inches	AXIS A. B. Values of r^2 for Distances in Inches back to back of— 0	3/8	1/2	5/8	3/4	7/8	1	AXIS C. D. Values of r^2 for Distances in Inches back to back of— 8	9	10	12	14	16
17	3 ×3×1/4	4.9	5.76	1.57	1.92	2 05	2.19	2.34	2.49	2.66	10.9	14.3	18.2	27.5	38.8	52.1
18	3/8	7.2	8.44	1.62	1.99	2.13	2.28	2.43	2.59	2.76	10.5	13.9	17.7	26.9	38.2	51.4
19	1/2	9.4	11.00	1.67	2.06	2.20	2.36	2.51	2.68	2.86	10.2	13.6	17.4	26.5	37.7	50.8
20	5/8	11.4	13.44	1.74	2.14	2.29	2.45	2.62	2.79	2.97	9.9	13.2	16.9	26.0	37.0	50.1
21	3 1/2×3×5/16	6.6	7.72	2.33	2.77	2.93	3.10	3.27	3.45	3.64	11.0	14.4	18.4	27.8	39.1	52.5
22	3/8	7.8	9.20	2.35	2.79	2.95	3 12	3.30	3.48	3.68	10.9	14.3	18.2	27.5	38.9	52.2
23	1/2	10.2	12.00	2.43	2.89	3.05	3.23	3.42	3.61	3.81	10.5	13.9	17.8	27.0	38.2	51.5
24	5/8	12.5	14.68	2.49	2.96	3.14	3.32	3.51	3.71	3.91	10.2	13.6	17.4	26.6	37.7	50.9
25	4 ×3×5/16	7.1	8.36	3.21	3.72	3.90	4.09	4.29	4.50	4.72	11.3	14.8	18.8	28.3	39.7	53.2
26	3/8	8.5	9.92	3.24	3.76	3.94	4.14	4.34	4.55	4.77	11.1	14.6	18.6	28.0	39.5	52.9
27	1/2	11.1	13.00	3.32	3.85	4.05	4.25	4.46	4.68	4.90	10.8	14.2	18.1	27.5	38.8	52.2
28	5/8	13.6	15.92	3.40	3.95	4.14	4.35	4.57	4.79	5.02	10.5	13.9	17.8	27.0	38.3	51.6
29	5 ×3×5/16	8.2	9.60	5.43	6.10	6.33	6.58	6.83	7.10	7.36	11.8	15.3	19.4	29.0	40.7	54.3
30	3/8	9.8	11.44	5.47	6.14	6.38	6.63	6.89	7.15	7.42	11.6	15.2	19.2	28.8	40.4	54.0
31	1/2	12.8	15.00	5.58	6.28	6.52	6.78	7.04	7.31	7.58	11.3	14.8	18.8	28.3	39.8	53.3
32	5/8	15.7	18.44	5.71	6.42	6.67	6.94	7.20	7.48	7.76	10.9	14.4	18.3	27.7	39.1	52.5

FOUR ANGLES

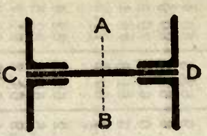


Number	Four Angles: Size in Inches	Four Angles: Lbs. per Foot	Total Area in Square Inches	Axis A. B. — Values of r^2 for Distances in Inches back to back of— 0	3/8	1/2	5/8	3/4	7/8	1	Axis C. D. — Values of r^2 for Distances in Inches back to back of— 9	10	12	14	16	18
33	3 1/2 × 3 1/2 × 3/8	8.5	9.92	2.18	2.60	2.75	2.91	3.08	3.26	3.44	13.3	17.1	26.1	37.0	50.0	65.0
34	1/2	11.1	13.00	2.24	2.68	2.84	3.01	3.18	3.36	3.55	13.0	16.6	25.5	36.4	49.3	64.2
35	5/8	13.6	15.92	2.30	2.75	2.91	3.09	3.27	3.46	3.65	12.8	16.4	25.2	36.0	48.8	63.6
36	13/16	17.1	20.12	2.41	2.88	3.06	3.24	3.43	3.63	3.83	12.1	15.7	24.4	35.0	47.7	62.4
37	5 × 3 1/2 × 3/8	10.4	12.20	5.14	5.78	6.01	6.25	6.49	6.74	7.00	14.3	18.2	27.5	38.7	52.0	67.3
38	1/2	13.6	16.00	5.26	5.92	6.15	6.39	6.64	6.90	7.17	13.9	17.7	26.9	38.1	51.3	66.5
39	5/8	16.8	19.68	5.34	6.01	6.25	6.50	6.76	7.02	7.29	13.6	17.4	26.5	37.6	50.7	65.8
40	3/4	19.8	23.24	5.46	6.16	6.40	6.66	6.92	7.19	7.46	13.2	17.0	26.0	37.0	50.0	65.0
41	7/8	22.7	26.68	5.55	6.26	6.51	6.77	7.04	7.31	7.59	12.9	16.6	25.5	36.5	49.4	64.3
42	6 × 3 1/2 × 3/8	11.7	13.68	7.92	8.72	9.00	9.30	9.59	9.90	10.2	14.7	18.7	28.1	39.5	53.0	68.4
43	1/2	15.3	18.00	8.02	8.83	9.12	9.42	9.72	10.0	10.4	14.4	18.3	27.7	39.0	52.4	67.7
44	5/8	18.9	22.20	8.16	8.99	9.28	9.59	9.90	10.2	10.5	14.0	17.9	27.1	38.4	51.6	66.9
45	3/4	22.3	26.24	8.31	9.17	9.46	9.78	10.1	10.4	10.7	13.6	17.5	26.6	37.7	50.9	66.0
46	7/8	25.7	30.20	8.42	9.29	9.59	9.91	10.2	10.6	10.9	13.3	17.1	26.2	37.2	50.3	65.4

FOUR ANGLES—CONTINUED.

Number	Four Angles: Size in Inches	Lbs. per Foot	Total Area in Square Inches	AXIS A. B. Values of r² for Distances in Inches back to back of— 0	3/8	1/2	5/8	3/4	7/8	1	AXIS C. D. Values of r² for Distances in Inches back to back of— 10	12	14	16	18	20
47	4 ×4×5/16	8.2	9.60	2.80	3.26	3.43	3.60	3.79	3.98	4.17	16.6	25.4	36.1	48.9	63.6	80.4
48	3/8	9.8	11.44	2.82	3.28	3.45	3.63	3.82	4.01	4.21	16.4	25.1	35.9	48.6	63.3	80.0
49	1/2	12.8	15.00	2.87	3.35	3.52	3.71	3.90	4.10	4.30	16.1	24.7	35.4	48.0	62.6	79.3
50	5/8	15.7	18.44	2.96	3.46	3.64	3.83	4.03	4.23	4.44	15.7	24.2	34.8	47.3	61.8	78.4
51	13/16	19.9	23.36	3.05	3.57	3.76	3.96	4.16	4.37	4.59	15.2	23.6	34.0	46.4	60.8	77.3
52	6 ×4×3/8	12.3	14.44	7.49	8.26	8.53	8.81	9.09	9.38	9.68	17.8	27.0	38.1	51.2	66.3	83.4
53	1/2	16.2	19.00	7.62	8.40	8.68	8.96	9.25	9.56	9.86	17.4	26.4	37.4	50.5	65.5	82.5
54	5/8	20.0	23.44	7.72	8.52	8.80	9.09	9.38	9.69	10.0	17.0	26.0	36.9	49.9	64.8	81.7
55	3/4	23.6	27.76	7.86	8.67	8.96	9.26	9.56	9.87	10.2	16.6	25.5	36.3	49.1	64.0	80.8
56	7/8	27.2	31.96	7.96	8.80	9.09	9.39	9.70	10.00	10.3	16.3	25.0	35.8	48.6	63.3	80.1
												14	16	18	20	22
57	6 ×6×7/16	17.2	20.24	6.24	6.91	7.14	7.38	7.63	7.89	8.16		32.0	43.7	57.4	73.1	90.7
58	1/2	19.6	23.00	6.28	6.95	7.18	7.43	7.68	7.95	8.21		31.8	43.4	57.0	72.7	90.3
59	5/8	24.2	28.44	6.39	7.08	7.32	7.57	7.83	8.10	8.37		31.2	42.7	56.3	71.8	89.3
60	3/4	28.7	33.76	6.51	7.21	7.46	7.72	7.98	8.26	8.54		30.6	42.0	55.5	70.9	88.4
61	7/8	33.1	38.96	6.59	7.31	7.56	7.83	8.10	8.38	8.66		30.1	41.5	54.8	70.2	87.7

FOUR ANGLES. ONE PLATE.

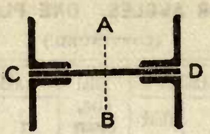


No.	One Web Plate, Size in Inches	FOUR ANGLES Size in Inches	FOUR ANGLES Thickness	Total Area, Square Inches	AXIS A. B. I	AXIS A. B. r²	AXIS C. D. I	AXIS C. D. r²
1	6×¼	2½×2	¼	5.74	31.6	5.51	6.2	1.07
2			⅜	7.70	42.9	5.57	9.3	1.21
3		3 ×2½	¼	6.74	36.2	5.37	10.3	1.53
4			⅜	9.18	48.9	5.33	15.7	1.71
5		3½×2½	¼	7.26	40.5	5.58	16.0	2.21
6			⅜	9.94	55.1	5.54	24.2	2.43
7			½	12.50	68.1	5.45	32.3	2.59
8	6×⅜	2½×2	⅜	8.45	45.1	5.34	10.1	1.19
9		3 ×2½	⅜	9.93	51.2	5.15	16.8	1.69
10		3½×2½	⅜	10.69	57.4	5.37	25.6	2.40
11			½	13.25	70.4	5.31	34.2	2.58
12	7×¼	2½×2	¼	5.99	45.8	7.64	6.2	1.03
13			⅜	7.95	62.1	7.81	9.3	1.17
14		3 ×2½	¼	6.99	52.4	7.50	10.3	1.47
15			⅜	9.43	71.1	7.53	15.7	1.67
16		3½×2½	¼	7.51	58.4	7.77	16.0	2.13
17			⅜	10.19	79.6	7.81	24.2	2.37
18			½	12.75	98.8	7.75	32.8	2.54
19		3½×3	5/16	9.47	69.4	7.32	20.1	2.13
20			⅜	10.95	80.2	7.32	24.2	2.21
21			½	13.75	98.8	7.18	32.8	2.38
22		4 ×3	5/16	10.11	76.5	7.57	29.6	2.93
23			⅜	11.67	88.2	7.56	35.4	3.03
24			½	14.75	109.5	7.42	47.8	3.24
25		5 ×3	5/16	11.35	90.5	7.97	56.3	4.96
26			⅜	13.19	105.0	7.96	67.6	5.12
27			½	16.75	130.9	7.81	90.6	5.41
28	7×⅜	2½×2	⅜	8.83	65.7	7.44	10.1	1.15
29		3 ×2½	⅜	10.31	74.6	7.24	16.8	1.63
30		3½×2½	⅜	11.07	83.2	7.52	25.6	2.32
31			½	13.63	102.4	7.51	34.2	2.51

FOUR ANGLES. ONE PLATE.

(CONTINUED.)

No.	One Web Plate, Size in Inches	FOUR ANGLES Size in Inches	FOUR ANGLES Thickness	Total Area, Square Inches	AXIS A. B. I	AXIS A. B. r^2	AXIS C. D. I	AXIS C. D. r^2
32	7×3/8	3 1/2×3	3/8	11.83	83.7	7.08	25.7	2.17
33			1/2	14.63	102.4	7.00	34.7	2.37
34			5/8	17.31	119.6	6.91	43.5	2.51
35		4 ×3	3/8	12.55	91.8	7.32	37.3	2.97
36			1/2	15.63	113.1	7.24	50.1	3.21
37			5/8	18.55	132.4	7.14	62.8	3.39
38		5 ×3	3/8	14.07	108.6	7.72	70.2	4.99
39			1/2	17.63	134.5	7.63	94.2	5.34
40			5/8	21.07	157.4	7.47	118.4	5.62
41	7×1/2	3 1/2×2 1/2	1/2	14.50	106.0	7.31	36.1	2.49
42		3 1/2×3	1/2	15.50	106.9	6.90	36.7	2.37
43			5/8	18.18	123.1	6.77	46.2	2.54
44		4 ×3	1/2	16.50	116.7	7.07	52.8	3.20
45			5/8	19.42	135.9	7.00	65.9	3.40
46		5 ×3	1/2	18.50	138.0	7.46	97.9	5.29
47			5/8	21.94	161.0	7.34	123.0	5.61
48	8×1/4	2 1/2×2	1/4	6.24	62.9	10.1	6.2	0.99
49			3/8	8.20	85.3	10.4	9.3	1.12
50		3 ×2 1/2	1/4	7.24	72.1	9.96	10.3	1.42
51			3/8	9.68	97.9	10.1	15.7	1.62
52		3 1/2×2 1/2	1/4	7.76	80.0	10.3	16.0	2.06
53			3/8	10.44	109.2	10.5	24.2	2.32
54			1/2	13·00	135.9	10.5	32.3	2.49
55		3 1/2×3	5/16	9.72	95.6	9.83	20.1	2.07
56			3/8	11.20	110.5	9.87	24.2	2.16
57			1/2	14.00	136.8	9.77	32.8	2.34
58		4 ×3	5/16	10.36	105.1	10.1	29.6	2.86
59			3/8	11.92	121.2	10.2	35.4	2.97
60			1/2	15.00	151.0	10.1	47.8	3.18
61		5 ×3	5/16	11.60	123.5	10.6	56.3	4.86
62			3/8	13.44	143.4	10.7	67.6	5.03
63			1/2	17.00	179.4	10.6	90.6	5.33
64		5 ×3 1/2	3/8	14.20	143.7	10.1	67.9	4.78
65			1/2	18.00	179.6	9.98	91.0	5.06
66		6 ×3 1/2	3/8	15.68	164.9	10.5	115.6	7.37
67			1/2	20.00	208.6	10.4	153.9	7.69
68	8×3/8	2 1/2×2	3/8	9.20	90.6	9.85	10.1	1.10
69		3 ×2 1/2	3/8	10.68	103.3	9.67	16.8	1.57
70		3 1/2×2 1/2	3/8	11.44	114.6	10.0	25.6	2.24
71			1/2	14.00	141.2	10 1	34.2	2.45

FOUR ANGLES. 

ONE PLATE.

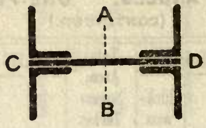
No.	One Web Plate, Size in Inches	FOUR ANGLES		Total Area, Square Inches	AXIS A. B.		AXIS C. D.	
		Size in Inches	Thick-ness		I	r^2	I	r^2
72	8×3/8	3½×3	3/8	12.20	115.9	9.50	25.7	2.11
73			½	15.00	142.1	9.47	34.7	2.31
74			5/8	17.68	166.4	9.41	43.5	2.46
75		4 ×3	3/8	12.92	126.6	9.79	37.3	2.89
76			½	16.00	156.3	9.77	50.1	3.13
77			5/8	18.92	183.5	9.70	62.8	3.32
78		5 ×3	3/8	14.44	148.7	10.3	70.2	4.86
79			½	18.00	184.7	10.3	94.2	5.24
80			5/8	21.44	217.1	10.1	118.4	5.52
81		5 ×3½	3/8	15.20	149.0	9.80	70.6	4.64
82			½	19.00	185.0	9.74	94.7	4.99
83			5/8	22.68	218.3	9.63	118.2	5.21
84		6 ×3½	3/8	16.68	170.3	10.2	119.3	7.15
85			½	21.00	213.9	10.2	158.9	7.57
86			5/8	25.20	252.4	10.0	198.5	7.88
87			¾	29.24	286.5	9.80	240.6	8.23
88	8×½	3½×2½	½	15.00	146.6	9.77	36.1	2.41
89		3½×3	½	16.00	147.4	9.21	36.7	2.29
90			5/8	18 68	171.7	9.19	46.2	2.47
91		4 ×3	½	17.00	161.7	9.51	52.8	3.10
92			5/8	19.92	188.8	9.48	65.9	3.31
93		5 ×3	½	19.00	190.1	10.00	97.9	5.15
94			5/8	22.44	222.4	9.91	123.0	5.48
95		5 ×3½	½	20.00	190.3	9.52	98.4	4.92
96			5/8	23.68	223.7	9.44	123.0	5 19
97		6 ×3½	½	22.00	219.2	9.97	164.2	7.46
98			5/8	26.20	257.8	9.81	204.9	7.82
99			¾	30.24	291.9	9.65	248.3	8.21
100	9×¼	3 ×2½	¼	7.49	95.5	12.7	10.3	1.38
101			3/8	9.93	129.6	13.1	15.7	1 58
102		3½×2½	¼	8.01	105.5	13.2	16.0	2.00
103			3/8	10.69	144.0	13.5	24.2	2.26
104			½	13.25	179.5	13.6	32.3	2.44

FOUR ANGLES. ONE PLATE.

(CONTINUED.)

No.	One Web Plate, Size in Inches	Four Angles: Size in Inches	Four Angles: Thickness	Total Area, Square Inches	Axis A. B.: I	Axis A. B.: r^2	Axis C. D.: I	Axis C. D.: r^2
105	9×¼	3½×3	5/16	9.97	226.7	22.7	20.1	2.02
106			⅜	11.45	146.5	12.8	24 2	2.12
107			½	14.25	181.7	12.8	32.8	2.30
108		4 ×3	5/16	10.61	138.8	13.1	29.6	2.79
109			⅜	12.17	160.2	13.2	35.4	2.91
110			½	15.25	200.0	13.1	47.8	3.13
111		5 ×3	5/16	11.85	162.2	13.7	56.3	4.75
112			⅜	13.69	188.5	13.8	67.6	4.94
113			½	17.25	236.4	13·7	90.6	5.25
114		5 ×3½	⅜	14.45	189.6	13.1	67.9	4.70
115			½	18.25	237.6	13.0	91.0	4.99
116		6 ×3½	⅜	15.93	216.8	13.6	115.6	7.26
117			½	20.25	274.7	13.6	153.8	7.60
118		6 ×4	⅜	16.69	217.8	13.1	115.4	6.91
119			½	21.25	274.3	12.9	154.5	7.27
120	9×⅜	3 ×2½	⅜	11.06	137.2	12.4	16.8	1.52
121		3½×2½	⅜	11.82	151.6	12.8	25.6	2.17
122			½	14.38	187.1	13.0	34.2	2.38
123		3½×3	⅜	12.58	154.1	12.3	25.7	2.05
124			½	15.38	189.3	12.3	34.7	2.26
125			⅝	18.06	222 0	12.3	43.5	2.41
126		4 ×3	⅜	13.30	167.8	12.6	37.3	2.81
127			½	16.38	207.6	12.7	50.1	3.06
128			⅝	19.30	244.1	12.7	62.8	3.26
129		5 ×3	⅜	14.82	196.1	13.2	70.3	4.74
130			½	18.38	244.0	13.3	94.2	5.13
131			⅝	21.82	287.5	13.2	118.4	5.42
132		5 ×3½	⅜	15.58	197.2	12.7	70.6	4.53
133			½	19.38	245.2	12.7	94.7	4.89
134			⅝	23.06	290.1	12.6	118.2	5.13
135			¾	26.62	329.7	12.4	143.1	5.38
136		6 ×3½	⅜	17.06	224.4	13.2	119.3	6.99
137			½	21.38	282.3	13.2	158.9	7.43
138			⅝	25.58	333.9	13.1	198.5	7.76
139			¾	29.62	380.4	12.8	240.6	8.12
140		6 ×4	⅜	17.78	225.4	12.7	119.3	6.71
141			½	22.38	281.9	12.6	159.7	7.14
142			⅝	26.82	335.1	12.5	199.6	7.44
143			¾	31.14	382.3	12.3	240.8	7.73
144	9×½	3½×2½	½	15.50	194.7	12.6	36.2	2.33
145		3½×3	½	16.50	196.9	11.9	36.7	2.22
146			⅝	19.18	229.6	12.0	46.2	2.41

FOUR ANGLES. ONE PLATE.

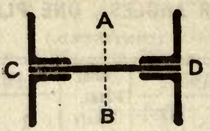


No.	One Web Plate, Size in Inches	FOUR ANGLES Size in Inches	FOUR ANGLES Thickness	Total Area, Square Inches	AXIS A. B. I	AXIS A. B. r²	AXIS C. D. I	AXIS C. D. r²
147	9×½	4 ×3	½	17.50	215.2	12.3	52.8	3.02
148			⅝	20.42	251.7	12.3	65.9	3.23
149		5 ×3	½	19.50	251.6	12.9	97.9	5.02
150			⅝	22.94	295.1	12.9	123.0	5.36
151		5 ×3½	½	20.50	252.8	12.3	98.5	4.80
152			⅝	24.18	297.7	12.3	123.0	5.09
153			¾	27.74	337.3	12.2	148.7	5.36
154		6 ×3½	½	22.50	289.9	12.9	164.2	7.30
155			⅝	26.70	341.5	12.8	206.2	7.72
156			¾	30.74	388.0	12.6	248.3	8.08
157		6 ×4	½	23.50	289.5	12.3	165.1	7.02
158			⅝	27.94	342.7	12.3	206.3	7.38
159			¾	32.26	389.9	12.1	248.9	7.71
160	10×¼	3½×2½	¼	8.26	134.9	16.3	16.0	1.94
161			⅜	10.94	184.2	16.8	24.2	2.21
162			½	13.50	229.7	17.0	32.3	2.39
163		3½×3	5/16	10.22	162.7	15.9	20.1	1.97
164			⅜	11.70	188.2	16.1	24.2	2.07
165			½	14.50	233.9	16.1	32.8	2.26
166		4 ×3	5/16	10.86	177.8	16.4	29.6	2.72
167			⅜	12.42	205.1	16.5	35.4	2.85
168			½	15.50	256.6	16.6	47.8	3.08
169		5 ×3	5/16	12.10	207.0	17.1	56.3	4.66
170			⅜	13.94	240.5	17.3	67.6	4.85
171			½	17.50	302.1	17.3	90.6	5.18
172		5 ×3½	⅜	14.70	242.7	16.5	67.9	4.62
173			½	18.50	304.7	16.5	91.0	4.92
174		6 ×3½	⅜	16.18	276.6	17.1	115.6	7.15
175			½	20.50	350.8	17.1	153.9	7.50
176		6 ×4	⅜	16.94	278.4	16.4	115.4	6.81
177			½	21.50	351.4	16.4	154.5	7.19
178	10×⅜	3½×2½	⅜	12.19	194.6	16.0	25.6	2.10
179			½	14.75	240.1	16.3	34.2	2.32

FOUR ANGLES. ONE PLATE.

(CONTINUED.)

No.	One Web Plate, Size in Inches	FOUR ANGLES Size in Inches	FOUR ANGLES Thickness	Total Area, Square Inches	AXIS A. B. I	AXIS A. B. r^2	AXIS C. D. I	AXIS C. D. r^2
180	10×⅜	3½×3	⅜	12.95	198.6	15.3	25.7	1.99
181			½	15.75	244.3	15.5	34.7	2.20
182			⅝	18.43	286.7	15.6	43.5	2.36
183		4 ×3	⅜	13.67	215.5	15.8	37.3	2.73
184			½	16.75	267.0	15.9	50 1	2.99
185			⅝	19.67	314.3	16.0	62.8	3.19
186		5 ×3	⅜	15.19	250.9	16.5	70.3	4.62
187			½	18.75	312.5	16.7	94.2	5.03
188			⅝	22.19	368.8	16.6	118.4	5.33
189		5 ×3½	⅜	15.95	253.1	15.9	70.6	4.42
190			½	19.75	315.1	16.0	94.7	4.80
191			⅝	23.43	373.3	15.9	118.2	5.05
192		6 ×3½	⅜	17.43	287.0	16.5	119.3	6.85
193			½	21.75	361.3	16.6	158.9	7.31
194			⅝	25.95	428.3	16.5	198.5	7.65
195			¾	29.99	489.2	16.3	240.6	8.02
196		6 ×4	⅜	18.19	288.8	15.9	119.3	6.56
197			½	22.75	361.8	15.9	159.7	7.02
198			⅝	27.19	430.8	15.8	199.6	7.34
199			¾	31.51	492.7	15.6	240.8	7.64
200	10×½	3½×2½	½	16.00	250.5	15.6	36.2	2.26
201		3½×3	½	17.00	254.7	15.0	36.7	2.16
202			⅝	19.68	297.2	15.1	46.2	2.35
203		4 ×3	½	18.00	277.4	15.4	52.8	2.93
204			⅝	20.92	324.7	15.5	65.9	3.15
205		5 ×3	½	20.00	322.9	16.1	97.9	4.90
206			⅝	23.44	379.2	16.2	123.0	5.25
207		5 ×3½	½	21.00	325.6	15.5	98.5	4.69
208			⅝	24.68	383.7	15.6	123.0	4.98
209		6 ×3½	½	23.00	371.7	16.2	164.2	7.14
210			⅝	27.20	438.6	16.1	206.1	7.58
211			¾	31.24	499.6	16.0	248.3	7.95
212		6 ×4	½	24.00	372.3	15.5	165.1	6.88
213			⅝	28.44	441.2	15.5	206.3	7.25
214			¾	32.76	503.1	15.4	248.9	7.60
215	12×¼	3½×2½	¼	8.76	206.4	23.6	16.0	1.83
216			⅜	11.44	281.1	24.6	24.2	2.11
217			½	14.00	350.4	25.0	32.3	2.31
218		3½×3	5/16	10.72	250.3	23.4	20.2	1.88
219			⅜	12.20	289.3	23.7	24.2	1.99
220			½	15.00	359.8	24.0	32.8	2.19

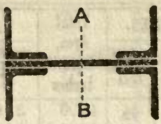
FOUR ANGLES.  ONE PLATE.

No.	One Web Plate, Size in Inches	FOUR ANGLES		Total Area, Square Inches	AXIS A. B.		AXIS C. D.	
		Size in Inches	Thickness		I	r^2	I	r^2
221	12×¼	4 ×3	5/16	11.36	272.2	24.0	29.6	2.60
222			⅜	12.92	314.0	24.3	35.4	2.74
223			½	16.00	393.2	24.6	47.8	2.99
224		5 ×3	5/16	12.60	314.7	25.0	56.4	4.47
225			⅜	14.44	365.5	25.3	67.6	4.68
226			½	18.00	459.7	25.5	90.6	5.03
227		5 ×3½	⅜	15.20	371.1	24.4	67.9	4.46
228			½	19.00	466.8	24.6	91.0	4.79
229		6 ×3½	⅜	16.68	420.6	25.2	115.6	6.93
230			½	21.00	534.2	25.4	153.9	7.33
231		6 ×4	⅜	17.44	425.3	24.4	115.4	6.62
232			½	22.00	538.0	24.5	154.6	7.03
233	12×⅜	3½×2½	⅜	12.94	299.1	23.1	25.7	1.98
234			½	15.50	368.4	23.8	34.2	2.21
235		3½×3	⅜	13.70	307.3	22.4	25.7	1.88
236			½	16.50	377.8	22.9	34.7	2.10
237			⅝	19.18	443.9	23.2	43.5	2.27
238		4 ×3	⅜	14.42	332.0	23.0	37.3	2.59
239			½	17.50	411 2	23.5	50.2	2.87
240			⅝	20.42	484.5	23.7	62.9	3.08
241		5 ×3	⅜	15.94	383.5	24.1	70.3	4.41
242			½	19.50	477.7	24.5	94.3	4.83
243			⅝	22.94	564.9	24.6	118.4	5.16
244		5 ×3½	⅜	16.70	389.1	23.3	70.6	4.23
245			½	20.50	484.8	23.6	94.7	4.62
246			⅝	24.18	575.1	23.8	118.2	4.89
247		6 ×3½	⅜	18.18	438.6	24.1	119.3	6.56
248			½	22.50	552.2	24.5	158.9	7.06
249			⅝	26.70	656.2	24.6	198.5	7.43
250			¾	30.74	751.7	24.5	240.6	7.83
251		6 ×4	⅜	18.94	443.3	23.4	119.3	6.30
252			½	23.50	556.0	23.7	159.7	6.80
253			⅝	27.94	663.1	23.7	199.7	7.15
254			¾	32.26	760.8	23.6	240.8	7.46

FOUR ANGLES. ONE PLATE. (CONTINUED.)

No.	One Web Plate, Size in Inches	FOUR ANGLES Size in Inches	FOUR ANGLES Thickness	Total Area, Square Inches	AXIS A. B. I	AXIS A. B. r^2	AXIS C. D. I	AXIS C. D. r^2
255	12×½	3½×2½	½	17.0	386.4	22.7	36.2	2.13
256		3½×3	½	18.0	395.8	22.0	36.7.	2.04
257			⅝	20.68	461.9	22.3	46.2	2.23
258		4 ×3	½	19.00	429.2	22.6	52.8	2.78
259			⅝	21.92	502.5	22.9	66.0	3.01
260		5 ×3	½	21.00	495.7	23.6	97.9	4.66
261			⅝	24.44	582.9	23.9	123.1	5.04
262		5 ×3½	½	22.00	502.8	22.9	98.5	4.48
263			⅝	25.68	593.1	23.1	123.0	4.79
264		6 ×3½	½	24.00	570.2	23.8	164.2	6·84
265			⅝	28.20	674.2	23.9	206.1	7.31
266			¾	32.24	769.7	23.9	248.3	7.70
267		6 ×4	½	25.00	574.0	23.0	165.1	6.60
268			⅝	29.44	681.1	23.1	206.3	7.01
269			¾	33.76	778.8	23.1	248.9	7.37
270	14×¼	4 ×3	5/16	11.86	389.3	32.8	29.6	2.49
271			⅜	13.42	448.7	33.4	35.4	2.64
272			½	16.50	561.8	34.0	47.8	2.90
273		5 ×3	5/16	13.10	447.6	34.2	56.4	4.30
274			⅜	14.94	519.4	34.8	67.6	4.52
275			½	18.50	653.4	35.3	90 6	4.90
276		5 ×3½	⅜	15.70	529.8	33.7	67.9	4.32
277			½	19.50	666.8	34.2	91.0	4.67
278		6 ×3½	⅜	17.18	598.0	34.8	115.6	6.73
279			½	21.50	759.4	35.3	153.9	7.16
280		6 ×4	⅜	17.94	607.1	33.8	115.4	6.43
281			½	22.50	768.6	34.2	154.6	6.87
282	14×⅜	4 ×3	⅜	15.17	477.2	31.5	37.3	2.46
283			½	18.25	590.4	32.4	50.2	2.75
284			⅝	21.17	695.5	32.9	62.9	2.97
285		5 ×3	⅜	16.69	548.0	32.8	70.3	4.21
286			½	20.25	682.0	33.7	94.3	4.66
287			⅝	23.69	806.8	34.1	118.4	5.00
288		5 ×3½	⅜	17.45	558.4	32.0	70.6	4.04
289			½	21.25	695.3	32.7	94.7	4.46
290			⅝	24.93	825.4	33.1	118.2	4.74
291		6 ×3½	⅜	18.93	626.6	33.1	119.4	6.30
292			½	23.25	788.0	33.9	158.9	6 84
293			⅝	27.45	937.6	34.2	198.5	7.23
294			¾	31.49	1075.9	34.2	240.6	7.64
295		6 ×4	⅜	19.69	635.6	32.3	119.4	6.06
296			½	24.25	797.1	32.9	159.7	6.59
297			⅝	28.69	951.2	33.2	199.7	6.96
298			¾	33.01	1093.4	33.1	240.8	7.29

FOUR ANGLES. ONE PLATE.

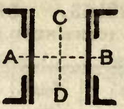


No.	One Web Plate, Size in Inches	FOUR ANGLES Size in Inches	FOUR ANGLES Thickness	Total Area, Square Inches	AXIS A. B. I	AXIS A. B. r^2	AXIS C. D. I	AXIS C. D. r^2
299	14×½	4 ×3	½	20.00	618.9	31.0	52.9	2.64
300			⅝	22.92	724.1	31.6	66.0	2.88
301		5 ×3	½	22.00	710.6	32.3	98.0	4.45
302			⅝	25.44	835.4	32.8	123.1	4.84
303		5 ×3½	½	23.00	723.9	31.5	98.5	4.28
304			⅝	26.68	854.0	32.0	123.1	4.61
305		6 ×3½	½	25.00	816.5	32.7	164.3	6.57
306			⅝	29.20	966.2	33.1	206.1	7.06
307			¾	33.24	1104.5	33.2	248.3	7.47
308		6 ×4	½	26.00	825.7	31.8	165.1	6.35
309			⅝	30.44	979.8	32.2	206.3	6.78
310			¾	34.76	1122.0	32.3	248.9	7.16
311	16×¼	5 ×3	5/16	13.60	606.7	44.6	56.4	4.14
312			⅜	15.44	703.1	45.5	67.6	4.38
313			½	19.00	884.1	46.5	90.6	4.77
314		5 ×3½	⅜	16.20	720.0	44.4	67.9	4.19
315			½	20.00	905.8	45.3	91.0	4.55
316		6 ×3½	⅜	17.68	809.8	45.8	115.6	6.54
317			½	22.00	1027.6	46.7	153.9	6.99
318		6 ×4	⅜	18.44	824.6	44.7	115.4	6.26
319			½	23.00	1043.9	45.4	154.6	6.72
320	16×⅜	5 ×3	⅜	17.44	745.8	42.8	70.3	4.03
321			½	21.00	926.7	44.1	94.3	4.49
322			⅝	24.44	1096.1	44.9	118.4	4.84
323		5 ×3½	⅜	18.20	762.7	41.9	70.6	3.88
324			½	22.00	948.5	43.1	94.8	4.31
325			⅝	25.68	1125.5	43.8	118.3	4.61
326		6 ×3½	⅜	19.68	852.5	43.3	119.4	6.07
327			½	24.00	1070.3	44.6	159.0	6.62
328			⅝	28.20	1273.7	45.2	198.5	7.04
329			¾	32.24	1463.0	45.4	240.6	7 46
330		6 ×4	⅜	20.44	867.3	42.4	119.4	5.84
331			½	25.00	1086.6	43.5	159.7	6.39
332			⅝	29.44	1296.8	44.1	199.7	6.78
333			¾	33.76	1492.0	44.2	240.8	7.13

FOUR ANGLES. ONE PLATE.

(CONTINUED.)

No.	One Web Plate, Size in Inches	FOUR ANGLES Size in Inches	FOUR ANGLES Thickness	Total Area, Square Inches	AXIS A. B. I	AXIS A. B. r²	AXIS C. D. I	AXIS C. D. r²
334	16×½	5 ×3	½	23.00	969.4	42.1	98.0	4.26
335			⅝	26.44	1138.8	43.1	123.1	4.66
336		5 ×3½	½	24.00	991.2	41.3	98.5	4.11
337			⅝	27.68	1168.1	42.2	123.1	4.45
338		6 ×3½	½	26.00	1112.9	42.8	164.3	6.32
339			⅝	30.20	1316.3	43.6	206.1	6.83
340			¾	34.24	1505.6	44.0	248.4	7.25
341		6 ×4	½	27.00	1129.3	41.8	165.2	6.12
342			⅝	31.44	1339.5	42.6	206.3	6.56
343			¾	35.76	1534.7	42.9	248.9	6.96
344	18×¼	6 ×3½	⅜	18.18	1057.0	58.1	115.6	6.36
345			½	22.50	1340.0	59.6	153.9	6.84
346		6 ×4	⅜	18.94	1079.0	57.0	115.4	6.09
347			½	23.50	1366.0	58.1	154.6	6.58
348	18×⅜	6 ×3½	⅜	20.43	1118.0	54.7	119.4	5.84
349			½	24.75	1401.	56.6	159.0	6.42
350			⅝	28.95	1666.	57.6	198.5	6.86
351			¾	32.99	1914.	58.0	240.7	7.29
352		6 ×4	⅜	21.19	1140.	53.8	119.4	5.63
353			½	25.75	1426.	55.4	159.7	6 20
354			⅝	30.19	1701.	56.4	199.7	6.61
355			¾	34.51	1958.	56.8	240.8	6.98
356		8 ×6	½	33.79	1802.	53.3	368.9	10.9
357			⅝	40.51	2173.	53.7	468.7	11.6
358			¾	46.51	2490.	53.4	563.1	12.1
359			⅞	53.23	2838.	53.3	672.2	12.6
360			1	60.39	3192.	52.9	811.6	13.4
361	18×½	6 ×3½	½	27.00	1462.	54.1	164.3	6.09
362			⅝	31.20	1727.	55.4	206.2	6.61
363			¾	35.24	1975.	56.1	248.4	7.05
364		6 ×4	½	28.00	1487.	53.1	165.2	5.90
365			⅝	32.44	1762.	54.3	206.4	6.36
366			¾	36.76	2019.	54.9	249.0	6.77
367		8 ×6	½	36.04	1863.	51.7	377.8	10.5
368			⅝	42.76	2234.	52.3	479.9	11.2
369			¾	48.76	2551.	52.3	576.7	11.8
370			⅞	55.48	2899.	52.3	688.2	12.4
371			1	62.64	3253.	51.9	830.7	13.3

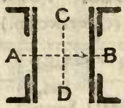
TWO PLATES.  FOUR ANGLES.

No.	Two Web Plates, Size in Inches	FOUR ANGLES Size in Inches	FOUR ANGLES Thickness	Total Area, Square Inches	AXIS A. B. I	AXIS A. B. r^2	AXIS C. D. Out to Out of Webs	AXIS C. D. I
1	8×1/4	2 ×2	1/4	7.76	66.5	8.57	5.4	68.5
2			5/16	8.60	75.9	8.82		
3			3/8	9.44	84.7	8.97	5.4	89.0
4	8×5/16	2 ×2	5/16	9.60	81.2	8.46	5.3	81.6
5			3/8	10.44	90.0	8.62		
6			7/16	11.24	98.4	8.76	5.3	102.
7	9×1/4	2 1/2×2 1/2	1/4	9.26	101.	10.9	5.9	103.
8			5/16	10.38	117.	11.3		
9			3/8	11.42	131.	11.5	5.9	135.
10	9×5/16	2 1/2×2 1/2	5/16	11.51	124.	10.8	5.9	127.
11			3/8	12.55	139.	11.1		
12			7/16	13.63	153.	11.2	5.9	160.
13	10×1/4	3 ×2 1/2	1/4	10.24	143.	14.0	6.5	144.
14			5/16	11.48	166.	14.5		
15			3/8	12.68	187.	14.8	6.5	191.
16	10×5/16	3 ×2 1/2	5/16	12.73	177.	13.9	6.5	179.
17			3/8	13.93	198.	14.2		
18			7/16	15.13	219.	14.5	6.4	221.
19	10×3/8	3 ×2 1/2	3/8	15.18	208.	13.7	6.5	213.
20			7/16	16.38	229.	14.0		
21			1/2	17.50	248.	14.2		
22			9/16	18.62	267.	14.3	6.3	268.
23	12×1/4	3 ×3	1/4	11.76	230.	19.6	8.1	235.
24			5/16	13.12	265.	20.2		
25			3/8	14.44	299.	20.7	8.1	305.
26	12×5/16	3 ×3	5/16	14.62	283.	19.4	8.0	286.
27			3/8	15.94	317.	19.9		
28			7/16	17.22	350.	20.3		
29			1/2	18.50	382.	20.6	8.0	387.

TWO PLATES. FOUR ANGLES.

(CONTINUED.)

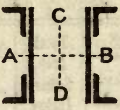
No.	Two Web Plates, Size in Inches	FOUR ANGLES		Total Area, Square Inches	AXIS A. B.		AXIS C. D.	
		Size in Inches	Thickness		I	r^2	Out to Out of Webs	I
30	12×3/8	3 ×3	3/8	17.44	335.	19.2	8.0	340.
31			7/16	18.72	368.	19.6		
32			1/2	20.00	400.	20.0		
33			9/16	21.24	430.	20.2		
34			5/8	22.44	457.	20.4	7.9	464.
35	12×1/2	3 ×3	1/2	23.00	436.	18.9	8.0	445.
36			9/16	24.24	466.	19.2		
37			5/8	25.44	493.	19.4	7.9	502.
38	12×5/8	3 ×3	5/8	28.44	529.	18.6	7.9	536.
39	12×1/4	3 1/2×2 1/2	1/4	11.76	242.	20.6	8.0	248.
40			5/16	13.12	280.	21.4		
41			3/8	14.44	317.	22.0		
42			7/16	15.72	352.	22.4	7.9	355.
43	12×5/16	3 1/2×2 1/2	5/16	14.62	298.	20.4	7.9	301.
44			3/8	15.94	335.	21.0		
45			7/16	17.22	370.	21.5		
46			1/2	18.50	404.	21.9	7.9	412.
47	12×3/8	3 1/2×2 1/2	3/8	17.44	353.	20.2	7.9	358.
48			7/16	18.72	388.	20.7		
49			1/2	20.00	422.	21.1		
50			5/8	22.44	485.	21.6	7.7	486.
51	12×1/2	3 1/2×2 1/2	1/2	23.00	458.	19.9	7.8	459.
52			9/16	24.24	490.	20.2		
53			5/8	25.44	521.	20.5	7.8	532.
54	12×5/8	3 1/2×2 1/2	5/8	28.44	557.	19.6	7.8	566.
55	14×5/16	3 1/2×3 1/2	5/16	17.11	455.	26.6	9.4	461.
56			3/8	18.67	510.	27.3		
57			7/16	20.23	564.	27.9		
58			1/2	21.75	616.	28.3	9.4	626.
59	14×3/8	3 1/2×3 1/2	3/8	20.42	539.	26.4	9.4	549.
60			7/16	21.98	592.	26.9		
61			1/2	23.50	645.	27.4		
62			5/8	26.42	743.	28.1	9.3	753.
63	14×1/2	3 1/2×3 1/2	1/2	27.00	702.	26.0	9.3	710.
64			9/16	28.48	752.	26.4		
65			5/8	29 92	800.	26.7	9.3	815.

TWO PLATES.  **FOUR ANGLES.**

No.	Two Web Plates, Size in Inches	FOUR ANGLES		Total Area, Square Inches	AXIS A. B.		AXIS C. D.	
		Size in Inches	Thick-ness		I	r^2	Out to Out of Webs	I
66	14×5/8	3 1/2×3 1/2	5/8	33.42	857.	25.7	9.2	857.
67	14×3/4	3 1/2×3 1/2	1/2	34.00	816.	24.0	9.3	822.
68			9/16	35.48	866.	24.4		
69			5/8	36.92	914.	24.8	9.3	927.
70	14×5/16	4 ×3	5/16	17.11	475.	27.8	9.2	482.
71			3/8	18.67	534.	28.6		
72			7/16	20.23	593.	29.3		
73			1/2	21.75	648.	29.8	9.2	650.
74	14×3/8	4 ×3	3/8	20.42	563.	27.6	9.2	563.
75			7/16	21.98	622.	28.3		
76			1/2	23.50	676.	28.8		
77			5/8	26.42	781.	29.6	9.2	796.
78	14×1/2	4 ×3	1/2	27.00	733.	27.2	9.2	742.
79			9/16	28.48	787.	27.6		
80			5/8	29.92	838.	28.0	9.1	841.
81	14×5/8	4 ×3	5/8	33.42	896.	26.8	9.1	897.
82	14×3/4	4 ×3	1/2	34.00	848.	24.9	9.2	852.
83			9/16	35.48	901.	25.4		
84			5/8	36.92	953.	25.8	9.2	966.
85	15×5/16	3 1/2×3 1/2	5/16	17.74	540.	30.4	10.2	549.
86			3/8	19.30	605.	31.4		
87			7/16	20.86	668.	32.0		
88			1/2	22.38	729.	32.6	10.2	737.
89	15×3/8	3 1/2×3 1/2	3/8	21.17	640.	30.2	10.1	642.
90			7/16	22.73	703.	30.9		
91			1/2	24.25	765.	31.5		
92			5/8	27.17	880.	32.4	10.1	885.
93	15×1/2	3 1/2×3 1/2	1/2	28.00	835.	29.8	10.1	846.
94			9/16	29 48	894.	30.3		
95			5/8	30.92	951.	30.7	10.1	965.

TWO PLATES. FOUR ANGLES. (CONTINUED.)

No.	Two Web Plates, Size in Inches	FOUR ANGLES Size in Inches	FOUR ANGLES Thickness	Total Area, Square Inches	AXIS A. B. I	AXIS A. B. r^2	AXIS C. D. Out to Out of Webs	AXIS C. D. I
96	15×5/8	3½×3½	5/8	34.67	1021.	29.4	10.0	1023.
97	15×3/4	3½×3½	1/2	35.50	976.	27 5	10.1	992.
98			9/16	36.98	1035.	28.0		
99			5/8	38.42	1091.	28.4	10.1	1111.
100	15×7/8	3½×3½	1/2	39.25	1046.	26.6	10.1	1059.
101			9/16	40.73	1105.	27.1		
102			5/8	42.17	1162.	27.5	10.1	1179.
103	15×5/16	4 ×3	5/16	17.74	562.	31.7	10.1	571.
104			3/8	19.30	631.	32.7		
105			7/16	20.86	700.	33.5		
106			1/2	22.38	764.	34.1	10.1	774.
107	15×3/8	4 ×3	3/8	21.17	667.	31.5	10.0	668.
108			7/16	22.73	735.	32.3		
109			1/2	24.25	799.	33.0		
110			5/8	27.17	922.	33.9	10.0	931.
111	15×1/2	4 ×3	1/2	28.00	869.	31.1	10.0	880.
112			9/16	29.48	932.	31.6		
113			5/8	30.92	993.	32.1	10.0	1009.
114	15×5/8	4 ×3	5/8	34.67	1063.	30.7	9.9	1064.
115	15×3/4	4 ×3	1/2	35.50	1010.	28.5	10.0	1022.
116			9/16	36.98	1073.	29.0		
117			5/8	38.42	1133.	29.5	10.0	1151.
118	15×7/8	4 ×3	1/2	39.25	1080.	27.5	10.0	1089.
119			9/16	40.73	1143.	28.1		
120			5/8	42.17	1203.	28.5	10.0	1218.
121	16×3/8	3½×3½	3/8	21.92	752.	34.3	10.9	758.
122			7/16	23.48	825.	35.1		
123			1/2	25.00	897.	35.9		
124			5/8	27.92	1031.	36.9	10.9	1032.
125	16×1/2	3½×3½	1/2	29.00	982.	33.9	10.9	998.
126			9/16	30.48	1051.	34.5		
127			5/8	31.92	1117.	35.0	10.9	1133.
128	16×5/8	3½×3½	5/8	35.92	1200.	33.5	10.8	1210.
129	16×3/4	3½×3½	1/2	37.00	1155.	31.2	10.8	1165.
130			9/16	38.48	1220.	31.7		
131			5/8	39.92	1285.	32.2	10.8	1295.
132	16×7/8	3½×3½	1/2	41.00	1240.	30.2	10.8	1250.
133			9/16	42.48	1305.	30.8		
134			5/8	43.92	1375.	31.3	10.8	1380.

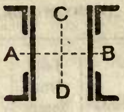
TWO PLATES.  **FOUR ANGLES.**

No.	Two Web Plates, Size in Inches	FOUR ANGLES		Total Area, Square Inches	AXIS A. B.		AXIS C. D.	
		Size in Inches	Thick-ness		I	r^2	Out to Out of Webs	I
135	16×1	3½×3½	½	45.00	1325.	29.4	10.8	1330.
136			9/16	46.48	1390.	30.0		
137			⅝	47.92	1460.	30.4	10.8	1460.
138	16×⅜	4 ×3	⅜	21.92	780.	35.6	10.8	785.
139			7/16	23.48	860.	36.6		
140			½	25.00	935.	37.4		
141			⅝	27.92	1075.	38.6	10.8	1080.
142	16×½	4 ×3	½	29.00	1020.	35.1	10.8	1035.
143			9/16	30.48	1090.	35.8		
144			⅝	31.92	1160.	36.4	10.8	1180.
145	16×⅝	4 ×3	⅝	35.92	1245.	34.7	10.7	1250.
146	16×¾	4 ×3	½	37.00	1190.	32.2	10.7	1195.
147			9/16	38.48	1265.	32.8		
148			⅝	39.92	1335.	33.4	10.7	1335.
149	16×⅞	4 ×3	½	41.00	1275.	31.1	10.7	1275.
150			9/16	42.48	1350.	31.7		
151			⅝	43.92	1420.	32.3	10.7	1420.
152	16×1	4 ×3	½	45.00	1360.	30.2	10.8	1380.
153			9/16	46.48	1435.	30.8		
154			⅝	47.92	1505.	31.4	10.8	1525.
155	18×⅜	3½×3½	⅜	23.42	1010.	43.1	12.4	1015.
156			7/16	24.98	1105.	44.2		
157			½	26.50	1200.	45.2		
158			⅝	29.42	1375.	46.8	12.6	1395.
159	18×½	3½×3½	½	31.00	1320.	42.6	12.4	1335.
160			9/16	32.48	1410.	43 4		
161			⅝	33.92	1495.	44.1	12.4	1505.

TWO PLATES. FOUR ANGLES.
(CONTINUED.)

No.	Two Web Plates, Size in Inches	FOUR ANGLES		Total Area, Square Inches	AXIS A. B.		AXIS C. D.	
		Size in Inches	Thickness		I	r^2	Out to Out of Webs	I
162	18×⅝	3½×3½	⅝	38.42	1620.	42.1	12.3	1620.
163	18×¾	3½×3½	½	40.00	1565.	39.1	12.2	1565.
164			$\frac{9}{16}$	41.48	1655.	39.9		-
165			⅝	42.92	1740.	40.5	12.3	1755.
166	18×1	3½×3½	½	49.00	1805.	36.9	12.2	1815.
167			$\frac{9}{16}$	50.48	1895.	37.6		
168			⅝	51.92	1985.	38.2	12.3	2005.
169	18×⅜	5 ×3½	⅜	25.70	1185.	46.1	12.0	1195.
170			$\frac{7}{16}$	27.62	1310.	47.4		
171			½	29.50	1430.	48.4		
172			⅝	33.18	1660.	50.0	12.0	1670.
173	18×½	5 ×3½	½	34.00	1550.	45.6	11.9	1550.
174			$\frac{9}{16}$	35.88	1670.	46.5		
175			⅝	37.68	1780.	47.3	11.9	1785.
176	18×⅝	5 ×3½	⅝	42.18	1900.	45.1	11.9	1915.
177	18×¾	5 ×3½	½	43.00	1790.	41.7	11.9	1805.
178			$\frac{9}{16}$	44.88	1910.	42.6		
179			⅝	46.68	2025.	43.3	11.9	2040.
180	18×1	5 ×3½	½	52.00	2035.	39.1	11.9	2040.
181			$\frac{9}{16}$	53.88	2155.	40.0		
182			⅝	55.68	2265.	40.7	11.9	2270.
183	21×⅜	4 ×4	⅜	27.19	1600.	58.8	14.5	1610.
184			$\frac{7}{16}$	28.99	1755.	60.5		
185			½	30.75	1905.	61.9		
186			⅝	34.19	2190.	64.1	14.7	2190.
187	21×½	4 ×4	½	36.00	2095.	58.3	14.5	2120.
188			$\frac{9}{16}$	37.72	2240.	59.4		
189			⅝	39.44	2385.	60.4	14.6	2415.
190	21×⅝	4 ×4	⅝	44.69	2575.	57.6	14.4	2585.
191	21×¾	4 ×4	½	46.50	2485.	53.4	14.3	2510.
192			$\frac{9}{16}$	48.22	2625.	54.4		
193			⅝	49.94	2770.	55.5	14.4	2805.
194	21×1	4 ×4	½	57.00	2870.	50.3	14.2	2885.
195			$\frac{9}{16}$	58.72	3010.	51.3		
196			⅝	60.44	3155.	52.2	14.3	3180.

TWO PLATES. FOUR ANGLES.

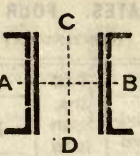


No.	Two Web Plates, Size in Inches	FOUR ANGLES		Total Area, Square Inches	AXIS A. B.		AXIS C. D.	
		Size in Inches	Thickness		I	r^2	Out to Out of Webs	I
197	21×1¼	4×4	½	67.50	3255.	48.2	14.2	3255.
198			9/16	69.22	3395.	49.1		
199			⅝	70.94	3540.	49.9	14.3	3560.
200	21×1½	4×4	½	78.00	3640.	46.7	14.3	3655.
201			9/16	79.72	3785.	47.5		
202			⅝	81.44	3925.	48.2	14.4	3970.
203	24× 7/16	4×4	½	36.00	2785.	77.4	16.8	2805.
204			9/16	37.72	2980.	79.0		
205			⅝	39.44	3175.	80.5	16.9	3175.
206	24× ½	4×4	½	39.00	2930.	75.1	16.7	2960.
207			9/16	40.72	3125.	76.7		
208			⅝	42.44	3320.	78.2	16.8	3330.
209	24× ⅝	4×4	⅝	48.44	3605.	77.4	16.6	3615.
210	24× ¾	4×4	½	51.00	3505.	66.8	16.4	3545.
211			9/16	52.72	3700.	70.2		
212			⅝	54.44	3895.	71.5	16.5	3915.
213	24×1	4×4	½	63.00	4080.	64.8	16.2	4090.
214			9/16	64.72	4275.	66.1		
215			⅝	66.44	4470.	67.3	16.4	4515.
216	24×1¼	4×4	½	75.00	4660.	62.1	16.2	4670.
217			9/16	76.72	4850.	63.2		
218			⅝	78.44	5045.	64.3	16.3	5050.
219	24×1½	4×4	½	87.00	5235.	60.2	16.3	5285.
220			9/16	88.72	5425.	61.2		
221			⅝	90.44	5620.	62.2	16.4	5675.
222	27× ½	4×4	½	42.00	3940.	93.8	18.8	3960.
223			9/16	43.72	4190.	95.8		
224			⅝	45.44	4445	97.8	19.0	4460.
225	27× ⅝	4×4	⅝	52.19	4855.	93.0	18.8	4900.

TWO PLATES. FOUR ANGLES.

(CONTINUED.)

No.	Two Web Plates, Size in Inches	FOUR ANGLES		Total Area, Square Inches	AXIS A. B.		AXIS C. D.	
		Size in Inches	Thickness		I	r^2	Out to Out of Webs	I
226	27× ¾	4×4	½	55.50	4760.	85.8	18.4	4790.
227			9/16	57.22	5010.	87.6		
228			⅝	58.94	5265.	89.3	18.6	5295.
229	27×1	4×4	½	69.00	5580.	80.9	18.2	5605.
230			9/16	70.72	5830.	82.4		
231			⅝	72.44	6085.	84.0	18.4	6125.
232	27×1¼	4×4	⅝	85.94	6905.	80.3	18.3	6920.
233	27×1½	4×4	⅝	99.44	7725.	77.7	18.3	7745.
234	27× ½	6×6	½	50.00	4935.	98.7	18.4	4965.
235			⅝	55.44	5675.	102.4		
236			¾	60.76	6390.	105.2		
237			⅞	65.96	7080.	107.4	18.5	7090.
238	27× ⅝	6×6	⅝	62.19	6085.	97.9	18.3	6100.
239			¾	67.51	6800.	100.7		
240			⅞	72.71	7495.	103.1		
241			1	77.75	8155.	104.9	18.4	8190.
242	27× ¾	6×6	⅝	68.94	6495.	94.2	18.2	6515.
243			¾	74.26	7210.	97.1		
244			⅞	79.46	7905.	99.5		
245			1	84.50	8565.	101.3	18.3	8595.
246	27× ⅞	6×6	⅝	75.69	6905.	91.3	18.1	6910.
247			¾	81.01	7620.	94.1		
248			⅞	86.21	8315.	96.4		
249			1	91.25	8975.	98.3	18.3	9065.
250	27×1	6×6	⅝	82.44	7315.	88.8	18.1	7355.
251			¾	87.76	8030.	91.5		
252			⅞	92.96	8725.	93.8		
253			1	98.00	9385.	95.8	18.2	9425.
254	27×1¼	6×6	⅝	95.94	8135.	84.8	18.1	8195.
255			¾	101.26	8850.	87.4		
256			⅞	106.46	9545.	89.6		
257			1	111.50	10205.	91.5	18.2	10280.
258	27×1½	6×6	⅝	109.44	8955.	81.8	18.1	8995.
259			¾	114.76	9670.	84.3		
260			⅞	119.96	10365.	86.4		
261			1	125.00	11025.	88.2	18.2	11090.

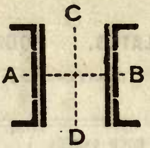
FOUR PLATES.  FOUR ANGLES.

No.	Two Web Plates, Size in Inches	Two Side Plates, Size in Inches	FOUR ANGLES Size in Inches	Thickness	Total Area, Square Inches	AXIS A. B. I	r²	Out to Out of Webs for Equal I
1	18×½	10½×⅜	3½×3½	½	38.88	1392	35.8	11.3
2		½			41.50	1417	34.1	
3	⅝	⅜			43.38	1514	34.9	
4		½			46.00	1538	33.4	
5		⅝		⅝	51.55	1739	33.7	11.0
6	18×¾	10½×⅜	3½×3½	½	47.88	1635	34.1	11.4
7		½			50.50	1660	32.9	
8		⅝			53.13	1684	31.7	
9		⅜		⅝	50.80	1812	35.7	
10		½			53.42	1836	34.4	
11		⅝			56.05	1861	33.2	11.0
12	21×½	12½×⅜	4×4	½	45.38	2219	48.9	13.2
13		½			48.50	2260	46.6	
14		⅜		⅝	48.82	2506	51.3	
15		½			51.94	2546	49.0	
16		⅝			55.07	2587	47.0	12.8
17	21×⅝	12½×⅜	4×4	½	50.63	2412	47.6	13.2
18		½			53.75	2453	45.6	
19		⅝			56.88	2493	43.8	
20		⅜		⅝	54.07	2699	49.9	
21		½			57.19	2739	47.9	
22		⅝			60.32	2780	46.1	12.8
23	21×¾	12½×⅜	4×4	½	55.88	2605	46.6	13.3
24		½			59.00	2646	44.8	
25		⅝			62.13	2686	43.2	
26		¾			65.25	2727	41.8	
27		⅜		⅝	59.32	2892	48.8	

FOUR PLATES. FOUR ANGLES.

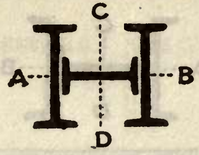
(CONTINUED.)

No.	Two Web Plates, Size in Inches	Two Side Plates, Size in Inches	FOUR ANGLES Size in Inches	FOUR ANGLES Thickness	Total Area, Square Inches	AXIS A. B. I	AXIS A. B. r^2	Out to Out of Webs for Equal I
28	21×¾	12½×½	4×4	⅝	62.44	2932	47.0	
29		⅝			65.57	2973	45.3	
30		¾			68.69	3014	43.9	12.6
31	21×⅞	12½×½	4×4	⅝	67.69	3125	46.2	13.1
32		⅝			70.82	3166	44.7	
33		¾			73.94	3206	43.4	
34	21×1	12½×½	4×4	½	69.50	3032	43.6	
35		⅝			72.63	3072	42.3	
36		½		⅝	72.94	3318	45.5	
37		⅝			76.07	3359	44.2	13.0
38	24×½	15½×⅜	4×4	½	50.63	3163	62.5	15.1
39		½			54.50	3241	59.5	
40		⅝		⅝	61.82	3706	60.0	
41	24×⅝	15½×⅜	4×4	½	56.63	3451	60.9	15.1
42		½			60.50	3529	58.3	
43		⅝			64.38	3606	56.0	
44		½		⅝	63.94	3916	61.2	
45		⅝			67.82	3994	58.9	14.7
46	24×¾	15½×⅜	4×4	½	62.63	3739	59.7	15.2
47		½			66.50	3817	57.4	
48		⅝			70.38	3894	55.3	
49		⅜		⅝	66.07	4126	62.5	
50	24×¾	15½×½	4×4	⅝	69.94	4204	60.1	
51		⅝			73.82	4282	58.0	14.8
52	24×⅞	15½×½	4×4	½	72.50	4105	56.6	14.9
53		⅝			76.38	4182	54.8	
54		½		⅝	75.94	4492	59.2	

FOUR PLATES.  **FOUR ANGLES.**

No.	Two Web Plates, Size in Inches	Two Side Plates, Size in Inches	FOUR ANGLES Size in Inches	FOUR ANGLES Thickness	Total Area, Square Inches	AXIS A. B. I	AXIS A. B. r^2	Out to Out of Webs for Equal I
55	24× ⅞	15½×⅝	4×4	⅝	79.82	4570	57.3	
56		¾			83.69	4647	55.5	14.5
57	24×1	15½×½	4×4	½	78.50	4393	56.0	14.9
58		⅝			82.38	4470	54.3	
59		½		⅝	81.94	4780	58.3	
60		⅝			85.82	4858	56.6	
61		½		¾	85.26	5150	60.4	
62		⅝			89.14	5228	58.7	
63		¾			93.01	5305	57.0	14.8
64	24×1¼	15½×½	4×4	⅝	93.94	5356	57.0	
65		⅝			97.82	5434	55.5	
66	27× ½	18½×⅜		½	55.88	4335	77.6	17.1
67		½			60.50	4467	73.8	
68		⅜		⅝	59.32	4839	81.6	
69		½			63.94	4971	77.7	16.9
70	27× ⅝	18½×⅜	4×4	½	62.63	4745	75.8	17.0
71		½			67.25	4877	72.5	
72		⅜		⅝	66.07	5249	79.4	
73		½			70.69	5381	76.1	
74		⅝			75.32	5513	73.2	16.5
75	27× ¾	18½×½	4×4	½	74.00	5287	71.4	16.7
76		½		⅝	77.44	5791	74.8	
77		⅝			82.07	5923	72.2	
78	⅞	½		½	80.75	5697	70.5	16.7
79		⅝		⅝	88.82	6333	71.3	
80	27×1	18½×⅝	4×4	⅝	95.57	6743	70.6	16.6
81	1¼				109.07	7563	69.3	16 8

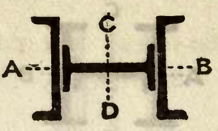
THREE



I BEAMS.

No.	TWO BEAMS			ONE BEAM			Total Area, Sq. Ins.		
	Depth in Ins.	Lbs. per Ft.	Area in Sq. Ins.	Depth in Inches	Lbs. per Ft.	Area in Sq. Ins.		I	r^2
1	9	21.0	12.62	7	15.0	4.42	17.04	172.5	10 12
2				8	18.0	5.33	17.95	173.6	9.67
3				9	21.0	6.31	18.93	175.0	9.25
4				10	25.0	7.37	19.99	176.7	8.84
5	10	25.0	14.74	8	18.0	5.33	20.07	248.0	12.36
6				9	21.0	6.31	21.05	249.4	11.85
7				10	25.0	7.37	22.11	251.1	11.36
8				12	31.5	9.26	24.00	253.7	10.57
9	12	31.5	18.52	9	21.0	6.31	24.83	436.8	17.59
10				10	25.0	7.37	25.89	438.5	16.94
11				12	31.5	9.26	27.78	441.1	15.88
12				15	42.0	12.48	31.00	446.2	14.39
13	15	42.0	24.96	9	21.0	6.31	31.27	637.5	20.39
14				10	25.0	7.37	32.33	798.4	24.70
15				12	31.5	9.26	34.22	892.9	26.09
16				15	42.0	12.48	37.44	898.0	23.98
17	18	55.0	31.86	10	25.0	7.37	39.23	993.5*	25.33*
18				12	31.5	9.26	41.12	1452. *	35.31*
19				15	42.0	12.48	44.34	1606.	36.22
20				18	55.0	15.93	47.79	1612.	33.73
21	20	65.0	38.16	12	31.5	9.26	47.42	1706. *	35.97*
22				15	42.0	12.48	50.64	2354.	46.49
23				18	55.0	15.93	54.09	2360.	43.64
24				20	65.0	19.08	57.24	2367.	41.36
25	24	80.0	46.64	12	31.5	9.26	55.90	2038. *	36.46*
26				15	42.0	12.48	59.12	3243. *	54.86*
27				18	55.0	15.93	62.57	4197.	67.08
28				20	65.0	19.08	65.72	4204.	63.98
29				24	80.0	23.32	69.96	4219.	60.31

* These values are about Axis C. D.; all others are about Axis A. B.

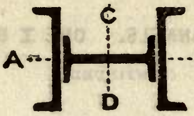
TWO CHANNELS  ONE I BEAM.

No.	TWO CHANNELS		ONE I BEAM		Total Area, Square Inches	AXIS A. B.		AXIS C. D.	
	Depth in Inches	Lbs. per Foot	Depth in Inches	Lbs. per Foot		I	r^2	I	r^2
1	6	8.0	4	7.5	6.97	26.8	3.84	37.6	5.40
2			5	9.75	7.63	27.2	3.57	56.8	7.44
3			6	12.25	8.37	27.9	3.33	82.1	9.81
4			7	15.0	9.18	28.7	3.12	114.4	12.5
5			8	18.0	10.09	29.8	2.95	155.4	15.4
6	6	15.5	4	7.5	11.33	39.8	3.51	67.7	5.98
7			5	9.75	11.99	40.2	3.36	99.3	8.28
8			6	12.25	12.73	40.9	3.21	139.0	10.9
9			7	15.0	13 54	41.7	3.08	188.1	13.9
10			8	18.0	14.45	42.8	2.96	247.9	17.2
11	7	9.75	5	9.75	8.57	43.4	5.07	66.9	7.81
12			6	12.25	9.31	44.1	4.73	95.4	10.2
13			7	15.0	10.12	44.9	4.43	131.5	13.0
14			8	18.0	11.03	46.0	4.17	176.6	16.0
15			9	21.0	12.01	47 4	3.94	232.0	19.3
16	7	12.25	5	9.75	10.07	49.6	4.93	80.5	7.99
17			6	12.25	10.81	50.3	4.65	113.8	10.5
18			7	15.0	11.62	51.1	4.39	155.4	13.4
19			8	18.0	12.53	52.2	4.16	206.9	16.5
20			9	21.0	13.51	53.6	3.96	269.3	19.9
21	7	14.75	5	9.75	11.55	55.6	4.82	94.9	8.22
22			6	12.25	12.29	56.3	4.58	133.1	10.8
23			7	15.0	13.10	57.1	4.36	180.3	13.8
24			8	18.0	14.01	58.2	4.15	238.2	17.0
25			9	21.0	14.99	59.6	3.97	307.8	20.5
26	7	19.75	5	9.75	14.49	67.6	4.67	126.2	8.71
27			6	12.25	15.23	68.3	4.48	174.7	11.5
28			7	15.0	16.04	69.1	4.31	233.6	14.6
29			8	18.0	16.95	70.2	4.14	304.7	18.0
30			9	21.0	17.93	71.6	3.99	388.8	21.7

TWO CHANNELS. ONE I BEAM.

(CONTINUED.)

No.	TWO CHANNELS		ONE I BEAM		Total Area, Square Inches	AXIS A. B.		AXIS C. D.	
	Depth in Inches	Lbs. per Foot	Depth in Inches	Lbs. per Foot		I	r^2	I	r^2
31	8	11.25	6	12.25	10.31	66.5	6.45	110.1	10.7
32			7	15.0	11.12	67.3	6.05	150.2	13.5
33			8	18.0	12.03	68.4	5.68	199.9	16.6
34			9	21.0	13.01	69.8	5.36	260.2	20.0
35			10	25.0	14.07	71.5	5.08	333.1	23 7
36	8	13.75	6	12.25	11.69	73.9	6.32	127.1	10.9
37			7	15.0	12.50	74.7	5.97	172.3	13.8
38			8	18.0	13.41	75.8	5.65	227.8	17.0
39			9	21.0	14.39	77.2	5.36	294.7	20.5
40			10	25.0	15.45	78.9	5.11	374.7	24.3
41	8	16.25	6	12.25	13.17	81.7	6.20	146.2	11.1
42			7	15.0	13.98	82.5	5.90	197.0	14.1
43			8	18.0	14.89	83.6	5.61	258.9	17.4
44			9	21.0	15.87	85.0	5.35	332.9	21.0
45			10	25.0	16.93	86.7	5.12	420.8	24.9
46	8	21.25	6	12.25	16.11	97.5	6.05	187.1	11.6
47			7	15.0	16.92	98.3	5.81	249.5	14.7
48			8	18.0	17.83	99 4	5.57	324.4	18.2
49			9	21.0	18.81	100.8	5.36	412.9	22.0
50			10	25.0	19.87	102.5	5.16	516.8	26.0
51	9	13.25	6	12.25	11.39	96.5	8.47	126.6	11.1
52			7	15.0	12.20	97.3	7.97	171.0	14.0
53			8	18.0	13.11	98.4	7.50	225.6	17.2
54			9	21.0	14.09	99.8	7.08	291.4	20.7
55			10	25.0	15.15	101.5	6.70	370.2	24.4
56	9	15.0	6	12.25	12.43	103.7	8.34	139.4	11.2
57			7	15.0	13.24	104.5	7.89	187.7	14.2
58			8	18.0	14.15	105.6	7 46	246.6	17.4
59			9	21.0	15.13	107.0	7.07	317.3	21.0
60			10	25.0	16.19	108.7	6.71	401.6	24.8

TWO CHANNELS  ONE I BEAM.

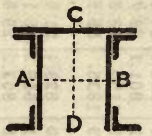
No.	TWO CHANNELS Depth in Inches	TWO CHANNELS Lbs. per Foot	ONE I BEAM Depth in Inches	ONE I BEAM Lbs. per Foot	Total Area, Square Inches	AXIS A. B. I	AXIS A. B. r^2	AXIS C. D. I	AXIS C. D. r^2
61	9	25.0	6	12.25	18.31	143.3	7.82	219.8	12.0
62			7	15.0	19.12	144.1	7.54	291.1	15.2
63			8	18.0	20.03	145.2	7.25	375.9	18.8
64			9	21.0	21.01	146.6	6.98	475.5	22.6
65			10	25.0	22.07	148.3	6.72	591.5	26 8
66	10	15.0	6	12.25	12.53	135.7	10.8	144.5	11.5
67			7	15.0	13.34	136.5	10.2	193.6	14.5
68			8	18.0	14.25	137.6	9.65	253.5	17.8
69			9	21.0	15.23	139.0	9.12	325.1	21.3
70			10	25.0	16.29	140.7	8.64	410.3	25.2
71	10	20.0	6	12·25	15 37	159.3	10.4	180.7	11.8
72			7	15.0	16.18	160.1	9.89	240.5	14.9
73			8	18.0	17.09	161.2	9.43	312.4	18.3
74			9	21.0	18.07	162.6	9.00	397.6	22.0
75			10	25.0	19.13	164.3	8.59	497.8	26.0
76	10	35.0	6	12.25	24.19	232.9	9.63	312.1	12.9
77			7	15.0	25.00	233.7	9.35	407.7	16.3
78			8	18.0	25.91	234.8	9.06	519.9	20.1
79			9	21.0	26.89	236.2	8.78	649.7	24.2
80			10	25.0	27.95	237.9	8.51	798.9	28.6
81	12	20.5	7	15.0	16.48	258.9	15.7	257.2	15.6
82			8	18.0	17.39	260.0	15.0	331.6	19.1
83			9	21.0	18.37	261.4	14.2	419.3	22.8
84			10	25.0	19.43	263.1	13.5	522.3	26.9
85			12	31.5	21.32	265.7	12.5	765.7	35.9
86	12	25.0	7	15.0	19.12	290.7	15.2	301.9	15.8
87			8	18.0	20.03	291.8	14.6	387.7	19.4
88			9	21.0	21.01	293.2	14.0	488.1	23.2
89			10	25.0	22.07	294.9	13.4	605.1	27.4
90			12	31.5	23.96	297.5	12.4	880.4	36.8

TWO CHANNELS. ONE I BEAM.

(CONTINUED.)

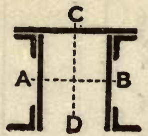
No.	TWO CHANNELS		ONE I BEAM		Total Area, Square Inches	AXIS A. B.		AXIS C. D.	
	Depth in Inches	Lbs. per Foot	Depth in Inches	Lbs. per Foot		I	r^2	I	r^2
91	12	30.0	7	15.0	22.06	326.1	14.8	354.4	16.1
92			8	18.0	22.97	327.2	14.2	453.2	19.7
93			9	21.0	23.95	328.6	13.7	568.1	23.7
94			10	25.0	25.01	330.3	13.2	701.1	28.0
95			12	31.5	26.90	332.9	12.4	1013.	37.6
96	12	35.0	8	18.0	25.91	362.4	14.0	522.1	20.2
97			9	21.0	26.89	363.8	13.5	651.9	24.2
98			10	25.0	27.95	365.5	13.1	801.1	28.7
99			12	31.5	29.84	368.1	12.3	1150.	38.5
100			15	42.0	33.06	373.2	11.3	1835.	55.5
101	15	33.0	8	18.0	25.13	629.0	25.0	528.4	21.0
102			9	21.0	26.11	630.4	24.1	656.3	25.1
103			10	25.0	27.17	632.1	23.3	803.2	29.6
104			12	31.5	29.06	634.7	21.8	1146.	39.4
105			15	42.0	32.28	639.8	19.8	1820.	56.4
106	15	35.0	8	18.0	25.91	643.8	24.9	545.9	21.1
107			9	21.0	26.89	645.2	24.0	677.6	25.2
108			10	25.0	27.95	646.9	23.1	828.7	29.6
109			12	31.5	29.84	649.5	21.8	1181.	39.6
110			15	42.0	33.06	654.6	19.8	1873.	56.6
111	15	40.0	8	18.0	28.85	698.8	24.2	613.8	21.3
112			9	21.0	29.83	700.2	23.5	760.1	25.5
113			10	25.0	30.89	701.9	22.7	927.4	30.0
114			12	31.5	32.78	704.5	21.5	1317.	40.2
115			15	42.0	36.00	709.6	19.7	2074.	57.6
116	15	55.0	8	18.0	37.69	864.2	22.9	834.0	22 1
117			9	21.0	38.67	865.6	22.4	1026.	26.5
118			10	25.0	39.73	867.3	21.8	1244.	31.3
119			12	31.5	41.62	869.9	20.9	1747.	42.0
120			15	42.0	44.84	875.0	19.5	2708.	60.4

THREE PLATES. FOUR ANGLES.



No.	Two Web Plates, Size in Inches	Top Plate, Size in Inches	Top Angles: Size in Inches	Top Angles: Thickness	Bottom Angles: Size in Inches	Bottom Angles: Thickness	Total Area, Square Inches	Eccentricity	Axis A. B.: I	Axis A. B.: r^2	Axis C. D.: I
1	9×¼	12×¼	2 ×2	¼	2½×2½	7/16	13.38	0.48	178.7	13.4	237.3
2				5/16	3 ×2½	7/16	14.24	0.43	193.2	13.6	
3	5/16						15.37	0.40	201.1	13.1	
4				⅜		½	16.35	0.35	214.7	13.1	
5	9×⅜	12×5/16	2 ×2	¼	2½×2½	½	16.88	0.49	216.2	12.8	
6				5/16	3 ×2½	½	17.81	0.43	232.3	13.0	
7	7/16						18.93	0.40	240.1	12.7	
8				7/16		9/16	20.31	0.43	258.2	12.7	
9	½	⅜		5/16			21.36	0.44	271.2	12.7	375.0
10	10×¼	13×¼	2½×2½	¼	2½×2½	½	15.13	0.54	249.4	16.5	281.8
11				5/16	3 ×2½	½	16.19	0.49	271.3	16.8	
12	5/16						17.44	0.45	282.0	16.2	
13				⅜	2½×3½		18.46	0.42	303.0	16.4	
14	⅜	5/16		¼			19.44	0.39	317.2	16.3	
15	7/16						20.69	0.36	327.8	15.8	
16	½					7/16	21.30	0.47	324.8	15.3	
17				5/16		½	22.50	0.44	346.6	15.4	

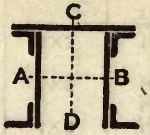
18	10×9/16	13×5/16	2½×2½	5/16	3½×2½	½	23.75	0.41	357.3	15.0	
19	5/8						25.00	0.39	367.9	14.7	439.2
20	12×¼	14×¼	2½×2½	5/16	3 ×3	½	17.94	0.51	427.6	23.9	421.0
21	5/16						19.44	0.47	446.3	22.9	447.7
22	3/8				4 ×3	3/8	20.40	0.54	455.6	22.3	480.4
23	7/16						21.90	0.51	474.1	21.7	505.5
24	½				3 ×3	7/16	23.30	0.53	482.1	20.7	502.7
25		5/16					24.18	0.74	510.2	21.1	516.9
26	9/16						25.68	0.69	528.9	20.6	540.5
27	5/8						27.18	0.65	547.7	20.2	563.5
28	13×¼	15×¼	2½×2½	¼	3½×3	7/16	17.93	0.49	506.5	28.2	507.5
29					4 ×3	7/16	18.37	0.33	526.2	28.6	541.0
30	5/16	5/16			3½×3	½	21.20	0.53	591.7	27.9	590.4
31				5/16		9/16	22.44	0.48	631.2	28.1	637.6
32	3/8			¼	4 ×3	7/16	22.56	0.54	610.5	27.1	629.6
33				5/16		½	23.88	0.47	653.1	27.4	682.7
34				3/8			24.40	0.58	666.9	27.3	700.9
35		3/8				5/8	26.80	0.48	757.4	28.2	782.9
36	13×7/16	15×3/8	2½×2½	5/16	4 ×3	9/16	27.19	0.50	741.1	27.3	767.2
37						5/8	27.91	0.35	765.7	27.4	799.1
38	½					9/16	28.81	0.48	764.3	26.5	800.5
39	9/16						30.44	0.45	787.5	25.9	833.2
40				3/8		5/8	31.68	0.40	826.9	26.1	883.3
41				7/16			32.22	0.49	841.4	26.1	902.5
42	5/8			5/16		½	31.32	0.56	784.0	25.0	832.1
43				3/8		9/16	32.58	0.51	824.8	25.3	882.7
44				7/16		5/8	33.84	0.47	864.8	25.6	933.9

THREE PLATES.  FOUR ANGLES.

No.	Two Web Plates, Size in Inches	Top Plate, Size in Inches	TOP ANGLES Size in Inches	TOP ANGLES Thickness	BOTTOM ANGLES Size in Inches	BOTTOM ANGLES Thickness	Total Area, Square Inches	Eccentricity	AXIS A. B. I	AXIS A. B. r^2	AXIS C. D. I
45	14×¼	17×5/16	3×3	¼	4×3	7/16	20.93	0.96	704.0	33.6	723.0
46				5/16		½	22.37	0.88	758.2	33.9	
47	5/16			¼		7/16	22.68	0.88	734.0	32.4	
48				5/16			23.36	1.04	751.9	32.2	
49				⅜		½	24.78	0.96	806.0	32.5	
50	14×⅜	17×5/16	3×3	5/16	4×3	½	25.87	0.76	817.9	31.6	
51		⅜				9/16	27.68	0.84	897.9	32.4	
52				⅜		⅝	29.06	0.79	349.4	32.7	
53	7/16	5/16		5/16		½	27.62	0.71	847.3	30.7	
54				⅜		9/16	29.02	0.67	899.8	31.0	
55		⅜					30.09	0.90	945.7	31.4	
56		7/16				⅝	31.87	0.96	1024.	32.1	
57	14×½	17×5/16	3×3	5/16	4×3	7/16	28.61	0.85	842.	29.4	
58		⅜				9/16	31.18	0.74	957.	30.7	
59		½		⅜		11/16	35.40	0.97	1134.	32.0	
60	9/16	⅜				9/16	33.59	0.81	1005.	29.9	
61		½				⅝	36.43	1.06	1129.	31.0	

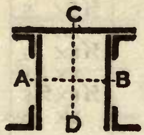
62	14×5/8	17×1/2	3×3	3/8	4×3	5/8	38.18	1.01	1160	30.4	
63	3/4						41.68	0.93	1220	29.3	1320
64	15×3/8	15×3/8	3×3	5/16	3×3	9/16	26.56	1.00	944	35.5	607
65				3/8		5/8	27.82	0.98	996	35.8	
66				7/16	4×3	9/16	28.98	0.94	1059	36.5	
67				1/2		5/8	30.34	0.88	1118	36.9	
68				9/16			30.96	0.99	1137	36.7	788
69	15×5/16	18×5/16	3×3	5/16	4×3	1/2	25.07	0.93	938	37.4	1003
70	3/8						26.94	0.86	975	36.2	
71				3/8		9/16	28.34	0.81	1036	36.6	
72		3/8				5/8	30.18	0.89	1130	37.4	
73	7/16	5/16		5/16		1/2	28.82	0.81	1011	35 1	
74				3/8		9/16	30.22	0.76	1072	35.5	
75		3/8				5/8	32.06	0.84	1166	36.4	
76	15×7/16	18×3/8	3×3	7/16	5×3	5/8	33.96	0.65	1266	37.3	
77		7/16					35.09	0.88	1323	37.7	
78	1/2	5/16		5/16	4×3	1/2	30.69	0.76	1047	34.1	
79		3/8		3/8		5/8	33.93	0.80	1203	35.5	
80		7/16		7/16	5×3	5/8	36.96	0.84	1360	36.8	
81		1/2		1/2			38.72	1.14	1434	37.0	
82	15×9/16	18×5/16	3×3	5/16	4×3	1/2	32.57	0.72	1083	33.3	
83		3/8		3/8		5/8	35.81	0.75	1239	34.6	
84		7/16		7/16	5×3	5/8	38.84	0.80	1396	35.9	
85		1/2		1/2			40.60	1.09	1471	36.2	
86	5/8	5/16		5/16	4×3	1/2	34.44	0.68	1120	32.5	
87		3/8		3/8		9/16	36.96	0.85	1237	33.5	

THREE PLATES. FOUR ANGLES.



No.	Two Web Plates, Size in Inches	Top Plate, Size in Inches	TOP ANGLES Size in Inches	TOP ANGLES Thickness	BOTTOM ANGLES Size in Inches	BOTTOM ANGLES Thickness	Total Area, Square Inches	Eccentricity	AXIS A. B. I	AXIS A. B. r^2	AXIS C. D. I
88	15×5/8	18×7/16	3×3	7/16	4×3	5/8	39.45	1.01	1351	34.2	
89		1/2		1/2	5×3	5/8	42.47	1.04	1508	35.5	
90	3/4	3/8		3/8	4×3	1/2	39.97	0.91	1270	31.8	
91		7/16		7/16		5/8	43.20	0.93	1425	33.0	
92		1/2		1/2	5×3	5/8	46.22	0.96	1583	34.3	1807
93	16×7/16	16×7/16	3×3	5/16	4×3	1/2	31.06	1.17	1252	40.3	866
94				3/8			31.72	1.29	1275	40.2	
95				7/16		9/16	33.10	1.21	1347	40.7	
96				1/2		5/8	34.46	1.15	1416	41.1	
97				9/16			35.08	1.25	1436	40.9	
98				5/8	5×3	5/8	36.94	1.04	1552	42.0	1164
99	16×5/16	18×5/16	3×3	5/16	4×3	7/16	24.93	1.20	1038	41.6	979
100	3/8						26.93	1.11	1083	40.2	1043
101		3/8		3/8		1/2	29.47	1.31	1214	41.2	1150
102			3½×3½	3/8	3½×3½	5/8	31.67	1.10	1306	41.2	1092
103	7/16	5/16	3×3	5/16	4×3	7/16	28.93	1.04	1128	39.0	1106
104		3/8		3/8		1/2	31.47	1.23	1260	40.0	1213

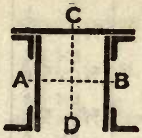
105	16×7/16	18×⅜	3½×3½	⅜	3½×3½	⅝	33.67	1.04	1351	40.1	1144
106		7/16	3 ×3	7/16	4 ×3	⅝	34.70	1.22	1438	41.4	1361
107			3½×3½	7/16	5 ×3½	⅝	37.46	0.95	1581	42.2	1389
108	½	5/16	3 ×3	5/16	4 ×3	7/16	30.93	0.97	1173	37.9	1167
109		⅜		⅜	4 ×3	½	33.47	1.15	1305	39.0	1274
110			3½×3½	⅜	3½×3½	⅝	35.67	0.98	1396	39.1	1195
111		7/16	3 ×3	7/16	4 ×3	⅝	36.70	1.16	1483	40.4	1422
112			3½×3½	7/16	5 ×3½	⅝	39.46	0.90	1526	38.7	1440
113		½	3 ×3	½	5 ×3	⅝	39.72	1.17	1663	41.9	1624
114	16×9/16	18×5/16	3 ×3	5/16	4 ×3	7/16	32.93	0.91	1218	37.0	1227
115		⅜		⅜		½	35.47	1.09	1350	38.1	1334
116			3½×3½	⅜	3½×3½	⅝	37.67	0.93	1440	38.2	1244
117		7/16	3 ×3	7/16	4 ×3	⅝	38.70	1.10	1529	39.5	1482
118			3½×3½	7/16	5 ×3½	⅝	41.46	0.85	1670	40.3	1489
119	16×⅝	18×5/16	3 ×3	5/16	4 ×3	7/16	34.93	0.86	1262	36.1	1285
120		⅜		⅜		½	37.47	1.03	1395	37.2	1393
121			3½×3½	⅜	3½×3½	⅝	39.67	0.88	1484	37.4	1292
122		7/16	3 ×3	7/16	4 ×3	⅝	40.70	1.04	1474	36.2	1541
123			3½×3½	7/16	5 ×3½	⅝	43.46	0.82	1714	39.4	1538
124		½	3 ×3	½	5 ×3	⅝	43.72	1.06	1753	40.1	1743
125			3½×3½	½	5 ×3½	⅝	45.34	1.10	1803	39.8	1603
126	16×¾	18×⅜	3 ×3	⅜	4 ×3	½	41.47	0.94	1485	35.8	1505
127			3½×3½	⅜	3½×3½	⅝	43.67	0.80	1572	36.0	1384
128		7/16	3 ×3	7/16	4 ×3	⅝	44.70	0.95	1663	37.2	1652
129			3½×3½	9/16	5 ×3½	⅝	48.96	0.93	1856	37.9	1699
130		½	3 ×3	½	4 ×3	⅝	46.46	1.21	1746	37.6	1715
131			3½×3½	½	5 ×3½	11/16	50.24	0.87	1948	38.8	1746

THREE PLATES.  FOUR ANGLES.

No.	Two Web Plates, Size in Inches	Top Plate, Size in Inches	TOP ANGLES Size in Inches	TOP ANGLES Thickness	BOTTOM ANGLES Size in Inches	BOTTOM ANGLES Thickness	Total Area, Square Inches	Eccentricity	AXIS A. B. I	AXIS A. B. r^2	AXIS C. D. I
132	16×3/8	20×3/8	3 ×3	5/16	4 ×3	9/16	30.30	1.16	1278	42.2	1546
133				3/8			30.96	1.28	1301	42.0	
134			3 1/2×3 1/2	3/8	3 1/2×3 1/2	5/8	32.42	1.26	1343	41.4	
135	7/16		3 ×3	5/16	4 ×3	9/16	32.30	1.09	1323	41.0	
136				3/8			32.96	1.20	1346	40.8	
137			3 1/2×3 1/2	5/16	3 1/2×3 1/2	9/16	32.92	1.24	1317	40.0	
138				3/8		5/8	34.42	1.20	1388	40.3	
139	16×1/2	20×3/8	3 ×3	3/8	4 ×3	9/16	34.96	1.14	1392	39.8	
140			3 1/2×3 1/2	3/8	3 1/2×3 1/2	5/8	36.42	1.13	1434	39.4	
141		7/16	3 ×3	7/16	5 ×3	5/8	38.83	1.02	1624	41.8	
142			3 1/2×3 1/2	7/16	5 ×3 1/2	9/16	39.43	1.23	1613	40.9	
143		1/2	3 ×3	1/2	5 ×3	5/8	40.72	1.35	1711	42.0	
144			3 1/2×3 1/2	1/2	5 ×3 1/2	5/8	42.34	1.37	1761	41.6	
145	16×9/16	20×3/8	3 ×3	3/8	4 ×3	9/16	36.96	1.07	1437	38.9	
146			3 1/2×3 1/2	3/8	5 ×3 1/2	1/2	38.46	1.02	1505	39.1	
147		7/16	3 ×3	7/16	5 ×3	9/16	39.97	1.14	1613	40.4	
148			3 1/2×3 1/2	7/16	5 ×3 1/2	9/16	41.43	1.18	1658	40.0	

149	16×9/16	20×1/2	3 ×3	1/2	5 ×3	5/8	42.72	1.29	1757	41.1	
150			3 1/2×3 1/2	1/2	5 ×3 1/2	5/8	44.34	1.31	1808	40.8	
151	5/8	3/8	3 ×3	3/8	4 ×3	1/2	38.22	1.17	1433	37.5	
152			3 1/2×3 1/2	3/8	3 1/2×3 1/2	1/2	38.96	1.31	1431	36 7	
153		7/16	3 ×3	7/16	5 ×3	1/2	41.11	1.27	1599	38.9	
154	16×5/8	20×7/16	3 1/2×3 1/2	7/16	5 ×3 1/2	1/2	42.49	1.30	1641	38.6	
155		1/2	3 ×3	1/2	5 ×3	5/8	44.72	1.23	1803	40.3	
156			3 1/2×3 1/2	1/2	5 ×3 1/2	5/8	46.34	1.26	1853	40.0	
157	3/4	3/8		3/8	3 1/2×3 1/2	7/16	44.20	1.33	1473	34.9	
158		1/2		1/2	5 ×3 1/2	5/8	50.34	1.16	1944	38.6	
159		5/8		5/8	6 ×3 1/2	11/16	56.58	1.29	2291	40.5	2737
160	18×5/16	16×5/16	3 ×3	5/16	4 ×3	3/8	24 77	1.38	1253	50.6	699
161				3/8		7/16	26.21	1.26	1353	51.6	
162			3 1/2×3 1/2	5/16	3 1/2×3 1/2	7/16	26.17	1.28	1324	50.6	
163				3/8		1/2	27.71	1.22	1421	51.3	
164	3/8		3 ×3	5/16	4 ×3	3/8	27 02	1.26	1418	52.5	
165			3 1/2×3 1/2	5/16	3 1/2×3 1/2	7/16	28.42	1.18	1388	48.8	
166		3/8	3 ×3	3/8	4 ×3	1/2	30.22	1.20	1547	51 2	
167			3 1/2×3 1/2	3/8	5 ×3 1/2	7/16	31.52	1.19	1622	51.5	
168	18×7/16	16×5/16	3 ×3	5/16	3 ×3	7/16	29.17	1.22	1362	46.7	
169			3 1/2×3 1/2	5/16	3 1/2×3 1/2	3/8	29.89	1.33	1387	46.4	
170		3/8	3 ×3	3/8	4 ×3	7/16	31.71	1.34	1546	48.8	
171			3 1/2×3 1/2	3/8	3 1/2×3 1/2	1/2	33.21	1.30	1615	48.6	
172	1/2	5/16	3 ×3	5/16	3 ×3	3/8	30.78	1.32	1371	44.5	788
173			3 1/2×2 1/2	5/16	3 1/2×3 1/2	3/8	32.14	1.23	1452	45.2	
174		3/8	3 ×3	3/8	4 ×3	7/16	33.96	1.25	1611	47.4	

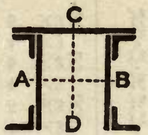
THREE PLATES. FOUR ANGLES.



No.	Two Web Plates, Size in Inches	Top Plate, Size in Inches	TOP ANGLES Size in Inches	TOP ANGLES Thickness	BOTTOM ANGLES Size in Inches	BOTTOM ANGLES Thickness	Total Area, Square Inches	Eccentricity	AXIS A. B. I	AXIS A. B. r^2	AXIS C. D. I
175	18×1/2	16×3/8	3 1/2×3 1/2	3/8	3 1/2×3 1/2	1/2	35.46	1.22	1679	47.4	
176		7/16	3 ×3	3/8	4 ×3	1/2	35.72	1.28	1742	48.8	
177			3 1/2×3 1/2	3/8	5 ×3 1/2	7/16	37.02	1.27	1817	49.1	
178	9/16	5/16	3 ×3	5/16	3 ×3	3/8	33.03	1.23	1436	43.5	
179			3 1/2×3 1/2	5/16	3 1/2×3 1/2	5/16	33.61	1.36	1450	43.1	
180	18×9/16	16×3/8	3 ×3	3/8	4 ×3	7/16	36.21	1.17	1675	46.3	
181			3 1/2×3 1/2	3/8	5 ×3 1/2	3/8	37.31	1.21	1730	46.4	
182		7/16	3 ×3	3/8	4 ×3	7/16	37.21	1.39	1741	46.8	987
183			3 1/2×3 1/2	3/8	3 1/2×3 1/2	1/2	38.71	1.36	1810	46.8	
184		1/2	3 ×3	3/8	4 ×3	1/2	38.97	1.42	1872	48.0	
185			3 1/2×3 1/2	3/8	5 ×3 1/2	7/16	40.27	1.40	1947	48.4	
186	18×5/8	16×5/16	3 ×3	5/16	3 ×3	5/16	34.62	1.32	1443	41.7	
187			3 1/2×3 1/2	5/16	3 1/2×3 1/2	5/16	35.86	1.28	1514	42.2	
188		3/8	3 ×3	3/8	3 ×3	7/16	37.58	1.33	1651	43.9	
189			3 1/2×3 1/2	3/8	3 1/2×3 1/2	7/16	39.20	1.25	1746	44.5	
190		7/16	3 ×3	3/8	4 ×3	7/16	39 46	1.31	1806	45.8	1031
191			3 1/2×3 1/2	3/8	3 1/2×3 1/2	7/16	40.20	1.46	1809	45.0	

192	18×5/8	16×1/2	3 ×3	3/8	4 ×3	1/2	41.22	1.34	1938	47.0	
193			3 1/2×3 1/2	3/8	5 ×3 1/2	7/16	42.52	1.32	2013	47.3	
194	3/4	3/8	3 ×3	3/8	3 ×3	3/8	41.44	1.33	1724	41.6	
195			3 1/2×3 1/2	3/8	3 1/2×3 1/2	3/8	42.92	1.28	1810	42.2	
196		1/2	3 ×3	3/8	4 ×3	7/16	44.96	1.36	2002	44.5	
197			3 1/2×3 1/2	3/8	3 1/2×3 1/2	7/16	45.70	1.49	2005	43.9	970
198	18×3/8	21×3/8	3 ×3	5/16	4 ×3	1/2	31.44	1.54	1632	51.9	1780
199			3 1/2×3 1/2	5/16	5 ×3 1/2	7/16	32.62	1.49	1703	52.2	
200			3 ×3	3/8	4 ×3	9/16	32.84	1.45	1728	52.6	
201			3 1/2×3 1/2	3/8	3 1/2×3 1/2	5/8	34.30	1.43	1788	52.1	
202	18×7/16	21 3/8	3 ×3	5/16	4 ×3	1/2	33 69	1.43	1693	50.4	
203			3 1/2×3 1/2	5/16	3 1/2×3 1/2	1/2	34.31	1.58	1695	49.4	
204			3 ×3	3/8	4 ×3	1/2	34.35	1.56	1727	50.3	
205			3 1/2×3 1/2	3/8	5 ×3 1/2	7/16	35.65	1.53	1802	50.6	
206	18×1/2	21×3/8	3 ×3	5/16	4 ×3	7/16	35.18	1.55	1696	48.2	
207			3 1/2×3 1/2	5/16	3 1/2×3 1/2	1/2	36.56	1.48	1762	48.2	
208			3 ×3	3/8	4 ×3	1/2	36.60	1.46	1793	49.0	
209			3 1/2×3 1/2	3/8	5 ×3 1/2	7/16	37.90	1.44	1868	49.3	
210		7/16	3 ×3	3/8	4 ×3	9/16	38.65	1.55	1942	50.2	
211			3 1/2×3 1/2	3/8	5 ×3 1/2	1/2	40.15	1.48	2033	50.6	
212	18×9/16	21×3/8	3 ×3	5/16	4 ×3	7/16	37.43	1.45	1762	47.1	
213			3 1/2×3 1/2	5/16	5 ×3 1/2	3/8	38.41	1.47	1813	47.2	
214			3 ×3	3/8	4 ×3	1/2	38.85	1.38	1858	47.8	
215			3 1/2×3 1/2	3/8	5 ×3 1/2	7/16	40.15	1.36	1933	48.1	
216		7/16	3 ×3	3/8	4 ×3	9/16	40.90	1.46	2008	49.1	
217			3 1/2×3 1/2	3/8	5 ×3 1/2	1/2	42.40	1.41	2098	49.5	

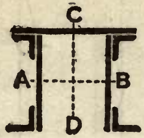
THREE PLATES. FOUR ANGLES.



No.	Two Web Plates, Size in Inches	Top Plate, Size in Inches	TOP ANGLES Size in Inches	TOP ANGLES Thickness	BOTTOM ANGLES Size in Inches	BOTTOM ANGLES Thickness	Total Area, Square Inches	Eccen-tricity	AXIS A. B. I	AXIS A. B. r^2	AXIS C. D. I
218	18×$\frac{9}{16}$	21×½	3 ×3	⅜	5×3	½	42.47	1.64	2128	50.1	
219			3½×3½	⅜	5×3½	$\frac{9}{16}$	44.65	1.45	2265	50.7	
220	⅝	⅜	3 ×3	$\frac{5}{16}$	4×3	⅜	38.90	1.56	1756	45.1	2095
221			3½×3½	$\frac{5}{16}$	5×3½	⅜	40.66	1.38	1879	46.2	
222			3 ×3	⅜	4×3	$\frac{7}{16}$	40.34	1.48	1856	46.0	
223			3½×3½	⅜	5×3½	⅜	41.44	1.50	1903	45.9	
224	18×⅝	21×$\frac{7}{16}$	3 ×3	⅜	4×3	$\frac{9}{16}$	43.15	1.39	2073	48.0	
225			3½×3½	⅜	5×3½	$\frac{7}{16}$	43.71	1.53	2082	47.6	
226		½	3 ×3	⅜	5×3	½	44.72	1.55	2195	49.1	
227			3½×3½	⅜	5×3½	½	45.96	1.57	2247	48.9	
228		$\frac{9}{16}$	3 ×3	⅜	5×3	$\frac{9}{16}$	46.89	1.60	2358	50.3	
229			3½×3½	⅜	5×3½	$\frac{9}{16}$	48.21	1.60	2415	50.1	
230				½		$\frac{11}{16}$	51.55	1.45	2636	51.1	
231	18×¾	21×⅜	3 ×3	⅜	4×3	$\frac{7}{16}$	44.84	1.33	1987	44.3	
232			3½×3½	⅜	5×3½	⅜	45.94	1.36	2042	44.4	
233		½	3 ×3	⅜	5×3	$\frac{7}{16}$	48.34	1.58	2245	46.4	
234			3½×3½	⅜	5×3½	½	50 46	1.43	2378	47.1	

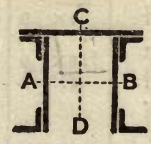
235	18×3/4	21×5/8	3 ×3	3/8	5 ×3	5/8	53.57	1.51	2652	49.5	
236			3 1/2×3 1/2	3/8	5 ×3 1/2	5/8	54.93	1.50	2713	49.4	
237				1/2		11/16	57.37	1.53	2853	49.7	2938
238	20×3/8	18×3/8	3 ×3	5/16	4 ×3	7/16	31.05	1.56	1915	61.7	1175
239			3 1/2×3 1/2	3/8	5 ×3 1/2	7/16	33.77	1.45	2131	63.1	
240	7/16					3/8	35.31	1.63	2113	59.8	
241	1/2						37.81	1.52	2203	58.3	
242		7/16				7/16	39.90	1.52	2399	60.1	
243	20×9/16	18×3/8	3 1/2×3 1/2	3/8	5 ×3 1/2	3/8	40.31	1.43	2291	56.8	
244		7/16				7/16	42.40	1.43	2488	58.7	
245		1/2				1/2	44.46	1.44	2679	60.3	
246	5/8	3/8			3 1/2×3 1/2	7/16	42.45	1.46	2318	54.6	
247		7/16			5 ×3 1/2	3/8	43.94	1.57	2471	56.2	
248		1/2				7/16	46.02	1.57	2667	58.0	
249				1/2		9/16	49.44	1.40	2953	59.7	
250	20×3/4	18×3/8	3 1/2×3 1/2	3/8	3 1/2×3 1/2	3/8	46.67	1.47	2413	51.7	
251		1/2	3 1/2×3 1/2	3/8	5 ×3 1/2	7/16	51.02	1.42	2844	55.7	
252		5/8				9/16	55.15	1.44	3232	58.6	
253				1/2		5/8	57.59	1.48	3412	59.2	1911
254	20×3/8	24×7/16	3 1/2×3 1/2	3/8	5 ×3 1/2	5/8	40.30	1.56	2721	67.5	3042
255	7/16						42.80	1.47	2810	65.7	
256	1/2					9/16	44.40	1.60	2801	63.1	
257				7/16		5/8	46.08	1.51	2941	63.8	
258	9/16			3/8		9/16	46.90	1.51	2891	61.6	
259		1/2				5/8	49.30	1.59	3108	63.0	
260				1/2	6 ×3 1/2	5/8	52.10	1.54	3347	64.2	

THREE PLATES. FOUR ANGLES.



No.	Two Web Plates, Size in Inches	Top Plate, Size in Inches	TOP ANGLES Size in Inches	TOP ANGLES Thickness	BOTTOM ANGLES Size in Inches	BOTTOM ANGLES Thickness	Total Area, Square Inches	Eccentricity	AXIS A. B. I	AXIS A. B. r^2	AXIS C. D. I
261	20×5/8	24×7/16	3½×3½	3/8	5 ×3½	9/16	49.40	1.44	2979	60.3	
262		1/2				5/8	51.80	1.52	3197	61.7	
263				1/2	6 ×3½	5/8	54 60	1.47	3436	62.9	
264		9/16		3/8			54.56	1.51	3476	63.7	
265				1/2		11/16	57.12	1.52	3769	66.0	
266	20×3/4	24×7/16	3½×3½	3/8	5 ×3½	1/2	53.46	1.48	3055	57.2	
267		1/2				9/16	55.90	1.55	3277	58.6	
268				1/2		5/8	58.34	1.58	3458	59.3	
269		5/8			6 ×4	11/16	64.32	1.53	4012	62.4	
270				5/8		3/4	66.84	1.52	4201	62.8	
271	20×7/8	24×1/2	3½×3½	1/2	5 ×3½	5/8	63.34	1.45	3637	57.4	
272		5/8			6 ×3½	5/8	67.60	1.65	4027	59.6	
273				5/8	6 ×4	11/16	70.78	1.57	4257	60.1	
274	20×1	24×1/2	3½×3½	1/2	5 ×3½	9/16	67.44	1.48	3717	55.1	
275		5/8			6 ×3½	5/8	72.60	1.54	4216	58.1	
276				5/8	6 ×4	11/16	75.78	1.46	4446	58.7	5498

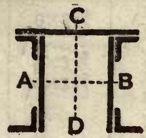
277	22×3/8	18×3/8	3 1/2×3 1/2	3/8	5 ×3 1/2	7/16	35.27	1.52	2660	75.4	1240
278	7/16						38.02	1.41	2777	73.0	
279	1/2					3/8	39 81	1.59	2766	69.5	
280		7/16		7/16		1/2	43.62	1.49	3181	72.9	
281	22×9/16	18×3/8	3 1/2×3 1/2	3/8	5 ×3 1/2	3/8	42.56	1.48	2885	67.8	
282		7/16		7/16		7/16	45.43	1.63	3176	69.9	
283		1/2		1/2		9/16	49.19	1.54	3586	72.9	
284	5/8	3/8		3/8	3 1/2×3 1/2	7/16	44.95	1.51	2929	65.2	
285		7/16		7/16	5 ×3 1/2	7/16	48 18	1.54	3293	68.4	
286	22×5/8	18×1/2	3 1/2×3 1/2	1/2	5 3×1/2	9/16	51.94	1.46	3703	71.3	
287		9/16		9/16	6 ×3 1/2	9/16	54.93	1.53	4034	73.4	
288	3/4	3/8		3/8	3 1/2×3 1/2	3/8	49.67	1.52	3063	61.7	
289		1/2		1/2	5 ×3 1/2	1/2	56.50	1.51	3813	67.5	
290		5/8		5/8	6 ×3 1/2	5/8	63.31	1.50	4564	72.1	
291	22×7/8	18×3/8	3 1/2×3 1/2	3/8	3 1/2×3 1/2	3/8	55.17	1.37	3296	59.7	
292		1/2		1/2		9/16	61.24	1.54	3917	64.0	
293		5/8		5/8	6 ×3 1/2	9/16	67.77	1.53	4666	68.8	
294		3/4		3/4		3/4	74.50	1.53	5389	72.3	2595
295	22×7/16	26×7/16	3 1/2×3 1/2	3/8	6 ×3 1/2	5/8	46.69	1.39	3766	80.7	4394
296				7/16			47.47	1.53	3821	80.5	
297	1/2			3/8		9/16	48.40	1.55	3748	77.4	
298				7/16		5/8	50.22	1.45	3937	78.4	
299	22×1/2	26×1/2	3 1/2×3 1/2	1/2	6 ×4	11/16	54.32	1.54	4336	79.8	
300	9/16	7/16		3/8	6 ×3 1/2	9/16	51.15	1.47	3865	75.6	
301				7/16			51.93	1.60	3918	75.4	
302		1/2		1/2	6 ×4	11/16	57.07	1.46	4454	78.0	

THREE PLATES.  FOUR ANGLES.

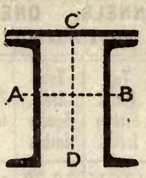
No.	Two Web Plates, Size in Inches	Top Plate, Size in Inches	TOP ANGLES		BOTTOM ANGLES		Total Area, Square Inches	Eccen-tricity	AXIS A. B.		AXIS C. D.
			Size in Inches	Thickness	Size in Inches	Thickness			I	r^2	I
303	22×5/8	26×7/16	3 1/2×3 1/2	3/8	6×3 1/2	1/2	52.84	1.62	3843	72.7	
304				7/16		9/16	54.68	1.52	4035	73.8	
305		1/2		1/2	6×4	5/8	58.72	1.60	4434	75.5	
306		9/16		9/16		3/4	63.25	1.57	4919	77.8	
307	22×3/4	26×7/16	3 1/2×3 1/2	3/8	6×3 1/2	1/2	58.34	1.47	4178	71.6	
308				7/16			59.12	1.58	4131	69.9	
309		1/2		1/2		5/8	63.60	1.55	4620	72.6	
310		9/16		9/16	6×4	3/4	68.75	1.44	5154	75.0	
311		5/8		5/8		13/16	72.15	1.59	5499	76.2	
312	22×7/8	26×7/16	3 1/2×3 1/2	7/16	6×3 1/2	1/2	64.62	1.45	4365	67.5	
313		1/2		1/2		5/8	69.10	1.43	4853	70.2	
314		9/16		9/16	6×4	11/16	73.19	1.49	5255	71.8	
315		5/8		5/8		3/4	76.59	1.63	5600	73.1	
316		3/4		3/4		7/8	83.36	1.88	6283	75.4	
317	22×1	1/2		1/2	6×3 1/2	1/2	72.50	1.65	4812	66.4	
318		5/8		5/8		11/16	80.33	1.75	5644	70.3	
319		3/4		3/4		7/8	87.98	1.85	6451	73.3	7863

320	24×3/8	20×1/2	3 1/2×3 1/2	3/8	5×3 1/2	9/16	41.90	1.86	3929	93.7	1956
321				7/16		5/8	43.58	1.76	4137	94.9	
322				1/2			44,34	1.92	4197	94.7	
323	7/16			3/8		9/16	44.90	1.74	4082	90.9	
324				7/16		5/8	46.58	1.65	4289	92.1	
325				1/2			47.34	1.79	4353	92.0	
326	24×1/2	20×1/2	3 1/2×3 1/2	3/8	5×3 1/2	1/2	46.96	1.88	4084	87.0	
327				7/16		9/16	48.68	1.77	4300	88.3	
328				1/2		5/8	50.34	1.69	4505	89.5	
329	9/16			3/8		1/2	49.96	1.77	4237	84.8	
330				7/16		9/16	51.68	1.67	4453	86.2	
331				1/2		5/8	53.34	1.59	4658	87.3	
332	24×5/8	20×1/2	3 1/2×3 1/2	3/8	5×3 1/2	7/16	52.02	1.89	4240	81.5	
333				1/2		9/16	55.44	1 71	4668	84.2	
334	3/4			3/8		7/16	58.02	1.70	4546	78.4	
335				1/2		9/16	61.44	1.54	4973	80.9	
326		5/8		5/8	6×3 1/2	5/8	67.56	1.74	5755	85.2	3100
337	24×3/8	28×7/16	3 1/2×3 1/2	3/8	5×3 1/2	9/16	44.15	2.38	4152	94.0	4725
338				7/16		5/8	45.83	2.27	4364	95.2	
339	7/16			3/8		9/16	47.15	2.23	4312	91.5	
340				7/16		5/8	48.83	2.13	4523	92.6	
341	1/2			3/8		1/2	49.21	2.35	4307	87.5	
342				7/16		9/16	50.93	2.23	4528	88.9	
343		1/2		1/2	6×3 1/2	9/16	54.56	2.39	4984	91 4	
344	9/16	7/16		3/8	5×3 1/2	1/2	52.21	2.21	4467	85.6	
345				7/16		9/16	53.93	2.11	4686	86.9	
346		1/2		1/2	6×3 1/2	9/16	57.56	2.27	5143	89.3	

THREE PLATES FOUR ANGLES.



No.	Two Web Plates, Size in Inches	Top Plate, Size in Inches	TOP ANGLES Size in Inches	TOP ANGLES Thickness	BOTTOM ANGLES Size in Inches	BOTTOM ANGLES Thickness	Total Area, Square Inches	Eccentricity	AXIS A. B. I	AXIS A. B. r^2	AXIS C. D. I
347	24×9/16	28×9/16	3½×3½	9/16	6×3½	11/16	62.11	2.22	5740	92.4	
348	5/8	7/16		3/8	5×3½	7/16	54.27	2.32	4462	82.2	
349				7/16		½	55.99	2.21	4684	83.7	
350		½		½	6×3½	½	59.50	2.39	5118	86.0	
351		9/16		9/16		5/8	64.09	2.33	5721	89.3	
352		5/8		5/8	6×4	11/16	68.28	2.38	6210	91.0	
353	24×¾	28×7/16	3½×3½	3/8	5×3½	3/8	59.31	2.30	4612	77.8	
354				7/16		7/16	61.05	2.20	4838	79.2	
355		½		½	6×3½	½	65.50	2.17	5437	83.0	
356		9/16		9/16		9/16	69.05	2.33	5857	84.8	
357		5/8		5/8	6×4	11/16	74.28	2.18	6532	87.9	
358	24×7/8	28×7/16	3½×3½	7/16	5×3½	7/16	67.05	2.00	5153	76.9	
359		½		½		9/16	71.44	2.01	5718	80.0	
360		5/8		5/8	6×4	5/8	79.18	2.19	6668	84.2	
361	1	½		½	5×3½	½	76.50	2.01	5873	76.8	
362		5/8		5/8	6×4	9/16	84.08	2.21	6796	80.8	
363		¾		¾		¾	92.26	2.28	7830	84.9	9701

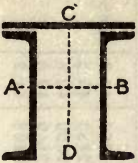
TWO CHANNELS  **ONE PLATE.**

No.	Two Channels: Depth in Inches	Two Channels: Lbs. per Foot	Dist. b. to b. [s	Top Plate, Size in Inches	Total Area, Square Inches	Eccentricity	Axis A. B.: I	Axis A. B.: r^2	Axis C. D.: I
1	5	6.5	4.0	8×¼	5.90	0.89	23.9	4.05	35.8
2			6.0	10×¼	6.40	1.03	25.3	3.95	69.3
3		9.0	4.0	8×¼	7.30	0.72	27.8	3.81	44.6
4			6.0	10×¼	7.80	0.84	29.5	3.78	86.3
5		11.5	3 5	8×¼	8.76	0.60	31.5	3.59	46.8
6			5.5	10×¼	9.26	0.71	33.4	3.61	94.2
7	6	8.0	6.0	10×¼	7.26	1.08	42.0	5.79	81.1
8			8.0	12×¼	7.76	1.21	44.0	5 67	134.5
9		10.5	5.5	10×¼	8.68	0.90	47.6	5.48	88.0
10			7.5	12×¼	9.18	1.02	49.9	5 44	149.6
11		13.0	5.5	10×¼	10.14	0.77	53.0	5.23	104.5
12			7.5	12×¼	10.64	0 88	55.7	5.23	177.2
13		15.5	5.0	10×¼	11.62	0.67	58.2	5.01	108.0
14			7.0	12×¼	12.12	0.77	61.1	5.04	187.9
15	7	9.75	5.5	10×¼	8.20	1.11	65.1	7.93	84.7
16			7.5	12×¼	8.70	1.25	68.1	7.82	143.2
17		12.25	5.5	10×¼	9.70	0.93	72.8	7.51	100.6
18			7.5	12×¼	10.20	1.07	76.2	7.47	170.1
19		14.75	5.0	10×¼	11.18	0.81	79.9	7.15	103.6
20			7.0	12×¼	11.68	0.93	83.7	7.17	180.1
21		17.25	5.0	10×¼	12.64	0.72	86.8	6.86	118.7
22			7.0	12×¼	13.14	0.83	90.8	6.91	206.0
23		19.75	4.5	10×¼	14.12	0.64	93.5	6.62	117.8
24			6.5	12×¼	14.62	0.74	97.8	6.69	210.4
25	8	11.25	5.0	10×¼	9.20	1.12	95.6	10.4	86.9
26			7.0	12×¼	9.70	1.28	100.0	10.3	150.0
27		13.75	5.0	10×¼	10.58	0.97	104.5	9.88	99.4
28			7.0	12×¼	11.08	1.12	109.2	9.86	172.1
29		16.25	5.0	10×5/16	12.69	1.03	120.6	9.50	118.9
30			7.0	12×5/16	13.31	1.17	126.4	9.49	205.8
31		18.75	4.5	10×⅜	14.77	1.06	136.7	9.26	122.7
32			6.5	12×⅜	15.52	1.21	143.7	9.26	218.6
33		21.25	4.5	10×⅜	16.25	0.97	146.2	9.00	136.4
34			6.5	12×⅜	17.00	1.11	153.7	9.04	242.6

TWO CHANNELS. ONE PLATE.

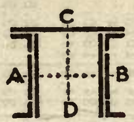
(CONTINUED.)

No.	TWO CHANNELS Depth in Inches	TWO CHANNELS Lbs. per Foot	Dist. b. to b. [s	Top Plate, Size in Inches	Total Area, Square Inches	Eccentricity	AXIS A. B. I	AXIS A. B. r^2	AXIS C. D. I
35	9	13.25	7.0	12×¼	10.78	1.29	140.9	13.1	170.8
36			9.0	14×¼	11.28	1.44	146.3	13.0	263.6
37		15.0	7.0	12×¼	11.82	1.17	149.7	12.7	187.5
38			9.0	14×¼	12.32	1.31	155.4	12.6	289.6
39		20.0	6.5	12×5/16	15.51	1.13	183.3	11.8	222.9
40			8.5	14×5/16	16.14	1.26	190.8	11.8	351.3
41		25.0	6.0	12×⅜	19.20	1.10	217.2	11.3	252.1
42			8.0	14×⅜	19.95	1.23	226.5	11.4	404.8
43	10	15.0	6.5	12×¼	11.92	1.29	192.8	16.2	175.5
44			8.5	14×¼	12.42	1.44	199.8	16 1	275.0
45		20.0	6.5	12×5/16	15.51	1.25	233.0	15.0	225.8
46			8.5	14×5/16	16.14	1.40	242.3	15.0	354.8
47			10.5	16×5/16	16.76	1.54	250.7	15.0	516.1
48		25.0	6.0	12×⅜	19.20	1.22	274.8	14.3	253.4
49			8.0	14×⅜	19.95	1.37	286.2	14.4	406.3
50			10.0	16×⅜	20.70	1.50	296.8	14.3	599.1
51	12	20.5	8.0	14×¼	15.56	1.38	358.0	23.0	331.9
52		25.0	7.5	14×¼	18.20	1.18	394.1	21.7	354.4
53			7.5	14×5/16	19.08	1.41	415.9	21.8	368.7
54			7.5	14×⅜	19.95	1.63	436.2	21.9	383.0
55			9.5	16×5/16	19.70	1.56	429.4	21.8	548.8
56			9.5	16×⅜	20.70	1.79	441.2	21.3	570.2
57			11.5	18×⅜	21.45	1.95	465.2	21.7	798.5
58		30.0	7.5	14×5/16	22.02	1.22	456.4	20.7	427.6
59			7.5	14×⅜	22.89	1.42	478.4	20.9	441.9
60			7.5	14×7/16	23.77	1.60	499.4	21.0	456.2
61			9.5	16×5/16	22.64	1.36	471.1	20.8	636.6
62			9.5	16×⅜	23.64	1.57	494.9	20.9	657.9
63			9.5	16×7/16	24.64	1.77	517.3	21.0	679.3
64			11.5	18×⅜	24.39	1.71	510.4	20.9	921.3
65			11.5	18×7/16	25.52	1.92	534.2	20.9	951.8
66		35.0	7.0	14×⅜	25.83	1.26	518.8	20.1	469.6
67			7.0	14×7/16	26.71	1.43	541.4	20.3	473.8
68			7.0	14×½	27.58	1.59	562.8	20.4	488.1
69			9.0	16×⅜	26.58	1.40	536.6	20.2	695.0
70			9.0	16×7/16	27.58	1.58	560.7	20.3	716.3
71			9.0	16×½	28.58	1.75	583.8	20.4	737.7
72			11.0	18×⅜	27.33	1.53	553.3	20.3	983.6
73			11.0	18×7/16	28.46	1.72	579.1	20.4	1014.
74			11.0	18×½	29.58	1.90	603.4	20.4	1044.

TWO CHANNELS  **ONE PLATE.**

No.	TWO CHANNELS		Dist. b. to b. [s	Top Plate, Size in Inches	Total Area, Square Inches	Eccentricity	AXIS A. B.		AXIS C. D.
	Depth in Inches	Lbs. per Foot					I	r^2	I
75	15	33.0	9.0	16×5/16	24.80	1.54	859.2	34.6	678.0
76			9.0	16×3/8	25.80	1.79	897.4	34.8	699.4
77			11.0	18×3/8	26.55	1.96	922.8	34.8	983.1
78			13.0	20×3/8	27.30	2.11	946.8	34.7	1320.
79		35.0	9.0	16×5/16	25.58	1.50	875.8	34.2	699.3
80			9.0	16×3/8	26.58	1.74	914.7	34.4	720.6
81			9.0	16×7/16	27.58	1.96	951.3	34.5	741.9
82			11.0	18×3/8	27.33	1.90	940.5	34.4	1013.
83			11.0	18×7/16	28.46	2.14	979.7	34.4	1044.
84			13.0	20×3/8	28.08	2.05	965.0	34.4	1360.
85			13.0	20×7/16	29.33	2.30	1006.	34.3	1402.
86		40.0	8.5	16×3/8	29.52	1.56	977.6	33.1	742.6
87			8.5	16×7/16	30.52	1.77	1017.	33.3	763.9
88			8.5	16×1/2	31.52	1.97	1054.	33.4	785.2
89			10.5	18×3/8	30.27	1.71	1005.	33.2	1057.
90			10.5	18×7/16	31.40	1.94	1047.	33.3	1087.
91			10.5	18×1/2	32.52	2.15	1086.	33.4	1118.
92			12.5	20×3/8	31.02	1.86	1031.	33.2	1432.
93			12.5	20×7/16	32.27	2.09	1075.	33.3	1474.
94			12.5	20×1/2	33.52	2.31	1117.	33.3	1515.
95		45.0	8.5	16×3/8	32.48	1.42	1039.	32.0	821.0
96			8.5	16×7/16	33.48	1.61	1080.	32.3	842.0
97			8.5	16×1/2	34.48	1.80	1119.	32.5	863.3
98			8.5	16×5/8	36.48	2.14	1194.	32.7	906.0
99			10.5	18×3/8	33.23	1.56	1068.	32.2	1168.
100			10.5	18×7/16	34.36	1.77	1112.	32.4	1199.
101			10.5	18×1/2	35.48	1.97	1154.	32.5	1229.
102			10.5	18×5/8	37.73	2.33	1233.	32.7	1290.
103			12.5	20×3/8	33.98	1.70	1096.	32.2	1582.
104			12.5	20×7/16	35.23	1.92	1142.	32.4	1624.
105			12.5	20×1/2	36.48	2.12	1186.	32.5	1666.
106			12.5	20×5/8	38.98	2.51	1269.	32.6	1749.
107			16.5	24×1/2	38.48	2.42	1246.	32.4	2760.
108			16.5	24×5/8	41.48	2.83	1335.	32.2	2904.

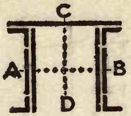
FIVE PLATES. FOUR ANGLES.



No.	Two Web Plates, Size in Inches	Top Plate, Size in Inches	Side Plates, Size in Inches	TOP ANGLES		BOTTOM ANGLES		Total Area, Square Inches	Eccentricity	AXIS A. B.		AXIS C. D.
				Size in Inches	Thickness	Size in Inches	Thickness			I	r^2	I
1	18×½	21×⅜	10½×⅜	3½×3½	⅜	5×3½	7/16	45.78	1.20	1953	42.7	2385
2		7/16	7/16				½	49.34	1.21	2133	43.2	
3	⅝	⅜	⅜				⅜	49.32	1.26	2000	40.6	
4		7/16					7/16	51.59	1.30	2169	42.0	
5			7/16					52.90	1.27	2183	41.3	
6	18×⅝	21×½	10½×⅜	3½×3½	⅜	5×3½	½	53.84	1.34	2336	43.4	
7			½					56.46	1.28	2364	41.9	
8		9/16	⅜				9/16	56.09	1.37	2505	44.7	
9			½					58.71	1.31	2534	43.2	
10					½		11/16	62 05	1.21	2750	44.3	
11	18×¾	21×⅜	10½×⅜	3½×3½	⅜	5×3½	⅜	53.82	1.16	2127	39.5	
12		½					½	58.34	1.24	2464	42.2	
13			½					60.96	1.18	2493	40.9	
14		⅝			½		11/16	67.87	1.29	2971	43.8	
15			⅝					70.50	1.24	2999	42.5	

16	20×½	24×7/16	12½×⅜	3½×3½	⅜	5×3½	9/16	53.78	1.32	2943	54.7	3977
17			½					56.90	1.25	2988	52.5	
18	⅝		⅜					58.78	1.21	3117	53.2	
19			½					61.90	1.15	3162	51.1	
20	20×⅝	24×½	12½×⅜	3½×3½	⅜	5×3½	⅝	61.18	1.28	3338	54.6	
21			½					64.30	1.22	3383	52.6	
22			⅝					67.43	1.16	3429	50.9	
23	20×¾	24×7/16	12½×⅜	3½×3½	⅜	5×3½	½	62.84	1.26	3195	50.8	
24			½					65.96	1.20	3240	49.1	
25		½			½		⅝	70.84	1.30	3646	51.5	
26			⅝					73.97	1.25	3691	49.9	
27	20×¾	24×⅝	12 ×½	3½×3½	½	6×4	11/16	76.32	1.32	4174	54.7	
28			⅝					79.32	1.28	4213	53.1	
29					⅝		¾	81.84	1.29	4400	53.8	
30			¾					84.84	1.25	4440	52.3	
31	20×⅞	24×½	12½×½	3½×3½	½	5×3½	⅝	75.84	1.21	3822	50.4	
32		⅝	12 ×⅝		⅝	6×4	11/16	85.78	1.34	4458	52.0	
33	1	½	12½×½		½	5×3½	9/16	79.94	1.25	3903	48.8	
34		⅝	12 ×⅝		⅝	6×4	11/16	90.78	1.26	4645	51.2	

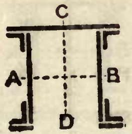
FIVE PLATES. FOUR ANGLES.



No.	Two Web Plates, Size in Inches	Top Plate, Size in Inches	Side Plates, Size in Inches	TOP ANGLES		BOTTOM ANGLES		Total Area, Square Inches	Eccentricity	AXIS A. B.		AXIS C. D.
				Size in Inches	Thickness	Size in Inches	Thickness			I	r^2	I
35	22×½	26×7/16	14½×⅜	3½×3½	⅜	6×3½	9/16	59.28	1.27	3959	66.8	5492
36			½					62.90	1.20	4028	64.0	
37		½	14 ×½		½	6×4	11/16	68.32	1.22	4593	67.2	
38	22×⅝	26×7/16	14½×⅜	3½×3½	⅜	6×3½	½	63.72	1.34	4058	63.7	
39			½					67.34	1.27	4127	61.3	
40		½	14 ×½		½	6×4	⅝	72.72	1.34	4683	64.4	
41			×⅝					76.22	1.29	4744	62.2	
42	22×¾	26×7/16	14½×½	3½×3½	7/16	6×3½	½	73.62	1.27	4414	60.0	
43		½			½		⅝	78.10	1.26	4903	62.8	
44			⅝					81.73	1.21	4971	60.8	
45	22×¾	26×⅝	14 ×⅝	3½×3½	⅝	6×4	13/16	89.65	1.33	5810	64.8	
46			¾					93.15	1.29	5871	63.0	
47	⅞	7/16	14½×7/16		7/16	6×3½	½	77.31	1.21	4610	59.6	
48		½	½		½		⅝	83.60	1.18	5132	61.4	

49	22×7/8	26×5/8	14 ×5/8	3½×3½	5/8	6×4	3/4	94.09	1.38	5911	62.8	
50	1	1/2	14½×½		1/2	6×3½	1/2	87.00	1.37	5100	58.6	
51		5/8	5/8		5/8		11/16	98.46	1.42	6009	61.0	
52		3/4	3/4		3/4		7/8	109.73	1.48	6893	62.8	
53	24×½	28×7/16	16½×3/8	3½×3½	3/8	5×3½	1/2	61.59	1.88	4641	75.4	6603
54			1/2					65.71	1.76	4749	72.3	
55		1/2			1/2	6×3½	9/16	71.06	1.84	5430	76.4	
56	24×5/8	28×7/16	16½×3/8	3½×3½	3/8	5×3½	7/16	66.65	1.89	4797	72.0	
57		1/2	1/2		1/2	6×3½	1/2	76.00	1.87	5566	73.2	
58		5/8	16 ×5/8		5/8	6×4	11/16	88.28	1.89	6709	76.0	
59	24×3/4	28×7/16	16½×3/8	3½×3½	3/8	5×3½	3/8	71.69	1.90	4948	69.0	
60		1/2	1/2		1/2	6×3½	1/2	82.00	1.73	5875	71.7	
61		5/8	16 ×5/8		5/8	6×4	11/16	94.28	1.77	7017	74.4	
62	24×7/8	28×7/16	16½×7/16	3½×3½	7/16	5×3½	7/16	81.49	1.65	5527	67.8	
63		1/2	1/2		1/2		9/16	87.94	1.63	6147	69.9	
64		5/8	16 ×5/8		5/8	6×4	5/8	99.18	1.80	7154	72.1	
65	24×1	28×½	16½×3/8	3½×3½	1/2	5×3½	1/2	88.88	1.73	6197	69.7	
66			1/2					93.00	1.65	6303	67.8	
67		5/8	16 ×½		5/8	6×4	9/16	100.08	1.90	7188	71.8	
68			5/8					104.08	1.83	7286	70.0	
69		3/4			3/4		3/4	112.26	1.92	8323	74.1	
70			3/4					116.26	1.86	8421	72.4	

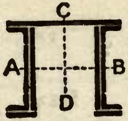
FIVE PLATES. FOUR ANGLES.



No.	Two Web Plates, Size in Inches	Top Plate, Size in Inches	TOP ANGLES		BOTTOM ANGLES		Flange Plates, Size in Inches	Total Area, Square Inches	AXIS A. B.		Eccentricity	AXIS C. D.
			Size in Inches	Thickness	Size in Inches	Thickness			I	r^2		I
1	18×½	21×½	3½×3½	⅜	3½×3½	½	4 ×⅝	44.96	2524	56.1	0.86	2328
2		9/16			4 ×4	⅝	4½×⅝	49.62	2870	57.8	0.51	2657
3	⅝	½				½	½	49.96	2656	53.2	0.73	2572
4		9/16				⅝	⅝	54.12	2993	55.3	0.47	2831
5	20×½	24×½	3½×3½	⅜	4 ×4	½	5 ×½	49.46	3403	68.8	1.01	3667
6		9/16				⅝		52.68	3697	70.2	0.98	
7	⅝	½				½		54.46	3574	65.6	0.92	
8		9/16				⅝		57.68	3869	67.1	0.89	
9				½			⅝	60.47	4129	68.3	0.86	
10	21×½	24×½	3½×3½	⅜	4 ×4	½	5 ×½	50.46	3797	75.2	1.04	3735
11				½		⅝	⅝	54.97	4256	77.4	0.68	4195
12		9/16		⅜				54.93	4300	78.3	0.72	4120
13				½	5 ×3½	⅝	6 ×⅝	58.34	4694	80.5	0.54	4657

14	21×5/8	24×1/2	3 1/2×3 1/2	3/8	5×3 1/2	1/2	6×1/2	57.21	4220	73.8	0.61	4365
15		9/16		1/2		5/8	5/8	63.59	4888	76.9	0.50	4968
16		5/8				3/4	3/4	68.37	5426	79.4	0.22	5422
17	21×11/16	24×1/2	3 1/2×3 1/2	3/8	5×3 1/2	1/2	6×1/2	59.84	4317	72.1	0.59	4519
18		9/16		1/2		5/8	5/8	66.22	4985	75.3	0.48	5120
19		5/8				3/4	3/4	71.00	5523	77.8	0.21	5573
20	21×3/4	24×1/2	3 1/2×3 1/2	1/2	5×3 1/2	5/8	6×5/8	67.34	4911	72.9	0.23	5193
21		9/16					3/4	70.34	5282	75.1	0.21	5443
22		5/8				3/4		73.62	5619	76.3	0.21	5716
23		11/16			6×4	5/8	7×3/4	76.72	5989	78.1	0.20	6186
24		3/4				3/4		80.38	6365	79.1	0.16	6518
25	22×1/2	26×1/2	3 1/2×3 1/2	3/8	5×3 1/2	1/2	6×1/2	53.96	4573	84.7	0.88	5066
26	5/8			1/2				61.00	4921	80.7	1.03	
27		11/16				5/8	5/8	69.22	5920	85.6	1.21	
28	22×5/8	26×5/8	3 1/2×3 1/2	1/2	5×3 1/2	5/8	6×3/4	69.09	5974	86.5	0.68	
29	3/4	1/2					5/8	69.84	5578	79.9	0.39	
30		5/8				3/4	3/4	76.37	6386	83.6	0.39	
31	24×1/2	26×1/2	3 1/2×3 1/2	3/8	5×3 1/2	1/2	6×1/2	55.96	5553	99.2	0.92	5275
32	5/8			1/2			5/8	65.00	6266	96.4	0.77	6095
33		5/8				5/8		70.09	6965	99.4	1.00	6521
34	3/4	1/2			6×4	5/8	7×9/16	75.10	7078	94.5	0.07	7275
35		5/8				3/4	11/16	82.26	8115	98.9	0.01	8038

SEVEN PLATES. FOUR ANGLES.



No.	Two Web Plates, Size in Inches	Top Plate, Size in Inches	Side Plates, Size in Inches	TOP ANGLES		BOTTOM ANGLES		Flange Plates, Size in Inches	Total Area, Square Inches	AXIS A. B.		Eccentricity	AXIS C. D.
				Size in Inches	Thickness	Size in Inches	Thickness			I	r^2		I
1	18×½	21×½	10½×⅜	3½×3½	⅜	3½×3½	½	4 ×⅝	52.84	2601	49.2	0.73	2735
2		9/16	10 ×⅜			4 ×4	⅝	4½×⅝	57.12	2933	51.4	0.47	
3	⅝	½					½	½	57.46	2720	47.3	0.67	
4		9/16	½				⅝	⅝	64.12	3077	48.0	0.43	3357
5	20×½	24×½	12 ×⅜	3½×3½	⅜	4 ×4	½	5 ×½	58.46	3515	60.1	0.90	4347
6		9/16	½				⅝		64.68	3847	59.9	0.84	
7	⅝	½	⅜				½		63.46	3685	58.1	0.83	
8		9/16	½				⅝		69.68	4016	57.6	0.78	
9					½			⅝	72.47	4277	59.0	0.76	
10	21×½	24×½	13 ×⅜	3½×3½	⅜	4 ×4	½	5 ×½	60.21	3940	65.4	0.91	4471
11			½		½		⅝	⅝	67.97	4440	65.3	0.60	
12		9/16			⅜				67.93	4486	66.0	0.63	
13			13½×½		½	5 ×3½	⅝	6 ×⅝	71.84	4902	68.2	0.44	

14	21×5/8	24×1/2	13 1/2×1/2	3 1/2×3 1/2	3/8	5×3 1/2	1/2	6×1/2	70.71	4428	62.6	0.50	
15		9/16	5/8		1/2		5/8	5/8	80.47	5148	64.0	0.39	
16		5/8					3/4	3/4	85.25	5684	66.7	0.18	
17	21×11/16	24×1/2	13 1/2×1/2	3 1/2×3 1/2	3/8	5×3 1/2	1/2	6×1/2	73.34	4526	61.7	0.48	
18		9/16	5/8		1/2		5/8	5/8	83.10	5244	63.1	0.38	
19		5/8					3/4	3/4	87.88	5780	65.8	0.17	
20	21×3/4	24×1/2	13 1/2×5/8	3 1/2×3 1/2	1/2	5×3 1/2	5/8	6×5/8	84.22	5169	61.4	0.18	
21		9/16						3/4	87.22	5539	63.5	0.17	
22		5/8					3/4		90.50	5876	64.9	0.17	
23		11/16	13 ×5/8			6×4	5/8	7×3/4	92.97	6218	66.9	0.21	
24		3/4					3/4		96.63	6594	68.2	0.18	7779
25	22×1/2	26×1/2	14 1/2×1/2	3 1/2×3 1/2	3/8	5×3 1/2	1/2	6×1/2	68.46	4836	70.6	0.69	6444
26	5/8				1/2				75.50	5188	68.7	0.83	
27		11/16	5/8				5/8	5/8	87.35	6258	71.6	0.96	
28	22×5/8	26×5/8	14 ×5/8	3 1/2×3 1/2	1/2	5×3 1/2	5/8	6×1/4	87.22	6300	72.2	0.54	
29	3/4	1/2	1/2					5/8	84.34	5834	69.2	0.32	
30		5/8	5/8				3/4	3/4	94.50	6706	71.0	0.32	
31	24×1/2	26×1/2	16 1/2×1/2	3 1/2×3 1/2	3/8	5×3 1/2	1/2	6×1/2	72.46	5937	81.9	0.71	6844
32	5/8				1/2			5/8	81.50	6650	81.6	0.60	
33		5/8	5/8				5/8		90.72	7449	82.1	0.77	
34	3/4	1/2	16 ×5/8			6×4	5/8	7×9/16	95.10	7495	78.8	0.11	
35		5/8	3/4				3/4	11/16	106 26	8628	81.2	0.06	10381

VALUES OF $\frac{L^2}{r^2}$ L=Length in Feet. r=Radius of Gyration in Inches.

r^2 in Inches	LENGTH IN FEET.										
	8	10	12	14	15	16	18	20	22	24	26
0.0											
0.1	640	1000	1440	1960							
0.2	320	500	720	980							
0.3	213	333	480	653	750						
0.4	160	250	360	490	562	640					
0,5	128	200	288	392	450	512	648				
0.6	107	167	240	327	375	427	540	667			
0.7	91	143	206	280	321	366	463	572	692		
0.8	80	125	180	245	281	320	405	500	605	720	
0.9	71	111	160	218	250	284	360	444	538	640	751
1.0	64	100	144	196	225	256	324	400	484	576	676
1.1	58	91	131	178	205	233	295	364	440	524	615
1.2	53	83	120	163	187	213	270	333	403	480	563
1.3	49	77	111	151	173	197	249	308	372	443	520
1.4	46	71	103	140	161	183	231	286	346	411	483
1.5	43	67	96	131	150	171	216	267	323	384	451
1.6	40	62	90	122	141	160	202	250	302	360	422
1.7	38	59	85	115	132	151	191	235	285	339	398
1.8	36	56	80	109	125	142	180	222	269	320	376
1.9	34	53	76	103	118	135	171	211	255	303	356
2.0	32	50	72	98	112	128	162	200	242	288	338
2.1	30	48	69	93	107	122	154	191	231	274	322
2.2	29	45	65	89	102	116	147	182	220	262	307
2.3	28	43	63	85	98	112	141	174	210	250	294
2.4	27	42	60	82	94	107	135	167	202	240	282
2.5	26	40	58	78	90	102	130	160	194	230	270
2.6	25	38	55	75	87	98	125	154	186	222	260
2.7	24	37	53	73	83	95	120	148	179	213	250
2.8	23	36	51	70	80	91	116	143	173	206	241
2.9	22	34	50	68	78	88	112	138	167	199	233
3.0	21	33	48	65	75	85	108	133	161	192	225
3.1	21	32	46	63	73	83	105	129	156	186	218
3.2	20	31	45	61	70	80	101	125	151	180	211
3.3	19	30	44	59	68	78	98	121	147	175	205
3.4	19	29	42	58	66	75	95	118	142	169	199
3.5	18	29	41	56	64	73	93	114	138	165	193
3.6	18	28	40	54	62	71	90	111	134	160	188
3.7	17	27	39	53	61	69	88	108	131	156	183
3.8	17	26	38	52	59	67	85	105	127	152	178
3.9	16	26	37	50	58	66	83	103	124	148	173
4.0	16	25	36	49	56	64	81	100	121	144	169
4.1	16	24	35	48	55	62	79	98	118	141	165
4.2	15	24	34	47	54	61	77	95	115	137	161
4.3	15	23	34	46	52	60	75	93	113	134	157
4.4	15	23	33	45	51	58	74	91	110	131	154

VALUES OF $\frac{L^2}{r^2}$ L=Length in Feet. r=Radius of Gyration in Inches.

LENGTH IN FEET												r^2 in Inches
28	30	32	34	36	38	40	42	44	46	48	50	
												0.0
												0.1
												0.2
												0.3
												0.4
												0.5
												0.6
												0.7
												0.8
												0.9
784												1 0
713	818											1.1
653	750	853										1.2
603	692	788	889									1.3
560	643	731	826	926								1.4
523	600	683	771	864	963							1.5
490	562	640	723	810	903							1.6
461	529	602	680	762	849	941						1.7
436	500	569	642	720	802	889	980					1.8
413	474	539	608	682	760	842	928					1.9
392	450	512	578	648	722	800	882	968				2 0
373	429	488	551	617	688	762	840	922				2.1
356	409	466	526	589	656	727	802	880	962			2.2
341	391	445	503	564	628	696	767	842	920			2.3
327	375	427	482	540	602	667	735	807	882	960		2.4
314	360	410	462	518	578	640	706	774	846	922		2.5
302	346	394	445	498	555	615	678	745	814	886	962	2.6
290	333	379	428	480	535	593	653	717	784	853	926	2.7
280	321	366	413	463	516	571	630	691	756	823	893	2.8
270	310	353	399	447	498	552	608	668	730	795	862	2.9
261	300	341	385	432	481	533	588	645	705	768	833	3.0
253	290	330	373	418	466	516	569	625	683	743	806	3.1
245	281	320	361	405	451	500	551	605	661	720	781	3.2
238	273	310	350	393	438	485	535	587	641	698	758	3.3
231	265	301	340	381	425	471	519	569	622	678	735	3.4
224	257	293	330	370	413	457	504	553	605	658	714	3.5
218	250	284	321	360	401	444	490	538	588	640	695	3.6
212	243	277	312	350	390	433	477	523	572	623	676	3.7
206	237	269	404	341	380	421	464	509	557	606	658	3.8
201	231	263	296	332	370	410	452	496	543	591	641	3.9
196	225	256	289	324	361	400	441	484	529	576	625	4 0
191	220	250	282	316	352	390	430	472	516	562	610	4.1
187	214	244	275	309	344	381	420	461	504	549	595	4.2
182	209	238	269	301	336	372	410	450	492	536	581	4.3
178	205	233	263	295	328	364	401	440	481	524	568	4.4

VALUES OF $\frac{L^2}{r^2}$ L=Length in Feet. r=Radius of Gyration in Inches.

r^2 in Inches	LENGTH IN FEET.										
	8	10	12	14	15	16	18	20	22	24	26
4.5	14	22	32	44	50	57	72	89	108	128	150
4.6	14	22	31	43	49	56	70	87	105	125	147
4.7	14	21	31	42	48	55	69	85	103	123	144
4.8	13	21	30	41	47	53	67	83	101	120	141
4.9	13	20	29	40	46	52	66	82	99	118	138
5.0	13	20	29	39	45	51	65	80	97	115	135
5.1	13	20	28	38	44	50	64	78	95	113	133
5.2	12	19	28	38	43	49	62	77	93	111	130
5.3	12	19	27	37	42	48	61	75	91	109	128
5.4	12	19	27	36	42	47	60	74	90	107	125
5.5	12	18	26	36	41	47	59	73	88	105	123
5.6	11	18	26	35	40	46	58	71	86	103	121
5.7	11	18	25	34	39	45	57	70	85	101	119
5.8	11	17	25	34	39	44	56	69	83	99	117
5.9	11	17	24	33	38	43	55	68	82	98	115
6.0	11	17	24	33	37	43	54	67	81	96	113
6.1	10	16	24	32	37	42	53	66	79	94	111
6.2	10	16	23	32	36	41	52	65	78	93	109
6.3	10	16	23	31	36	41	51	63	77	91	107
6.4	10	16	23	31	35	40	51	62	76	90	106
6.5	10	15	22	30	35	39	50	62	74	89	104
6.6	10	15	22	30	34	39	49	61	73	87	102
6.7	10	15	21	29	34	38	48	60	72	86	101
6.8	9	15	21	29	33	38	48	59	71	85	99
6.9	9	14	21	28	33	37	47	58	70	83	98
7.0	9	14	21	28	32	37	46	57	69	82	97
7.1	9	14	20	28	32	36	46	56	68	81	95
7.2	9	14	20	27	31	36	45	56	67	80	94
7.3	9	14	20	27	31	35	44	55	66	79	93
7.4	9	14	19	26	30	35	44	54	65	78	91
7.5	9	13	19	26	30	34	43	53	65	77	90
7.6	8	13	19	26	30	34	43	53	64	76	89
7.7	8	13	19	25	29	33	42	52	63	75	88
7.8	8	13	18	25	29	33	42	51	62	74	87
7.9	8	13	18	25	28	32	41	51	61	73	86
8.0	8	12	18	25	28	32	41	50	61	72	85
8.1	8	12	18	24	28	32	40	49	60	71	83
8.2	8	12	18	24	27	31	40	49	59	70	82
8.3	8	12	17	24	27	31	39	48	58	69	81
8.4	8	12	17	23	27	30	39	48	58	69	80
8.5	8	12	17	23	26	30	38	47	57	68	80
8.6	7	12	17	23	26	30	38	47	56	67	79
8.7	7	11	17	23	26	29	37	46	56	66	78
8.8	7	11	16	22	26	29	37	45	55	65	77
8.9	7	11	16	22	25	29	36	45	54	65	76

VALUES OF $\frac{L^2}{r^2}$ L=Length in Feet. r=Radius of Gyration in Inches.

LENGTH IN FEET												r^2 in Inches
28	30	32	34	36	38	40	42	44	46	48	50	
174	200	228	257	288	321	356	392	430	470	512	556	4.5
170	196	223	251	282	314	348	384	421	460	501	544	4.6
167	192	218	246	276	307	340	375	412	450	490	532	4.7
163	188	213	241	270	301	333	368	403	441	480	521	4 8
160	184	209	236	265	295	327	360	395	432	470	510	4.9
157	180	205	231	259	289	320	353	387	423	461	500	5 0
154	176	201	227	254	283	314	346	380	415	452	490	5.1
151	173	197	222	249	278	308	339	372	407	443	481	5.2
148	170	193	218	245	273	302	333	365	399	435	472	5 3
145	167	190	214	240	267	296	327	359	392	427	463	5.4
143	164	186	210	236	263	291	321	352	385	419	455	5.5
140	161	183	206	231	258	286	315	346	378	411	446	5 6
138	158	180	203	227	253	281	309	340	371	404	439	5.7
135	155	177	199	223	249	276	304	334	365	397	431	5.8
133	153	174	196	220	245	271	299	328	359	391	424	5 9
131	150	171	193	216	241	267	294	323	353	384	417	6 0
129	148	168	190	212	237	262	289	317	347	378	410	6.1
126	145	165	186	209	233	258	285	312	341	372	403	6.2
124	143	163	184	206	229	254	280	307	336	366	397	6.3
123	141	160	181	203	226	250	276	303	331	360	391	6.4
121	138	158	178	199	222	246	271	298	326	355	385	6.5
119	136	155	175	196	219	242	267	293	321	349	379	6.6
117	134	153	173	193	216	239	263	289	316	344	373	6.7
115	132	151	170	191	212	235	259	285	311	339	368	6.8
114	130	148	168	188	209	232	256	281	307	334	362	6.9
112	129	146	165	185	206	229	252	277	302	329	357	7.0
110	127	144	163	183	203	225	248	273	298	325	352	7.1
109	125	142	161	180	201	222	245	269	294	320	347	7.2
107	123	140	158	178	198	219	242	265	290	316	342	7.3
106	122	138	156	175	195	216	238	262	286	311	338	7.4
105	120	137	154	173	193	213	235	258	282	307	333	7.5
103	118	135	152	171	190	211	232	255	278	303	329	7.6
102	117	133	150	168	188	208	229	251	275	299	325	7.7
101	115	131	148	166	185	205	226	248	271	295	321	7.8
99	114	130	146	164	183	203	223	245	268	292	316	7.9
98	113	128	145	162	182	200	221	242	265	288	313	8 0
97	111	126	143	160	178	198	218	239	261	284	309	8 1
96	110	125	141	158	176	195	215	236	258	281	305	8.2
94	108	123	139	156	174	193	213	233	255	278	301	8.3
93	107	122	138	154	172	191	210	230	252	274	298	8.4
92	106	120	136	152	170	188	208	228	249	271	294	8 5
91	105	119	134	151	168	186	205	225	246	268	291	8.6
90	103	118	133	149	166	184	203	223	243	265	287	8.7
89	102	116	131	147	164	182	200	220	240	262	284	8.8
88	101	115	130	146	162	180	198	218	238	259	281	8.9

VALUES OF $\frac{L^2}{r^2}$

L=Length in Feet.
r=Radius of Gyration in Inches.

r^2 in Inches	LENGTH IN FEET.										
	8	10	12	14	15	16	18	20	22	24	26
9.0	7	11	16	22	25	28	36	44	54	64	75
9.1	7	11	16	22	25	28	36	44	53	63	74
9.2	7	11	16	21	24	28	35	43	53	63	73
9.3	7	11	15	21	24	28	35	43	52	62	73
9.4	7	11	15	21	24	27	34	43	52	61	72
9.5	7	11	15	21	24	27	34	42	51	61	71
9.6	7	10	15	20	23	27	34	42	50	60	70
9.7	7	10	15	20	23	26	33	41	50	59	70
9.8	7	10	15	20	23	26	33	41	49	59	69
9.9	6	10	15	20	23	26	33	40	49	58	68
10.0	6	10	14	20	23	26	32	40	48	58	68
10.1	6	10	14	19	22	25	32	40	48	57	67
10.2	6	10	14	19	22	25	32	39	47	56	66
10.3	6	10	14	19	22	25	31	39	47	56	66
10.4	6	10	14	19	22	25	31	38	47	55	65
10.5	6	10	14	19	21	24	31	38	46	55	64
10.6	6	9	14	18	21	24	31	38	46	54	64
10.7	6	9	13	18	21	24	30	37	45	54	63
10.8	6	9	13	18	21	24	30	37	45	53	63
10.9	6	9	13	18	21	23	30	37	44	53	62
11.0	6	9	13	18	20	23	29	36	44	52	61
11.1	6	9	13	18	20	23	29	36	44	52	61
11.2	6	9	13	18	20	23	29	36	43	51	60
11.3	6	9	13	17	20	23	29	35	43	51	60
11.4	6	9	13	17	20	22	28	35	42	51	59
11 5	6	9	13	17	20	22	28	35	42	50	59
11.6	6	9	12	17	19	22	28	34	42	50	58
11.7	5	9	12	17	19	22	28	34	41	49	58
11.8	5	8	12	17	19	22	27	34	41	49	57
11.9	5	8	12	16	19	22	27	34	41	48	57
12.0	5	8	12	16	19	21	27	33	40	48	56
12.5	5	8	12	16	18	20	26	32	39	46	54
13.0	5	8	11	15	17	20	25	31	37	44	52
13.5	5	7	11	15	17	19	24	30	36	43	50
14.0	5	7	10	14	16	18	23	29	35	41	48
14.5	4	7	10	14	16	18	22	28	33	40	47
15.0	4	7	10	13	15	17	22	27	32	38	45
15.5	4	6	9	13	15	17	21	26	31	37	44
16.0	4	6	9	12	14	16	20	25	30	36	42
16.5	4	6	9	12	14	16	20	24	29	35	41
17.0	4	6	8	12	13	15	19	24	28	34	40
17.5	4	6	8	11	13	15	19	23	28	33	39
18.0	4	6	8	11	13	14	18	22	27	32	38
18.5	3	5	8	11	12	14	18	22	26	31	37
19.0	3	5	8	10	12	13	17	21	25	30	36

VALUES OF $\frac{L^2}{r^2}$ L=Length in Feet. r=Radius of Gyration in Inches.

LENGTH IN FEET												r^2 in Inches
28	30	32	34	36	38	40	42	44	46	48	50	
87	100	114	128	144	160	178	196	215	235	256	278	9.0
86	99	113	127	142	159	176	194	213	233	253	275	9.1
85	98	111	126	141	157	174	192	210	230	250	272	9 2
84	97	110	124	139	155	172	190	208	228	248	269	9.3
83	96	109	123	138	154	170	188	206	225	245	266	9.4
83	95	108	122	136	152	168	186	204	223	243	263	9.5
82	94	107	120	135	150	167	184	202	220	240	260	9.6
81	93	106	119	134	149	165	182	200	218	238	258	9.7
80	92	104	118	132	147	163	180	198	216	235	255	9.8
79	91	103	117	131	146	162	178	196	214	233	253	9.9
78	90	102	116	130	144	160	176	194	212	230	250	10.0
78	89	101	114	128	143	158	175	192	210	228	248	10.1
77	88	100	113	127	142	157	173	190	207	226	245	10.2
76	87	99	112	126	140	155	171	188	205	224	243	10.3
75	87	98	111	125	139	154	170	186	203	222	240	10.4
75	86	98	110	123	138	152	168	184	202	219	238	10.5
74	85	97	109	122	136	151	166	183	200	217	236	10.6
73	84	96	108	121	135	150	165	181	198	215	234	10 7
73	83	95	107	120	134	148	163	179	196	213	231	10.8
72	83	94	106	119	132	147	162	178	194	211	229	10.9
71	82	93	105	118	131	145	160	176	192	209	227	11.0
71	81	92	104	117	130	144	159	174	191	208	225	11.1
70	80	91	103	116	129	143	157	173	189	206	223	11.2
69	80	91	102	115	128	142	156	171	187	204	221	11.3
69	79	90	101	114	127	140	155	170	186	202	219	11.4
68	78	89	101	113	126	139	153	168	184	200	217	11.5
68	78	88	100	112	124	138	152	167	182	199	216	11.6
67	77	88	99	111	123	137	151	165	181	197	214	11.7
66	76	87	98	110	122	136	149	164	179	195	212	11.8
66	76	86	97	109	121	134	148	163	178	194	210	11.9
65	75	85	96	108	120	133	147	161	176	192	208	12.0
63	72	82	92	104	116	128	141	155	169	184	200	12.5
60	69	79	89	100	111	123	136	149	163	177	192	13.0
58	67	76	86	96	107	119	131	143	157	171	185	13.5
56	64	73	83	93	103	114	126	138	151	165	179	14.0
54	62	71	80	89	100	110	122	134	146	159	172	14.5
52	60	68	77	86	96	107	118	129	141	154	167	15.0
51	58	66	75	84	93	103	114	125	137	149	161	15.5
49	56	64	72	81	90	100	110	121	132	144	156	16.0
48	55	62	70	79	88	97	107	117	128	140	152	16 5
46	53	60	68	76	85	94	104	114	124	136	147	17.0
45	51	59	66	74	83	91	101	111	121	132	143	17.5
44	50	57	64	72	80	89	98	108	118	128	139	18.0
42	49	55	62	70	78	86	95	105	114	125	135	18.5
41	47	54	61	68	76	84	93	102	111	121	132	19.0

VALUES OF $\frac{L^2}{r^2}$ L=Length in Feet. r=Radius of Gyration in Inches.

r^2 in Inches	LENGTH IN FEET. 8	10	12	14	15	16	18	20	22	24	26
19.5	3	5	7	10	12	13	17	21	25	30	35
20.0	3	5	7	10	11	13	16	20	24	29	34
20.5	3	5	7	10	11	12	16	20	24	28	33
21.0	3	5	7	9	11	12	15	19	23	27	32
21.5	3	5	7	9	10	12	15	19	23	27	31
22.0	3	5	7	9	10	12	15	18	22	26	31
22.5	3	4	6	9	10	11	14	18	22	26	30
23.0	3	4	6	9	10	11	14	17	21	25	29
23.5	3	4	6	8	10	11	14	17	21	25	29
24.0	3	4	6	8	9	11	13	17	20	24	28
24.5	3	4	6	8	9	10	13	16	20	24	28
25.0	3	4	6	8	9	10	13	16	19	23	27
25.5	3	4	6	8	9	10	13	16	19	23	27
26.0	2	4	6	8	9	10	12	15	19	22	26
26.5	2	4	5	7	8	10	12	15	18	22	26
27.0	2	4	5	7	8	9	12	15	18	21	25
27.5	2	4	5	7	8	9	12	15	18	21	25
28.0	2	4	5	7	8	9	12	14	17	21	24
28.5	2	4	5	7	8	9	11	14	17	20	24
29.0	2	3	5	7	8	9	11	14	17	20	23
29.5	2	3	5	7	8	9	11	14	16	20	23
30.0	2	3	5	7	8	9	11	13	16	19	23
30.5	2	3	5	6	7	8	11	13	16	19	22
31 0	2	3	5	6	7	8	10	13	16	19	22
31.5	2	3	5	6	7	8	10	13	15	18	21
32.0	2	3	5	6	7	8	10	13	15	18	21
32.5	2	3	4	6	7	8	10	12	15	18	21
33.0	2	3	4	6	7	8	10	12	15	17	20
33.5	2	3	4	6	7	8	10	12	14	17	20
34.0	2	3	4	6	7	8	10	12	14	17	20
34.5	2	3	4	6	7	7	9	12	14	17	20
35.0	2	3	4	6	6	7	9	11	14	16	19
35.5	2	3	4	6	6	7	9	11	14	16	19
36.0	2	3	4	5	6	7	9	11	13	16	19
36.5	2	3	4	5	6	7	9	11	13	16	19
37.0	2	3	4	5	6	7	9	11	13	16	18
37.5	2	3	4	5	6	7	9	11	13	15	18
38.0	2	3	4	5	6	7	9	11	13	15	18
38.5	2	3	4	5	6	7	8	10	13	15	18
39.0	2	3	4	5	6	7	8	10	12	15	17
39.5	2	3	4	5	6	6	8	10	12	15	17
40.0	2	3	4	5	6	6	8	10	12	14	17
40.5	2	2	4	5	6	6	8	10	12	14	17
41.0	2	2	4	5	5	6	8	10	12	14	16
41.5	2	2	3	5	5	6	8	10	12	14	16

VALUES OF $\frac{L^2}{r^2}$ L=Length in Feet. r=Radius of Gyration in Inches.

LENGTH IN FEET												r^2 in Inches
28	30	32	34	36	38	40	42	44	46	48	50	
40	46	53	59	66	74	82	90	99	109	118	128	19.5
39	45	51	58	65	72	80	88	97	106	115	125	20.0
38	44	50	56	63	70	78	86	94	103	112	122	20.5
37	43	49	55	62	69	76	84	92	101	110	119	21.0
36	42	48	54	60	67	74	82	90	98	107	116	21.5
36	41	47	53	59	66	73	80	88	96	105	114	22.0
35	40	46	51	58	64	71	78	86	94	102	111	22.5
34	39	45	50	56	63	70	77	84	92	100	109	23.0
33	38	44	49	55	61	68	75	82	90	98	106	23.5
33	38	43	48	54	60	67	74	81	88	96	104	24.0
32	37	42	47	53	59	65	72	79	86	94	102	24.5
31	36	41	46	52	58	64	71	77	85	92	100	25.0
31	35	40	45	51	57	63	69	76	83	90	98	25.5
30	35	39	44	50	56	62	68	74	81	89	96	26.0
30	34	39	44	49	54	60	67	73	80	87	94	26.5
29	33	38	43	48	53	59	65	72	78	85	93	27.0
29	33	37	42	47	53	58	64	70	77	84	91	27.5
28	32	37	41	46	52	57	63	69	76	82	89	28.0
28	32	36	41	45	51	56	62	68	74	81	88	28.5
27	31	35	40	45	50	55	61	67	73	79	86	29.0
27	31	35	39	44	49	54	60	66	72	78	85	29.5
26	30	34	39	43	48	53	59	65	71	77	83	30.0
26	30	34	38	42	47	52	58	63	69	76	82	30.5
25	29	33	37	42	47	52	57	62	68	74	81	31.0
25	29	33	37	41	46	51	56	61	67	73	79	31.5
25	28	32	36	41	45	50	55	61	66	72	78	32.0
24	28	32	36	40	44	49	54	60	65	71	77	32.5
24	27	31	35	39	44	48	53	59	64	70	76	33.0
23	27	31	35	39	43	48	53	58	63	69	75	33.5
23	26	30	34	38	42	47	52	57	62	68	74	34.0
23	26	30	34	38	42	46	51	56	61	67	72	34.5
22	26	29	33	37	41	46	50	55	60	66	71	35.0
22	25	29	33	37	41	45	50	55	60	65	70	35.5
22	25	28	32	36	40	44	49	54	59	64	69	36.0
21	25	28	32	36	40	44	48	53	58	63	69	36.5
21	24	28	31	35	39	43	48	52	57	62	68	37.0
21	24	27	31	35	39	43	47	52	56	61	67	37.5
21	24	27	30	34	38	42	46	51	56	61	66	38.0
20	23	27	30	34	38	42	46	50	55	60	65	38.5
20	23	26	30	33	37	41	45	50	54	59	64	39.0
20	23	26	29	33	37	41	45	49	54	58	63	39.5
20	23	26	29	32	36	40	44	48	53	58	63	40.0
19	22	25	29	32	36	40	44	48	52	57	62	40.5
19	22	25	28	32	35	39	43	47	52	56	61	41.0
19	22	25	28	31	35	39	43	47	51	56	60	41.5

VALUES OF $\frac{L^2}{r^2}$ L=Length in Feet. r=Radius of Gyration in Inches.

r^2 in Inches	LENGTH IN FEET.									
	8	10	12	14	15	16	18	20	22	24	26
42.0	2	2	3	5	5	6	8	10	12	14	16
42.5	2	2	3	5	5	6	8	9	11	14	16
43.0	1	2	3	5	5	6	8	9	11	13	16
43.5	1	2	3	5	5	6	7	9	11	13	16
44.0	1	2	3	4	5	6	7	9	11	13	15
44.5	1	2	3	4	5	6	7	9	11	13	15
45.0	1	2	3	4	5	6	7	9	11	13	15
45.5	1	2	3	4	5	6	7	9	11	13	15
46.0	1	2	3	4	5	5	7	9	11	13	15
46.5	1	2	3	4	5	5	7	9	10	12	15
47.0	1	2	3	4	5	5	7	9	10	12	14
47.5	1	2	3	4	5	5	7	8	10	12	14
48.0	1	2	3	4	5	5	7	8	10	12	14
48 5	1	2	3	4	5	5	7	8	10	12	14
49.0	1	2	3	4	5	5	7	8	10	12	14
49.5	1	2	3	4	5	5	7	8	9	12	14
50.0	1	2	3	4	5	5	6	8	9	12	14
50.5	1	2	3	4	5	5	6	8	9	11	13
51.0	1	2	3	4	4	5	6	8	9	11	13
51.5	1	2	3	4	4	5	6	8	9	11	13
52.0	1	2	3	4	4	5	6	8	9	11	13
52.5	1	2	3	4	4	5	6	8	9	11	13
53.0	1	2	3	4	4	5	6	8	9	11	13
53.5	1	2	3	4	4	5	6	7	9	11	13
54.0	1	2	3	4	4	5	6	7	9	11	13
54.5	1	2	3	4	4	5	6	7	9	11	12
55.0	1	2	3	4	4	5	6	7	9	10	12
55.5	1	2	3	4	4	5	6	7	9	10	12
56.0	1	2	3	3	4	5	6	7	9	10	12
56.5	1	2	3	3	4	5	6	7	9	10	12
57.0	1	2	3	3	4	4	6	7	8	10	12
57.5	1	2	3	3	4	4	6	7	8	10	12
58.0	1	2	2	3	4	4	6	7	8	10	12
58.5	1	2	2	3	4	4	6	7	8	10	12
59.0	1	2	2	3	4	4	5	7	8	10	11
59.5	1	2	2	3	4	4	5	7	8	10	11
60,0	1	2	2	3	4	4	5	7	8	10	11
60.5	1	2	2	3	4	4	5	7	8	10	11
61.0	1	2	2	3	4	4	5	7	8	9	11
61.5	1	2	2	3	4	4	5	7	8	9	11
62.0	1	2	2	3	4	4	5	6	8	9	11
62.5	1	2	2	3	4	4	5	6	8	9	11
63.0	1	2	2	3	4	4	5	6	8	9	11
63.5	1	2	2	3	4	4	5	6	8	9	11
64.0	1	2	2	3	4	4	5	6	8	9	11

VALUES OF $\frac{L^2}{r^2}$ L=Length in Feet. r=Radius of Gyration in Inches.

LENGTH IN FEET												r^2 in Inches
28	30	32	34	36	38	40	42	44	46	48	50	
19	21	24	28	31	34	38	42	46	50	55	60	42.0
18	21	24	27	30	34	38	42	46	50	54	59	42.5
18	21	24	27	30	34	37	41	45	49	54	58	43 0
18	21	24	27	30	33	37	41	45	49	53	57	43.5
18	20	23	26	29	33	36	40	44	48	52	57	44.0
18	20	23	26	29	32	36	40	44	48	52	56	44.5
17	20	23	26	29	32	36	39	43	47	51	56	45.0
17	20	23	25	28	32	35	39	43	47	51	55	45.5
17	20	22	25	28	31	35	38	42	46	50	54	46.0
17	19	22	25	28	31	34	38	42	45	50	54	46.5
17	19	22	25	28	31	34	38	41	45	49	53	47.0
17	19	22	24	27	30	34	37	41	45	49	53	47.5
16	19	21	24	27	30	33	37	40	44	48	52	48.0
16	19	21	24	27	30	33	36	40	44	48	52	48.5
16	18	21	24	26	29	33	36	40	43	47	51	49.0
16	18	21	23	26	29	32	36	39	43	47	51	49.5
16	18	20	23	26	29	32	35	39	42	46	50	50.0
16	18	20	23	26	29	32	35	38	42	46	50	50.5
15	18	20	23	25	28	31	35	38	41	45	49	51.0
15	17	20	22	25	28	31	34	38	41	45	49	51.5
15	17	20	22	25	28	31	34	37	41	44	48	52.0
15	17	20	22	25	28	30	34	37	40	44	48	52.5
15	17	19	22	24	27	30	33	37	40	43	47	53.0
15	17	19	22	24	27	30	33	36	40	43	47	53.5
15	17	19	21	24	27	30	33	36	39	43	46	54.0
14	17	19	21	24	26	29	32	36	39	42	46	54.5
14	16	19	21	24	26	29	32	35	38	42	45	55.0
14	16	18	21	23	26	29	32	35	38	42	45	55.5
14	16	18	21	23	26	29	31	35	38	41	45	56.0
14	16	18	20	23	26	28	31	34	37	41	44	56.5
14	16	18	20	23	25	28	31	34	37	40	44	57 0
14	16	18	20	23	25	28	31	34	37	40	43	57.5
14	16	18	20	22	25	28	30	33	36	40	43	58.0
13	15	18	20	22	25	27	30	33	36	39	43	58 5
13	15	17	20	22	24	27	30	33	36	39	42	59.0
13	15	17	19	22	24	27	30	33	36	39	42	59.5
13	15	17	19	22	24	27	29	32	35	38	42	60 0
13	15	17	19	21	24	26	29	32	35	38	41	60.5
13	15	17	19	21	24	26	29	32	35	38	41	61.0
13	15	17	19	21	23	26	29	31	34	37	41	61.5
13	15	17	19	21	23	26	28	31	34	37	40	62.0
13	14	16	18	21	23	26	28	31	34	37	40	62.5
12	14	16	18	21	23	25	28	31	34	37	40	63.0
12	14	16	18	20	23	25	28	30	33	36	39	63.5
12	14	16	18	20	23	25	28	30	33	36	39	64.0

VALUES OF $\frac{L^2}{r^2}$ L=Length in Feet. r=Radius of Gyration in Inches.

r^2 in Inches	LENGTH IN FEET. 14	15	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50
64.5	3	3	4	5	6	8	9	10	12	14	16	18	20	22	25	27	30	33	36	39
65.0	3	3	4	5	6	7	9	10	12	14	16	18	20	22	25	27	30	33	35	38
65.5	3	3	4	5	6	7	9	10	12	14	16	18	20	22	24	27	30	32	35	38
66.0	3	3	4	5	6	7	9	10	12	14	16	18	20	22	24	27	29	32	35	38
66.5	3	3	4	5	6	7	9	10	12	14	15	17	19	22	24	27	29	32	35	38
67 0	3	3	4	5	6	7	9	10	12	13	15	17	19	22	24	26	29	32	34	37
67.5	3	3	4	5	6	7	9	10	12	13	15	17	19	21	24	26	29	31	34	37
68.0	3	3	4	5	6	7	8	10	12	13	15	17	19	21	24	26	28	31	34	37
68.5	3	3	4	5	6	7	8	10	11	13	15	17	19	21	23	26	28	31	34	36
69.0	3	3	4	5	6	7	8	10	11	13	15	17	19	21	23	26	28	31	33	36
69.5	3	3	4	5	6	7	8	10	11	13	15	17	19	21	23	25	28	30	33	36
70.0	3	3	4	5	6	7	8	10	11	13	15	17	19	21	23	25	28	30	33	36
70.5	3	3	4	5	6	7	8	10	11	13	15	16	18	20	23	25	27	30	33	35
71.0	3	3	4	5	6	7	8	10	11	13	14	16	18	20	23	25	27	30	32	35
71.5	3	3	4	5	6	7	8	9	11	13	14	16	18	20	22	25	27	30	32	35
72.0	3	3	4	5	6	7	8	9	11	13	14	16	18	20	22	25	27	29	32	35
73.0	3	3	4	4	5	7	8	9	11	12	14	16	18	20	22	24	27	29	32	34
74.0	3	3	3	4	5	7	8	9	11	12	14	16	18	20	22	24	26	29	31	34
75.0	3	3	3	4	5	6	8	9	10	12	14	15	17	19	21	24	26	28	31	33
76.0	3	3	3	4	5	6	8	9	10	12	13	15	17	19	21	23	25	28	30	33
77.0	3	3	3	4	5	6	7	9	10	12	13	15	17	19	21	23	25	27	30	32
78.0	2	3	3	4	5	6	7	9	10	12	13	15	17	19	21	23	25	27	30	32
79.0		3	3	4	5	6	7	9	10	11	13	15	16	18	20	22	25	27	29	32
80.0		3	3	4	5	6	7	8	10	11	13	14	16	18	20	22	24	26	29	31
81.0		3	3	4	5	6	7	8	10	11	13	14	16	18	20	22	24	26	28	31
82.0		3	3	4	5	6	7	8	10	11	12	14	16	18	20	22	24	26	28	30
84.0		3	3	4	5	6	7	8	9	11	12	14	15	17	19	21	23	25	27	30
86.0		3	3	4	5	6	7	8	9	10	12	13	15	17	19	21	23	25	27	29
88.0		3	3	4	5	6	7	8	9	10	12	13	15	16	18	20	22	24	26	28
90.0		3	3	4	4	5	6	8	9	10	11	13	14	16	18	20	22	24	26	28
92.0		2	3	4	4	5	6	7	9	10	11	13	14	16	17	19	21	23	25	27
94.0			3	3	4	5	6	7	8	10	11	12	14	15	17	19	21	23	25	27
96.0			3	3	4	5	6	7	8	9	11	12	14	15	17	18	20	22	24	26
98.0			3	3	4	5	6	7	8	9	10	12	13	15	16	18	20	22	24	26
100.0			3	3	4	5	6	7	8	9	10	12	13	14	16	18	19	21	23	26
102.0			3	3	4	5	6	7	8	9	10	11	13	14	16	17	19	21	23	25
104.0			2	3	4	5	6	7	7	9	10	11	12	14	15	17	19	20	22	24
106.0				3	4	5	5	6	7	8	10	11	12	14	15	17	18	20	22	24
108.0				3	4	4	5	6	7	8	9	11	12	13	15	16	18	20	21	23
110.0				3	4	4	5	6	7	8	9	11	12	13	15	16	18	19	21	23
112.0				3	4	4	5	6	7	8	9	10	12	13	14	16	17	19	21	22
114.0				3	4	4	5	6	7	8	9	10	11	13	14	15	17	19	20	22
116.0				3	3	4	5	6	7	8	9	10	11	12	14	15	17	18	20	22
118.0				3	3	4	5	6	7	8	9	10	11	12	14	15	16	18	20	21
120.0				3	3	4	5	6	7	8	9	10	11	12	13	15	16	18	19	21

WORKING STRENGTHS OF SOFT STEEL COLUMNS.

Square Bearing

$$S = \frac{12500}{1 + \frac{l^2}{36000 r^2}}$$

Pin and Square Bearing

$$S = \frac{12500}{1 + \frac{l^2}{24000 r^2}}$$

Pin Bearing

$$S = \frac{12500}{1 + \frac{l^2}{18000 r^2}}$$

Where :—

S = Working strengths in lbs. per square inch.
L = Length in feet.
l = Length in inches.
r = Least radius of gyration in inches.

$\frac{L^2}{r^2}$	WORKING STRENGTHS Lbs. per Sq. In.			$\frac{L^2}{r^2}$	WORKING STRENGTHS Lbs. per Sq. In.		
	Square	Pin and Square	Pin		Square	Pin and Square	Pin
1	12495	12426	12402	26	11323	10813	10348
2	12402	12352	12304	27	11282	10757	10280
3	12352	12280	12208	28	11241	10702	10213
4	12304	12208	12113	29	11201	10647	10146
5	12255	12137	12020	30	11161	10593	10081
6	12208	12067	11929	31	11121	10540	10016
7	12160	11997	11838	32	11082	10487	9952
8	12112	11928	11748	33	11043	10434	9889
9	12065	11860	11660	34	11004	10382	9827
10	12019	11793	11575	35	10965	10331	9766
11	11973	11726	11490	36	10927	10280	9705
12	11927	11660	11406	37	10888	10229	9645
13	11882	11596	11323	38	10851	10179	9586
14	11837	11532	11241	39	10813	10130	9527
15	11792	11468	11161	40	10776	10081	9469
16	11748	11405	11082	41	10739	10032	9412
17	11704	11343	11003	42	10702	9984	9355
18	11660	11282	10927	43	10666	9936	9301
19	11617	11221	10852	44	10629	9889	9246
20	11574	11161	10776	45	10592	9842	9191
21	11531	11102	10702	46	10557	9796	9137
22	11489	11043	10629	47	10522	9750	9084
23	11447	10984	10557	48	10486	9705	9032
24	11405	10927	10487	49	10451	9660	8980
25	11364	10870	10417	50	10416	9615	8928

WORKING STRENGTHS OF SOFT STEEL COLUMNS.

(CONTINUED.)

$\frac{L^2}{r^2}$	WORKING STRENGTHS Lbs. per Sq. Inch.			$\frac{L^2}{r^2}$	WORKING STRENGTHS Lbs. per Sq. Inch.		
	Square	Pin and Square	Pin		Square	Pin and Square	Pin
51	10382	9571	8878	86	9300	8245	7405
52	10348	9528	8828	87	9273	8213	7370
53	10314	9484	8778	88	9246	8181	7335
54	10280	9441	8728	89	9219	8149	7301
55	10246	9398	8680	90	9192	8117	7267
56	10212	9355	8633	91	9165	8085	7233
57	10179	9314	8585	92	9138	8054	7200
58	10146	9273	8538	93	9111	8023	7168
59	10113	9232	8492	94	9084	7992	7135
60	10081	9191	8446	95	9058	7962	7102
61	10048	9151	8401	96	9032	7931	7070
62	10016	9111	8356	97	9006	7901	7038
63	9984	9071	8311	98	8980	7871	7007
64	9953	9032	8267	99	8954	7842	6975
65	9921	8993	8224	100	8928	7813	6944
66	9889	8954	8181	101	8903	7783	6914
67	9858	8916	8138	102	8878	7754	6883
68	9827	8878	8096	103	8853	7726	6853
69	9796	8840	8054	104	8828	7697	6823
70	9766	8803	8013	105	8803	7669	6793
71	9735	8766	7972	106	8778	7641	6764
72	9705	8729	7932	107	8753	7613	6735
73	9675	8693	7892	108	8729	7585	6706
74	9645	8657	7852	109	8705	7558	6678
75	9615	8621	7813	110	8680	7530	6649
76	9586	8585	7774	111	8656	7503	6621
77	9557	8550	7735	112	8633	7476	6593
78	9528	8515	7697	113	8609	7449	6565
79	9499	8480	7659	114	8585	7423	6538
80	9470	8446	7622	115	8562	7397	6510
81	9441	8412	7585	116	8538	7370	6483
82	9412	8378	7548	117	8515	7344	6457
83	9384	8344	7512	118	8492	7318	6430
84	9356	8311	7476	119	8469	7293	6404
85	9328	8278	7440	120	8446	7268	6378

WORKING STRENGTHS OF SOFT STEEL COLUMNS.

(CONTINUED.)

$\frac{L^2}{r^2}$	WORKING STRENGTHS Lbs. per Sq. Inch.			$\frac{L^2}{r^2}$	WORKING STRENGTHS Lbs. per Sq. Inch.		
	Square	Pin and Square	Pin		Square	Pin and Square	Pin
121	8423	7242	6352	180	7268	6010	5123
122	8401	7217	6326	185	7184	5924	5040
123	8378	7192	6300	190	7102	5842	4960
124	8356	7168	6275	195	7023	5760	4883
125	8333	7143	6250	200	6944	5682	4808
126	8311	7118	6225	205	6868	5605	4735
127	8289	7094	6200	210	6793	5531	4664
128	8267	7070	6176	215	6720	5458	4596
129	8245	7046	6152	220	6649	5388	4529
130	8224	7023	6127	225	6579	5319	4464
131	8202	6999	6103	230	6510	5252	4401
132	8181	6975	6080	235	6443	5187	4340
133	8159	6952	6056	240	6378	5123	4281
134	8138	6929	6033	245	6313	5061	4223
135	8117	6906	6010	250	6250	5000	4167
136	8096	6883	5987	255	6188	4941	4112
137	8075	6861	5964	260	6128	4883	4058
138	8054	6838	5941	265	6068	4826	4007
139	8033	6816	5918	270	6010	4771	3956
140	8013	6793	5896	275	5952	4717	3906
141	7992	6771	5874	280	5896	4664	3858
142	7972	6749	5852	285	5841	4612	3811
143	7952	6728	5830	290	5787	4562	3765
144	7932	6706	5808	295	5734	4513	3720
145	7912	6684	5787	300	5682	4464	3677
146	7892	6633	5766	310	5580	4371	3592
147	7872	6642	5744	320	5483	4281	3511
148	7852	6621	5723	330	5388	4195	3434
149	7832	6600	5702	340	5297	4112	3360
150	7813	6579	5682	350	5209	4032	3288
155	7716	6477	5580	360	5123	3956	3222
160	7622	6378	5482	370	5040	3882	3157
165	7530	6282	5388	380	4960	3811	3094
170	7441	6188	5297	390	4883	3742	3034
175	7353	6098	5208	400	4808	3676	2976

WORKING STRENGTHS OF MEDIUM STEEL COLUMNS.

Square Bearing

$$S = \frac{15000}{1 + \frac{l^2}{36000 r^2}}$$

Pin and Square Bearing

$$S = \frac{15000}{1 + \frac{l^2}{24000 r^2}}$$

Pin Bearing

$$S = \frac{15000}{1 + \frac{l^2}{18000 r^2}}$$

Where :—

S = Working strengths in lbs. per square inch.
L = Length in feet.
l = Length in inches.
r = Least radius of gyration in inches.

$\frac{L^2}{r^2}$	WORKING STRENGTHS Lbs. per Sq. In.			$\frac{L^2}{r^2}$	WORKING STRENGTHS Lbs. per Sq. In.		
	Square	Pin and Square	Pin		Square	Pin and Square	Pin
1	14940	14910	14881	26	13587	12976	12417
2	14881	14822	14764	27	13538	12909	12336
3	14822	14735	14649	28	13489	12843	12255
4	14764	14649	14535	29	13441	12777	12175
5	14706	14563	14423	30	13393	12712	12097
6	14648	14479	14313	31	13345	12648	12019
7	14591	14396	14205	32	13298	12584	11943
8	14535	14313	14098	33	13251	12521	11867
9	14479	14232	13992	34	13204	12459	11793
10	14423	14151	13889	35	13157	12397	11719
11	14368	14071	13787	36	13112	12336	11646
12	14313	13992	13686	37	13066	12275	11574
13	14259	13915	13587	38	13021	12215	11503
14	15205	13838	13489	39	12976	12155	11433
15	14151	13761	13393	40	12931	12097	11364
16	14098	13686	13298	41	12887	12039	11295
17	14045	13612	13204	42	12843	11981	11228
18	13992	13538	13112	43	12799	11924	11161
19	13940	13465	13021	44	12755	11867	11095
20	13889	13393	12931	45	12712	11811	11030
21	13838	13322	12843	46	12669	11756	10965
22	13787	13251	12755	47	12626	11700	10901
23	13736	13181	12669	48	12583	11646	10838
24	13686	13112	12584	49	12542	11592	10776
25	13637	13044	12500	50	12500	11538	10714

WORKING STRENGTHS OF MEDIUM STEEL COLUMNS.

(CONTINUED.)

$\frac{L^2}{r^2}$	WORKING STRENGTHS Lbs. per Sq. Inch.			$\frac{L^2}{r^2}$	WORKING STRENGTHS Lbs. per Sq. Inch.		
	Square	Pin and Square	Pin		Square	Pin and Square	Pin
51	12459	11486	10653	86	11161	9894	8886
52	12417	11433	10593	87	11128	9855	8844
53	12376	11381	10534	88	11095	9817	8803
54	12336	11329	10475	89	11062	9779	8762
55	12295	11278	10417	90	11030	9740	8721
56	12255	11227	10359	91	10997	9702	8680
57	12215	11177	10302	92	10965	9665	8640
58	12176	11128	10246	93	10933	9628	8601
59	12136	11078	10190	94	10901	9591	8562
60	12097	11030	10135	95	10870	9554	8523
61	12058	10981	10081	96	10838	9518	8484
62	12019	10933	10027	97	10807	9482	8446
63	11981	10886	9974	98	10776	9446	8408
64	11943	10838	9921	99	10745	9410	8370
65	11905	10791	9869	100	10714	9375	8333
66	11867	10745	9817	101	10684	9340	8297
67	11830	10699	9766	102	10653	9305	8260
68	11793	10653	9715	103	10623	9271	8224
69	11756	10608	9665	104	10593	9237	8188
70	11719	10563	9615	105	10563	9202	8152
71	11682	10519	9566	106	10534	9169	8117
72	11646	10475	9518	107	10504	9135	8082
73	11610	10431	9470	108	10475	9102	8047
74	11574	10388	9422	109	10446	9069	8013
75	11538	10345	9375	110	10417	9036	7979
76	11503	10302	9329	111	10388	9003	7945
77	11468	10260	9282	112	10359	8971	7911
78	11433	10218	9236	113	10330	8930	7878
79	11398	10176	9191	114	10302	8907	7845
80	11364	10135	9146	115	10274	8876	7812
81	11329	10094	9102	116	10246	8844	7780
82	11295	10053	9058	117	10218	8813	7748
83	11261	10013	9014	118	10190	8782	7716
84	11227	9973	8971	119	10163	8751	7685
85	11194	9934	8928	120	10135	8721	7653

WORKING STRENGTHS OF MEDIUM STEEL COLUMNS.

(CONTINUED.)

$\frac{L^2}{r^2}$	WORKING STRENGTHS Lbs. per Sq. Inch.			$\frac{L^2}{r^2}$	WORKING STRENGTHS Lbs. per Sq. Inch.		
	Square	Pin and Square	Pin		Square	Pin and Square	Pin
121	10108	8691	7622	180	8721	7212	6143
122	10081	8661	7591	185	8621	7109	6048
123	10054	8631	7560	190	8523	7010	5952
124	10027	8601	7530	195	8427	6912	5859
125	10000	8571	7500	200	8333	6818	5769
126	9974	8542	7470	205	8242	6726	5682
127	9947	8513	7440	210	8152	6637	5597
128	9921	8484	7411	215	8064	6550	5515
129	9894	8456	7382	220	7979	6465	5435
130	9868	8427	7353	225	7895	6383	5357
131	9843	8399	7324	230	7812	6303	5282
132	9817	8370	7296	235	7732	6224	5208
133	9791	8343	7268	240	7653	6148	5137
134	9766	8315	7239	245	7575	6073	5067
135	9740	8287	7212	250	7500	6000	5000
136	9715	8260	7184	255	7426	5929	4934
137	9690	8233	7157	260	7353	5859	4870
138	9665	8206	7129	265	7281	5791	4808
139	9640	8179	7102	270	7212	5725	4747
140	9615	8152	7076	275	7143	5660	4668
141	9591	8126	7049	280	7076	5597	4630
142	9566	8099	7023	285	7010	5535	4573
143	9542	8073	6996	290	6945	5475	4518
144	9518	8047	6970	295	6881	5415	4464
145	9494	8021	6945	300	6818	5357	4412
146	9470	7996	6919	310	6696	5245	4311
147	9446	7970	6893	320	6579	5137	4214
148	9422	7945	6868	330	6465	5034	4121
149	9399	7919	6843	340	6356	4934	4032
150	9375	7895	6818	350	6250	4839	3947
155	9259	7772	6696	360	6147	4747	3866
160	9146	7653	6579	370	6048	4658	3788
165	9036	7538	6465	380	5952	4573	3713
170	8929	7426	6356	390	5859	4491	3641
175	8823	7317	6250	400	5769	4412	3572

TABLE OF SQUARE ROOTS.

Nos.	Roots	Nos.	Roots	Nos.	Roots	Nos.	Roots	Nos.	Roots
1	1.00	51	7.14	101	10.05	151	12.29	201	14.18
2	1.41	52	7.21	102	10.10	152	12.33	202	14 21
3	1.73	53	7.28	103	10.15	153	12.37	203	14.25
4	2.00	54	7.35	104	10 20	154	12.41	204	14.28
5	2.24	55	7.42	105	10.25	155	12.45	205	14.32
6	2.45	56	7.48	106	10.30	156	12.49	206	14.35
7	2.65	57	7.55	107	10.34	157	12.53	207	14.39
8	2.83	58	7 62	108	10.39	158	12.57	208	14.42
9	3.00	59	7.68	109	10.44	159	12.61	209	14.46
10	3.16	60	7.75	110	10.49	160	12.65	210	14.49
11	3.32	61	7.81	111	10.54	161	12.69	211	14.53
12	3.46	62	7.87	112	10.58	162	12.73	212	14.56
13	3.61	63	7.94	113	10.63	163	12.77	213	14.59
14	3.74	64	8.00	114	10.68	164	12 81	214	14.63
15	3.87	65	8.06	115	10.72	165	12.85	215	14.66
16	4.00	66	8.12	116	10.77	166	12.88	216	14.70
17	4 12	67	8.19	117	10.82	167	12.92	217	14 73
18	4.24	68	8 25	118	10.86	168	12.96	218	14.76
19	4.36	69	8 31	119	10.91	169	13.00	219	14.80
20	4.47	70	8.37	120	10.95	170	13.04	220	14.83
21	4.58	71	8.43	121	11.00	171	13.08	221	14.87
22	4.69	72	8.49	122	11.05	172	13.11	222	14.90
23	4.80	73	8.54	123	11.09	173	13.15	223	14.93
24	4.90	74	8.60	124	11.14	174	13.19	224	14.97
25	5.00	75	8.66	125	11.18	175	13.23	225	15 00
26	5.10	76	8.72	126	11.22	176	13.27	226	15.03
27	5.20	77	8.77	127	11.27	177	13.30	227	15.07
28	5.29	78	8.83	128	11.31	178	13.34	228	15.10
29	5.39	79	8.89	129	11.36	179	13.38	229	15.13
30	5.48	80	8.94	130	11.40	180	13.42	230	15.17
31	5.57	81	9.00	131	11.45	181	13.45	231	15.20
32	5.66	82	9.06	132	11.49	182	13.49	232	15.23
33	5 74	83	9.11	133	11.53	183	13.53	233	15 26
34	5.83	84	9.17	134	11.58	184	13 56	234	15 30
35	5.92	85	9.22	135	11.62	185	13.60	235	15.33
36	6 00	86	9.27	136	11.66	186	13.64	236	15.36
37	6 08	87	9.33	137	11.70	187	13 67	237	15 39
38	6 16	88	9.38	138	11.75	188	13.71	238	15 43
39	6 24	89	9 43	139	11.79	189	13 75	239	15.46
40	6.32	90	9.49	140	11.83	190	13 78	240	15 49
41	6.40	91	9 54	141	11.87	191	13 82	241	15.52
42	6.48	92	9.59	142	11 92	192	13.86	242	15.56
43	6 56	93	9 64	143	11.96	193	13.89	243	15.59
44	6 63	94	9.70	144	12 00	194	13.93	244	15.62
45	6.71	95	9.75	145	12.04	195	13.96	245	15.65
46	6 78	96	9 80	146	12.08	196	14.00	246	15 68
47	6.86	97	9.85	147	12.12	197	14.04	247	15.72
48	6.93	98	9.90	148	12.17	198	14.07	248	15.75
49	7 00	99	9 95	149	12 21	199	14.11	249	15.78
50	7.07	100	10.00	150	12.25	200	14.14	250	15.81

TABLE OF SQUARE ROOTS.

Nos.	Roots	Nos.	Roots	Nos.	Roots	Nos.	Roots	Nos.	Roots
251	15.84	301	17.35	351	18.73	401	20 02	451	21.24
252	15 87	302	17.38	352	18.76	402	20 05	452	21.26
253	15.91	303	17.41	353	18.79	403	20.07	453	21.28
254	15 94	304	17 44	354	18.81	404	20 10	454	21.31
255	15 97	305	17.46	355	18.84	405	20.12	455	21.33
256	16 00	306	17.49	356	18.87	406	20.15	456	21 35
257	16 03	307	17.52	357	18.89	407	80.17	457	21.38
258	16.06	308	17.55	358	18 92	408	20.20	458	21 40
259	16.09	309	17.58	359	18.95	409	20.22	459	21 42
260	16.12	310	17.61	360	18.97	410	20.25	460	21.45
261	16 16	311	17 64	361	19.00	411	20.27	461	21.47
262	16 19	312	17.66	362	19.03	412	20 30	462	21.49
263	16.22	313	17 69	363	19.05	413	20.32	463	21 52
264	16 25	314	17.72	364	19.08	414	20.35	464	21 54
265	16.28	315	17.75	365	19.10	415	20.37	465	21 56
266	16 31	316	17.78	366	19.13	416	20.40	466	21.59
267	16 34	317	17.80	367	19.16	417	20.42	467	21.61
268	16.37	318	17.83	368	19.18	418	20.45	468	21.63
269	16.40	319	17.86	369	19.21	419	20.47	469	21.66
270	16.43	320	17.89	370	19.24	420	20.49	470	21.68
271	16.46	321	17.92	371	19.26	421	20.52	471	21.70
272	16.49	322	17.94	372	19 29	422	20.54	472	21 73
273	16.52	323	17.97	373	19.31	423	20.57	473	21.75
274	16 55	324	18.00	374	19.34	424	20 59	474	21 77
275	16.58	325	18.03	375	19.36	425	20.62	475	21.79
276	16.61	326	18.06	376	19.39	426	20 64	476	21.82
277	16 64	327	18.08	377	19.42	427	20.66	477	21.84
278	16.67	328	18.11	378	19.44	428	20.69	478	21.86
279	16.70	329	18.14	379	19.47	429	20.71	479	21.89
280	16.73	330	18.17	380	19.49	430	20.74	480	21.91
281	16.76	331	18.19	381	19.52	431	20.76	481	21.93
282	16.79	332	18 22	382	19.54	432	20.78	482	21.95
283	16 82	333	18.25	383	19 57	433	20.81	483	21.98
284	16 85	334	18.28	384	19.60	434	20.83	484	22.00
285	16.88	335	18.30	385	19.62	435	20.86	485	22.02
286	16 91	336	18 33	386	19.65	436	20.88	486	22.05
287	16 94	337	18 36	387	19.67	437	20.90	487	22.07
288	16.97	338	18.38	388	19.70	438	20.93	488	22.09
289	17.00	339	18.41	389	19.72	439	20.95	489	22.11
290	17.03	340	18 44	390	19.75	440	20 98	490	22.14
291	17.06	341	18.47	391	19.77	441	21.00	491	22.16
292	17.09	342	18.49	392	19.80	442	21.02	492	22.18
293	17.12	343	18.52	393	19.82	443	21.05	493	22.20
294	17.15	344	18.55	394	19.85	444	21.07	494	22.23
295	17.18	345	18.57	395	19.87	445	21.10	495	22.25
296	17.20	346	18.60	396	19.90	446	21.12	496	22.27
297	17.23	347	18.63	397	19.92	447	21.14	497	22.29
298	17.26	348	18.65	398	19.95	448	21.17	498	22.32
299	17.29	349	18.68	399	19.97	449	21.19	499	22.34
300	17.32	350	18.71	400	20.00	450	21.21	500	22.36

TABLE OF SQUARE ROOTS.

Nos.	Roots	Nos.	Roots	Nos.	Roots	Nos.	Roots	Nos.	Roots
501	22.38	551	23.47	601	24.52	651	25.51	701	26.48
502	22.41	552	23.49	602	24.54	652	25.53	702	26.50
503	22.43	553	23.52	603	24.56	653	25.55	703	26.51
504	22.45	554	23.54	604	24.58	654	25.57	704	26.53
505	22.47	555	23.56	605	24.60	655	25.59	705	26.55
506	22.49	556	23.58	606	24.62	656	25.61	706	26.57
507	22.52	557	23.60	607	24.64	657	25 63	707	26 59
508	22.54	558	23.62	608	24.66	658	25.65	708	26.61
509	22 56	559	23.64	609	24,68	659	25.67	709	26.63
510	22.58	560	23.66	610	24.70	660	25 69	710	26 65
511	22.61	561	23 69	611	24.72	661	25.71	711	26 66
512	22.63	562	23.71	612	24.74	662	25.73	712	26 68
513	22 65	563	23.73	613	24.76	663	25.75	713	26.70
514	22.67	564	23.75	614	24 78	664	25.77	714	26.72
515	22.69	565	23.77	615	24.80	665	25.79	715	26.74
516	22 72	566	23.79	616	24.82	666	25.81	716	26.76
517	22 74	567	23.81	617	24.84	667	25.83	717	26.78
518	22.76	568	23 83	618	24.86	668	25.85	718	26.80
519	22.78	569	23.85	619	24.88	669	25.87	719	26.81
520	22.80	570	23.87	620	24 90	670	25.88	720	26.83
521	22.83	571	23.90	621	24.92	671	25.90	721	26.85
522	22.85	572	23.92	622	24.94	672	25.92	722	26.87
523	22 87	573	23.94	623	24.96	673	25 94	723	26 89
524	22.89	574	23 96	624	24.98	674	25.96	724	26.91
525	22.91	575	23.98	625	25.00	675	25.98	725	26.93
526	22.93	576	24.00	626	25.02	676	26.00	726	26.94
527	22.96	577	24.02	627	25.04	677	26.02	727	26.96
528	22.98	578	24 04	628	25,06	678	26 04	728	26.98
529	23.00	579	24.06	629	25 08	679	26.06	729	27.00
530	23 02	580	24.08	630	25.10	680	26 08	730	27.02
531	23.04	581	24.10	631	25.12	681	26 10	731	27.04
532	23.07	582	24.12	632	25.14	682	26 12	732	27.06
533	23.09	583	24.15	633	25.16	683	26.13	733	27.07
534	23.11	584	24.17	634	25.18	684	26 15	734	27 09
535	23.13	585	24.19	635	25.20	685	26.17	735	27 11
536	23.15	586	24.21	636	25.22	686	26.19	736	27.13
537	23 17	587	24.23	637	25.24	687	26 21	737	27.15
538	23.19	588	24.25	638	25 26	688	26 23	738	27.17
539	23.22	589	24.27	639	25 28	689	26.25	739	27 18
540	23.24	590	24.29	640	25 30	690	26.27	740	27.20
541	23.26	591	24.31	641	25.32	691	26 29	741	27.22
542	23.28	592	24.33	642	25.34	692	26 31	742	27.24
543	23.30	593	24.35	643	25.36	693	26 32	743	27.26
544	23 32	594	24 37	644	25 38	694	26.34	744	27.28
545	23 35	595	24.39	645	25.40	695	26-36	745	27.29
546	23 37	596	24.41	646	25 42	696	26.38	746	27.31
547	23 39	597	24.43	647	25 44	697	26 40	747	27.33
548	23 41	598	24.45	648	25.46	698	26.42	748	27 35
549	23.43	599	24.47	649	25 48	699	26 44	749	27 37
550	23.45	600	24.49	650	25 50	700	26.46	750	27.39

TABLE OF SQUARE ROOTS.

Nos.	Roots	Nos.	Roots	Nos.	Roots	Nos.	Roots	Nos.	Roots
751	27.40	801	28.30	851	29.17	901	30.02	951	30.84
752	27.42	802	28 32	852	29.19	902	30.03	952	30.85
753	27.44	803	28.34	853	29.21	903	30.05	953	30.87
754	27.46	804	28.35	854	29.22	904	30.07	954	30.89
755	27.48	805	28.37	855	29.24	905	30.08	955	30.90
756	27.50	806	28.39	856	29.26	906	30.10	956	30.92
757	27.51	807	28.41	857	29.27	907	30.12	957	30.94
758	27.53	808	28.43	858	29.29	908	30.13	958	30.95
759	27.55	809	28.44	859	29.31	909	30.15	959	30.97
760	27.57	810	28.46	860	29.33	910	30.17	960	30.98
761	27.59	811	28.48	861	29.34	911	30.18	961	31.00
762	27.60	812	28.50	862	29.36	912	30.20	962	31.02
763	27 62	813	28.51	863	29 38	913	30.22	963	31.03
764	27.64	814	28.53	864	29.39	914	30.23	964	31.05
765	27.66	815	28.55	865	29.41	915	30.25	965	31.06
766	27.68	816	28.57	866	29.43	916	30.27	966	31.08
767	27.69	817	28.58	867	29.44	917	30.28	967	31.10
768	27.71	818	28.60	868	29.46	918	30.30	968	31.11
769	27.73	819	28.62	869	29.48	919	30.32	969	31.13
770	27.75	820	28.64	870	29.50	920	30.33	970	31.14
771	27.77	821	28.65	871	29.51	921	30.35	971	31.16
772	27 78	822	28.67	872	29.53	922	30.36	972	31.18
773	27.80	823	28.69	873	29.55	923	30.38	973	31.19
774	27.82	824	28.71	874	29.56	924	30.40	974	31.21
775	27.84	825	28.72	875	29.58	925	30.41	975	31.22
776	27.86	826	28.74	876	29.60	926	30.43	976	31.24
777	27.87	827	28.76	877	29.61	927	30.45	977	31.26
778	27.89	828	28.77	878	29.63	928	30.46	978	31.27
779	27.91	829	28.79	879	29.65	929	30.48	979	31.29
780	27.93	830	28.81	880	29.66	930	30.50	980	31.30
781	27.95	831	28.83	881	29.6[illegible]	931	30.51	981	31.32
782	27.96	832	28.84	882	29.70	932	30.53	982	31.34
783	27.98	833	28.86	883	29.72	933	30.55	983	31.35
784	28 00	834	28.88	884	29.73	934	30.56	984	31.37
785	28.02	835	28.90	885	29.75	935	30.58	985	31.38
786	28.04	836	28.91	886	29.77	936	30.59	986	31.40
787	28.05	837	28.93	887	29.78	937	30.61	987	31.42
788	28.07	838	28.95	888	29.80	938	30.63	988	31.43
789	28.09	839	28 97	889	29.82	939	30 64	989	31.45
790	28.11	840	28.98	890	29.83	940	30.66	990	31.46
791	28.12	841	29.00	891	29.85	941	30.68	991	31.48
792	28.14	842	29.02	892	29.87	942	30.69	992	31.50
793	28.16	843	29.03	893	29.88	943	30.71	993	31.51
794	28.18	844	29.05	894	29.90	944	30.72	994	31.53
795	28.20	845	29.07	895	29.92	945	30.74	995	31.54
796	28.21	846	29.09	896	29 93	946	30.76	996	31 56
797	28.23	847	29.10	897	29.95	947	30.77	997	31.58
798	28.25	848	29.12	898	29.97	948	30 79	998	31.59
799	28.27	849	29.14	899	29.98	949	30 81	999	31.61
800	28.28	850	29.15	900	30.00	950	30.82	1000	31.62

TABLE OF SQUARE ROOTS.

Nos.	Roots	Nos.	Roots	Nos.	Roots	Nos.	Roots	Nos.	Roots
1001	31.64	1051	32.42	1101	33.18	1151	33.93	1201	34.66
1002	31.65	1052	32 43	1102	33.20	1152	33.94	1202	34.67
1003	31.67	1053	32.45	1103	33 21	1153	33.96	1203	34.68
1004	31.69	1054	32.47	1104	33.23	1154	33.97	1204	34.70
1005	31.70	1055	32.48	1105	33.24	1155	33.99	1205	34.71
1006	31.72	1056	32.50	1106	33.26	1156	34.00	1206	34.73
1007	31.73	1057	32.51	1107	33.27	1157	34.01	1207	34.74
1008	31.75	1058	32.53	1108	33.29	1158	34.03	1208	34.76
1009	31.76	1059	32.54	1109	33.30	1159	34.04	1209	34.77
1010	31.78	1060	32.56	1110	33.32	1160	34.06	1210	34.79
1011	31.80	1061	32.57	1111	33.33	1161	34.07	1211	34.80
1012	31.81	1062	32.59	1112	33.35	1162	34.09	1212	34.81
1013	31.83	1063	32.60	1113	33.36	1163	34.10	1213	34.83
1014	31.84	1064	32.62	1114	33.38	1164	34.12	1214	34.84
1015	31.86	1065	32.63	1115	33.39	1165	34.13	1215	34.86
1016	31.87	1066	32 65	1116	33.41	1166	34.15	1216	34.87
1017	31.89	1067	32.66	1117	33.42	1167	34.16	1217	34.89
1018	31.91	1068	32 68	1118	33.44	1168	34.18	1218	34.90
1019	31.92	1069	32.70	1119	33.45	1169	34 19	1219	34.91
1020	31.94	1070	32.71	1120	33.47	1170	34.21	1220	34.93
1021	31.95	1071	32.73	1121	33.48	1171	34.22	1221	34.94
1022	31 97	1072	32.74	1122	33.50	1172	34.23	1222	34 96
1023	31.98	1073	32 76	1123	33.51	1173	34.25	1223	34.97
1024	32.00	1074	32.77	1124	33.53	1174	34.26	1224	34.99
1025	32.02	1075	32.79	1125	33.54	1175	34.28	1225	35.00
1026	32.03	1076	32.80	1126	33.56	1176	34.29	1226	35.01
1027	32.05	1077	32.82	1127	33.57	1177	34.31	1227	35 03
1028	32.06	1078	32.83	1128	33.59	1178	34.32	1228	35.04
1029	32.08	1079	32.85	1129	33.60	1179	34.34	1229	35.06
1030	32.09	1080	32.86	1130	33.62	1180	34.35	1230	35.07
1031	32.11	1081	32.88	1131	33.63	1181	34.37	1231	35.09
1032	32.12	1082	32.89	1132	33.65	1182	34.38	1232	35.10
1033	32.14	1083	32.91	1133	33.66	1183	34.39	1233	35.11
1034	32.16	1084	32.92	1134	33.67	1184	34.41	1234	35.13
1035	32.17	1085	32.94	1135	33.69	1185	34.42	1235	35.14
1036	32.19	1086	32.95	1136	33.70	1186	34.44	1236	35.16
1037	32.20	1087	32.97	1137	33.72	1187	34.45	1237	35.17
1038	32.22	1088	32.98	1138	33.73	1188	34.47	1238	35.19
1039	32.23	1089	33 00	1139	33.75	1189	34 48	1239	35.20
1040	32.25	1090	33.02	1140	33.76	1190	34.50	1240	35.21
1041	32.26	1091	33.03	1141	33.78	1191	34.51	1241	35.23
1042	32.28	1092	33.05	1142	33 79	1192	34.53	1242	35.24
1043	32.30	1093	33.06	1143	33.81	1193	34.54	1243	35.26
1044	32.31	1094	33.08	1144	33.82	1194	34.55	1244	35.27
1045	32.33	1095	33.09	1145	33.84	1195	34.57	1245	35.28
1046	32.34	1096	33.11	1146	33.85	1196	34.58	1246	35 30
1047	32.36	1097	33.12	1147	33.87	1197	34.60	1247	35.31
1048	32.37	1098	33.14	1148	33 88	1198	34.61	1248	35.33
1049	32.39	1099	33.15	1149	33.90	1199	34 63	1249	35.34
1050	32.40	1100	33 17	1150	33.91	1200	34.64	1250	35.36

TABLE OF SQUARE ROOTS.

Nos.	Roots	Nos.	Roots	Nos.	Roots	Nos.	Roots	Nos.	Roots
1251	35.37	1301	36.07	1351	36.76	1401	37.43	1451	38.09
1252	35.38	1302	36 08	1352	36.77	1402	37.44	1452	38.11
1253	35.40	1303	36.10	1353	36.78	1403	37 46	1453	38.12
1254	35.41	1304	36.11	1354	26 80	1404	37 47	1454	38 13
1255	35.43	1305	36.12	1355	36.81	1405	37.48	1455	38.14
1256	35.44	1306	36.14	1356	36 82	1406	37 50	1456	38.16
1257	35 45	1307	36.15	1357	36.84	1407	37.51	1457	38.17
1258	35.47	1308	36.17	1358	36 85	1408	37.52	1458	38.18
1259	35.48	1309	36.18	1359	36.86	1409	37.54	1459	38 20
1260	35 50	1310	36.19	1360	36.88	1410	37.55	1460	38.21
1261	35.51	1311	36.21	1361	36 89	1411	37.56	1461	38.22
1262	35.52	1312	36.22	1362	36 91	1412	37.58	1462	38.24
1263	35.54	1313	36.24	1363	36 92	1413	37.59	1463	38.25
1264	35 55	1314	36.25	1364	36.93	1414	37.60	1464	38.26
1265	35 57	1315	36.26	1365	36.95	1415	37 62	1465	38.28
1266	35.58	1316	36 28	1366	36.96	1416	37.63	1466	38.29
1267	35 59	1317	36.29	1367	36.97	1417	37.64	1467	38.30
1268	35.61	1318	36.30	1368	36 99	1418	37.66	1468	38.31
1269	35 62	1319	36.32	1369	37.00	1419	37 67	1469	38.33
1270	35.64	1320	36.33	1370	37.01	1420	37 68	1470	38.34
1271	35 65	1321	36 35	1371	37.03	1421	37.70	1471	38.35
1272	35.67	1322	36.36	1372	37.04	1422	37.71	1472	38 37
1273	35.68	1323	36.37	1373	37.05	1423	37.72	1473	38.38
1274	35.69	1324	36.39	1374	37 07	1424	37.74	1474	38.39
1275	35.71	1325	36.40	1375	37.08	1425	37.75	1475	38.41
1276	35.72	1326	36.41	1376	37.09	1426	37.76	1476	38.42
1277	35.74	1327	36.43	1377	37.11	1427	37.78	1477	38 43
1278	35.75	1328	36.44	1378	37.12	1428	37.79	1478	38.44
1279	35.76	1329	36.46	1379	37.13	1429	37 80	1479	38 46
1280	35.78	1330	36.47	1380	37.15	1430	37.82	1480	38 47
1281	35.79	1331	36.48	1381	37.16	1431	37.83	1481	38 48
1282	35 81	1332	36.50	1382	37.18	1432	37.84	1482	38.50
1283	35 82	1333	36.51	1383	37.19	1433	37.85	1483	38 51
1284	35.83	1334	36 52	1384	37.20	1434	37.87	1484	38 52
1285	35.85	1335	36.54	1385	37.22	1435	37.88	1485	38.54
1286	35.86	1336	36.55	1386	37.23	1436	37.89	1486	38 55
1287	35.87	1337	36.57	1387	37.24	1437	37.91	1487	38 56
1288	35.89	1338	36.58	1388	37.26	1438	37 92	1488	38.57
1289	35 90	1339	36.59	1389	37 27	1439	37 93	1489	38.59
1290	35.92	1340	36.61	1390	37.28	1440	37.95	1490	38.60
1291	35.93	1341	36.62	1391	37.30	1441	37.96	1491	38 61
1292	35.94	1342	36 63	1392	37.31	1442	37 97	1492	38 63
1293	35 96	1343	36 65	1393	37 32	1443	37.99	1493	38.64
1294	35 97	1344	36.66	1394	37.34	1444	38 00	1494	38.65
1295	35.99	1345	36.67	1395	37.35	1445	38.01	1495	38.67
1296	36.00	1346	36 69	1396	37.36	1446	38 03	1496	38 68
1297	36.01	1347	36.70	1397	37.38	1447	38 04	1497	38.69
1298	36.03	1348	36.72	1398	37 39	1448	38.05	1498	38 70
1299	36.04	1349	36 73	1399	37 40	1449	38 07	1499	38.72
1300	36.06	1350	36 74	1400	37.42	1450	38 08	1500	38.73

TABLE OF SQUARE ROOTS.

Nos.	Roots	Nos.	Roots	Nos.	Roots	Nos.	Roots	Nos.	Roots
1501	38.74	1551	39.38	1601	40.01	1651	40.63	1701	41.24
1502	38 76	1552	39.40	1602	40.02	1652	40.64	1702	41.26
1503	38.77	1553	39.41	1603	40.04	1653	40.66	1703	41.27
1504	38.78	1554	39.42	1604	40.05	1654	40.67	1704	41.28
1505	38.79	1555	39.43	1605	40.06	1655	40.68	1705	41.29
1506	38.81	1556	39.45	1606	40.07	1656	40.69	1706	41.30
1507	38.82	1557	39.46	1607	40.09	1657	40.71	1707	41.32
1508	38.83	1558	39.47	1608	40.10	1658	40.72	1708	41.33
1509	38.85	1559	39.48	1609	40.11	1659	40.73	1709	41.34
1510	38.86	1560	39.50	1610	40.12	1660	40.74	1710	41.35
1511	38.87	1561	39.51	1611	40.14	1661	40.76	1711	41.36
1512	38.88	1562	39.52	1612	40.15	1662	40.77	1712	41.38
1513	38.90	1563	39.53	1613	40.16	1663	40.78	1713	41.39
1514	38.91	1564	39.55	1614	40.17	1564	40.79	1714	41.40
1515	38.92	1565	39.56	1615	40.19	1665	40.80	1715	41.41
1516	38.94	1566	39.57	1616	40.20	1666	40.82	1716	41.42
1517	38.95	1567	39.59	1617	40.21	1667	40.83	1717	41.44
1518	38.96	1568	39.60	1618	40 22	1668	40.84	1718	41.45
1519	38.97	1569	39.61	1619	40 24	1669	40.85	1719	41.46
1520	38.99	1570	39.62	1620	40.25	1670	40.87	1720	41.47
1521	39.00	1571	39.64	1621	40.26	1671	40.88	1721	41.48
1522	39.01	1572	39.65	1622	40.27	1672	40 89	1722	41.50
1523	39 03	1573	39.66	1623	40.29	1673	40.90	1723	41.51
1524	39.04	1574	39.67	1624	40.30	1674	40.91	1724	41.52
1525	39.05	1575	39.69	1625	40.31	1675	40.93	1725	41.53
1526	39.06	1576	39.70	1626	40.32	1676	40.94	1726	41.55
1527	39.08	1577	39.71	1627	40.34	1677	40.95	1727	41.56
1528	39.09	1578	39.72	1628	40.35	1678	40.96	1728	41.57
1529	39.10	1579	39.74	1629	40.36	1679	40.98	1729	41.58
1530	39.12	1580	39.75	1630	40.37	1680	40.99	1730	41 59
1531	39.13	1581	39.76	1631	40.39	1681	41.00	1731	41.61
1532	39.14	1582	39.77	1632	40.40	1682	41.01	1732	41.62
1533	39.15	1583	39.79	1633	40.41	1683	41.02	1733	41.63
1534	39.17	1584	39.80	1634	40.42	1684	41.04	1734	41 64
1535	39.18	1585	39.81	1635	40.44	1685	41.05	1735	41.65
1536	39.19	1586	39.82	1636	40.45	1686	41.06	1736	41.67
1537	39.20	1587	39.84	1637	40.46	1687	41.07	1737	41.68
1538	39.22	1588	39.85	1638	40.47	1688	41.09	1738	41.69
1539	39 23	1589	39.86	1639	40 48	1689	41.10	1739	41.70
1540	39.24	1590	39.87	1640	40.50	1690	41.11	1740	41.71
1541	39.26	1591	39.89	1641	40.51	1691	41.12	1741	41.73
1542	39.27	1592	39.90	1642	40.52	1692	41.13	1742	41.74
1543	39.28	1593	39.91	1643	40.53	1693	41.15	1743	41.75
1544	39.29	1594	39.92	1644	40.55	1694	41.16	1744	41.76
1545	39.31	1595	39.94	1645	40.56	1695	41.17	1745	41.77
1546	39.32	1596	39.95	1646	40.57	1696	41.18	1746	41.79
1547	39.33	1597	39 96	1647	40.58	1697	41.19	1747	41 80
1548	39.34	1598	39 97	1648	40.60	1698	41.21	1648	41.81
1549	39.36	1599	39.99	1649	40.61	1699	41.22	1749	41.82
1550	39.37	1600	40.00	1650	40.62	1700	41.23	1750	41.83

TABLE OF SQUARE ROOTS.

Nos.	Roots	Nos.	Roots	Nos.	Roots	Nos.	Roots	Nos.	Roots
1751	41.85	1801	42.44	1851	43.02	1901	43.60	1951	44.17
1752	41.86	1802	42.45	1852	43.03	1902	43.61	1952	44.18
1753	41.87	1803	42.46	1853	43.05	1903	43.62	1953	44.19
1754	41.88	1804	42.47	1854	43.06	1904	43.63	1954	44.20
1755	41.89	1805	42.49	1855	43.07	1905	43.65	1955	44.22
1756	41.90	1806	42.50	1856	43.08	1906	43.66	1956	44.23
1757	41.92	1807	42.51	1857	43.09	1907	43.67	1957	44.24
1758	41.93	1808	42.52	1858	43.10	1908	43.68	1958	44.25
1759	41.94	1809	42.53	1859	43.12	1909	43.69	1959	44.26
1760	41.95	1810	42.54	1860	43.13	1910	43.70	1960	44.27
1761	41.96	1811	42.56	1861	43.14	1911	43.71	1961	44.28
1762	41.98	1812	42.57	1862	43.15	1912	43.73	1962	44.29
1763	41.99	1813	42.58	1863	43.16	1913	43.74	1963	44.31
1764	42.00	1814	42.59	1864	43.17	1914	43.75	1964	44.32
1765	42.01	1815	42.60	1865	43.19	1915	43.76	1965	44.33
1766	42.02	1816	42.61	1866	43.20	1916	43.77	1966	44.34
1767	42.04	1817	42.63	1867	43.21	1917	43.78	1967	44.35
1768	42.05	1818	42.64	1868	43.22	1918	43.79	1968	44.36
1769	42.06	1819	42.65	1869	43.23	1919	43.81	1969	44.37
1770	42.07	1820	42.66	1870	43.24	1920	43.82	1970	44.38
1771	42.08	1821	42.67	1871	43.26	1921	43.83	1971	44.40
1772	42.10	1822	42.68	1872	43.27	1922	43.84	1972	44.41
1773	42.11	1823	42.70	1873	43.28	1923	43.85	1973	44.42
1774	42.12	1824	42.71	1874	43.29	1924	43.86	1974	44.43
1775	42.13	1825	42.72	1875	43.30	1925	43.87	1975	44.44
1776	42.14	1826	42.73	1876	43.31	1926	43.89	1976	44.45
1777	42.15	1827	42.74	1877	43.32	1927	43.90	1977	44.46
1778	42.17	1828	42.76	1878	43.34	1928	43.91	1978	44.47
1779	42.18	1829	42.77	1879	43.35	1929	43.92	1979	44.49
1780	42.19	1830	42.78	1880	43.36	1930	43.93	1980	44.50
1781	42.20	1831	42.79	1881	43.37	1931	43.94	1981	44.51
1782	42.21	1832	42.80	1882	43.38	1932	43.95	1982	44.52
1783	42.23	1833	42.81	1883	43.39	1933	43.97	1983	44.53
1784	42.24	1834	42.83	1884	43.41	1934	43.98	1984	44.54
1785	42.25	1835	42.84	1885	43.42	1935	43.99	1985	44.55
1786	42.26	1836	42.85	1886	43.43	1936	44.00	1986	44.56
1787	42.27	1837	42.86	1887	43.44	1937	44.01	1987	44.58
1788	42.28	1838	42.87	1888	43.45	1938	44.02	1988	44.59
1789	42.30	1839	42.88	1889	43.46	1939	44.03	1989	44.60
1790	42.31	1840	42.90	1890	43.47	1940	44.05	1990	44.61
1791	42.32	1841	42.91	1891	43.49	1941	44.06	1991	44.62
1792	42.33	1842	42.92	1892	43.50	1942	44.07	1992	44.63
1793	42.34	1843	42.93	1893	43.51	1943	44.08	1993	44.64
1794	42.36	1844	42.94	1894	43.52	1944	44.09	1994	44.65
1795	42.37	1845	42.95	1895	43.53	1945	44.10	1995	44.67
1796	42.38	1846	42.97	1896	43.54	1946	44.11	1996	44.68
1797	42.39	1847	42.98	1897	43.55	1947	44.12	1997	44.69
1798	42.40	1848	42.99	1898	43.57	1948	44.14	1998	44.70
1799	42.41	1849	43.00	1899	43.58	1949	44.15	1999	44.71
1800	42.43	1850	43.01	1900	43.59	1950	44.16	2000	44.72

TABLE OF SQUARE ROOTS.

Nos.	Roots	Nos.	Roots	Nos.	Roots	Nos.	Roots	Nos.	Roots
2001	44.73	2051	45.29	2101	45.84	2151	46.38	2201	46 S2
2002	44.74	2052	45.30	2102	45.85	2152	46.39	2202	46.93
2003	44.75	2053	45 31	2103	45.86	2153	46.40	2203	46.94
2004	44.77	2054	45.32	2104	45 87	2154	46.41	2204	46 95
2005	44.78	2055	45.33	2105	45.88	2155	46.42	2205	46.96
2006	44.79	2056	45.34	2106	45.89	2156	46.43	2206	46 97
2007	44.80	2057	45.35	2107	45.90	2157	46.44	2207	46.98
2008	44.81	2058	45 37	2108	45.91	2158	46.45	2208	46.99
2009	44.82	2059	45.38	2109	45.92	2159	46.47	2209	47.00
2010	44.83	2060	45 39	2110	45.93	2160	46.48	2210	47.01
2011	44.84	2061	45.40	2111	45.95	2161	46.49	2211	47.02
2012	44.85	2062	45.41	2112	45 96	2162	46.50	2212	47.03
2013	44.87	2063	45.42	2113	45.97	2163	46.51	2213	47.04
2014	44.88	2064	45.43	2114	45.98	2164	46.52	2214	47.05
2015	44.89	2065	45.44	2115	45.99	2165	46.53	2215	47.06
2016	44.90	2066	45.45	2116	46.00	2166	46.54	2216	47.07
2017	44.91	2067	45.46	2117	46.01	2167	46 55	2217	47.09
2018	44.92	2068	45.48	2118	46.02	2168	46 56	2218	47.10
2019	44.93	2069	45.49	2119	46.03	2169	46.57	2219	47.11
2020	44.94	2070	45.50	2120	46.04	2170	46.58	2220	47·12
2021	44 95	2071	45.51	2121	46.05	2171	46.59	2221	47.13
2022	44.97	2072	45 52	2122	46.07	2172	46 60	2222	47.14
2023	44.98	2073	45.53	2123	46 08	2173	46.62	2223	47.15
2024	44.99	2074	45.54	2124	46.09	2174	46.63	2224	47.16
2025	45.00	2075	45.55	2125	46.10	2175	46.64	2225	47.17
2026	45 01	2076	45.56	2126	46.11	2176	46 65	2226	47 18
2027	45.02	2077	45.57	2127	46.12	2177	46.66	2227	47.19
2028	45.03	2078	45.59	2128	46.13	2178	46.67	2228	47.20
2029	45.04	2079	45 60	2129	46.14	2179	46.68	2229	47.21
2030	45.06	2080	45.61	2130	46.15	2180	46.69	2230	47.22
2031	45.07	2081	45 62	2131	46.16	2181	46.70	2231	47.23
2032	45.08	2082	45.63	2132	46.17	2182	46.71	2232	47.24
2033	45 09	2083	45.64	2133	46.18	2183	46.72	2233	47.25
2034	45.10	2084	45.65	2134	46.19	2184	46.73	2234	47.26
2035	45.11	2085	45.66	2135	46.21	2185	46.74	2235	47.28
2036	45.12	2086	45.67	2136	46.22	2186	46.76	2236	47.29
2037	45.13	2087	45.68	2137	46.23	2187	46.77	2237	47.30
2038	45.14	2088	45.69	2138	46.24	2188	46 78	2238	47.31
2039	45.16	2089	45.71	2139	46.25	2189	46.79	2239	47.32
2040	45.17	2090	45.72	2140	46 26	2190	46.80	2240	47.33
2041	45.18	2091	45.73	2141	46.27	2191	46.81	2241	47.34
2042	45 19	2092	45 74	2142	46 28	2192	46 82	2242	47.35
2043	45.20	2093	45.75	2143	46.29	2193	46.83	2243	47.36
2044	45.21	2094	45.76	2144	46.30	2194	46.84	2244	47.37
2045	45.22	2095	45.77	2145	46.31	2195	46.85	2245	47.38
2046	45.23	2096	45.78	2146	46 32	2196	46.86	2246	47.39
2047	45.24	2097	45.79	2147	46.34	2197	46.87	2247	47.40
2048	45.25	2098	45.80	2148	46.35	2198	46.88	2248	47 41
2049	45 27	2099	45.82	2149	46.36	2199	46.89	2249	47 42
2050	45.28	2100	45.83	2150	46.37	2200	46.90	2250	47.43

SWING BRIDGES.

THREE POINTS OF SUPPORT.
TWO EQUAL ARMS.

REACTIONS, SHEARING STRESSES AND BENDING MOMENTS.

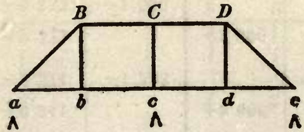
Single Loads, - - - pages 113 to 128.
Symmetrical Loads, - " 128 to 142.

The following Tables are based on the assumption of a panel load and panel length of unity. The actual shear will, therefore, be obtained by multiplying the actual panel load by the tabular shear, and the actual moment will be found by multiplying the actual panel load by the actual panel length and by the proper tabular coefficient.

If the chords are not parallel the web stresses may be obtained by the method of moments, or by a combination of the method of moments and graphics.

As the coefficients are based on unity both for load and panel length, the tables are applicable to any system of measurement and apply with equal facility to pounds, tons or kilogrammes and feet, inches or metres.

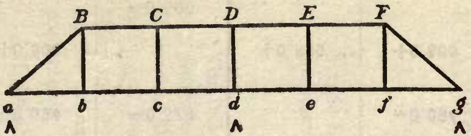
The coefficients are derived from the formulæ of the "Theorem of Three Moments" and are therefore applicable for the conditions upon which the theory was developed.



4 PANELS ALL EQUAL.

NOTE:—Shear in panel *ab* = reaction at *a*.

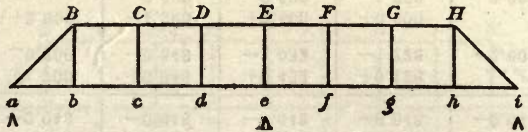
LOAD AT:	SHEAR IN PANEL:		REACTION AT:		MOMENT AT:	
	ab	*bc*	*c*	*e*	*b*	*c*
b	+0.406	−0.594	+0.688	−0.094	+0.406	−0.188
d	−0.094	−0.094	+0.688	+0.406	−0.094	−0.188
Maximum	+0.406	. . .	+1.376	+0.406	+0.406	. . .
	−0.094	−0.688	. . .	−0.094	−0.094	−0.376
As a Simple Span	+0.500	. . .	+0.500	+0.500	+0.500	. . .
	. . .	−0.500	. . .	. . .	. . .	. . .



6 PANELS ALL EQUAL.

NOTE :—Shear in panel *ab* = reaction at *a*.

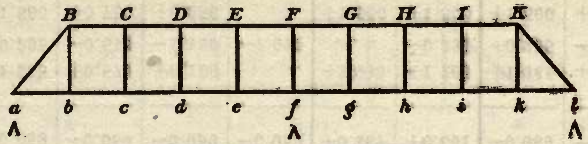
LOAD AT :	SHEAR IN PANEL :			REACTION :		MOMENT AT :		
	ab	*bc*	*cd*	*d*	*g*	*b*	*c*	*d*
b	+0.593	−0.407	−0.407	+0.481	−0.074	+0.593	+0.185	−0.222
c	+0.241	+0.241	−0.759	+0.852	−0.093	+0.241	+0.482	−0.278
e	−0.093	−0.093	−0.093	+0.852	+0.241	−0.093	−0.185	−0.278
f	−0.074	−0.074	−0.074	+0.481	+0.593	−0.074	−0.148	−0.222
Maximum	+0.834	+0.241	. . .	+2.666	+0.834	+0.834	+0.667	. . .
	−0.167	−0.574	−1.333	. . .	−0.167	−0.167	−0.333	−1.000
As a Simple Span	+1.000	+0.333	. . .	+1.000	+1.000	+1.000	+1.000	. . .
	. . .	−0.333	−1.000	. . .	. . .	. . .	. . .	. . .



8 PANELS ALL EQUAL.

NOTE:—Shear in panel ab = reaction at a.

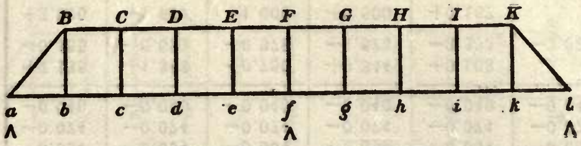
LOAD AT:	SHEAR IN PANEL:				REACTION:		MOMENT AT:			
	ab	*bc*	*cd*	*de*	*e*	*i*	*b*	*c*	*d*	*e*
b	+0.691	−0.309	−0.309	−0.309	+0.367	−0.059	+0.691	+0.383	+0.074	−0.234
c	+0.406	+0.406	−0.594	−0.594	+0.688	−0.094	+0.406	+0.812	+0.219	−0.375
d	+0.168	+0.168	+0.168	−0.832	+0.914	−0.082	+0.168	+0.336	+0.504	−0.328
f	−0.082	−0.082	−0.082	−0.082	+0.914	+0.168	−0.082	−0.164	−0.247	−0.328
g	−0.094	−0.094	−0.094	−0.094	+0.688	+0.406	−0.094	−0.188	−0.281	−0.375
h	−0.059	−0.059	−0.059	−0.059	+0.367	+0.691	−0.059	−0.117	−0.176	−0.234
Maximum	+1.265	+0.574	+0.168	. . .	+3.938	+1.265	+1.265	+1 531	+0.797	. . .
	−0.235	−0.544	−1.138	−1.970	. . .	−0.235	−0.235	−0.469	−0.704	−1.874
As a Simple Span	+1.500	+0.750	+0.250	. . .	+1.500	+1.500	+1.500	+2.000	+1.500	. . .
	. . .	−0.250	−0.750	−1.500	. . .	. . .	. . .	. . .	. . .	. . .



10 PANELS . ALL EQUAL.

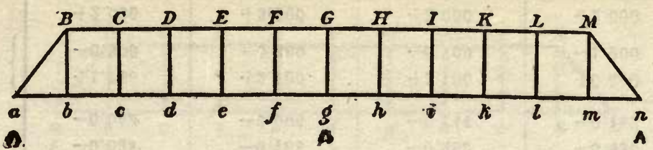
NOTE:—Shear in panel *ab* = reaction at *a*.

LOAD AT:	SHEAR IN PANEL:					REACTION AT:	
	ab	*bc*	*cd*	*de*	*ef*	*f*	*l*
b	+0.752	−0.248	−0.248	−0.248	−0.248	+0.296	−0.048
c	+0.516	+0.516	−0.484	−0.484	−0.484	+0.568	−0.084
d	+0.304	+0.304	+0.304	−0.696	−0.696	+0.792	−0.096
e	+0.128	+0.128	+0.128	+0.128	−0.872	+0.944	−0.072
g	−0.072	−0.072	−0.072	−0.072	−0.072	+0.944	+0.128
h	−0.096	−0.096	−0.096	−0 096	−0.096	+0.792	+0.304
i	−0.084	−0.084	−0.084	−0.084	−0.084	+0.568	+0.516
k	−0.048	−0.048	−0.048	−0.048	−0.048	+0.296	+0.752
Maximum	+1.700 −0.300	+0.948 −0.548	+0.432 −1.032	+0.128 −1 728	. . . −2.600	+5.200 . . .	+1.700 −0.300
As a Simple Span	+2.000 . . .	+1.200 −0.200	+0.600 −0.600	+0.200 −1.200	. . . −2.000	+2.000 . . .	+2.000 . . .



10 PANELS ALL EQUAL.

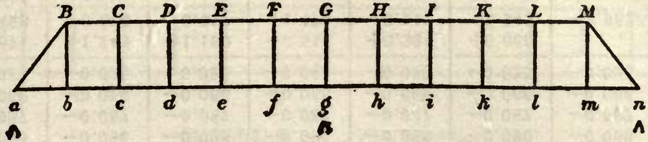
LOAD AT:	MOMENT AT: *b*	*c*	*d*	*e*	*f*
b	+0.752	+0.504	+0.256	+0.008	−0.240
c	+0.516	+1.032	+0.548	+0.064	−0.420
d	+0.304	+0.608	+0.912	+0.216	−0.480
e	+0.128	+0.256	+0.384	+0.512	−0.360
g	−0.072	−0.144	−0.216	−0.288	−0.360
h	−0.096	−0.192	−0.288	−0.384	−0.480
i	−0.084	−0.168	−0.252	−0.336	−0.420
k	−0.048	−0.096	−0.144	−0.192	−0.240
Maximum	+1.700	+2.400	+2.100	+0.800	. . .
	−0.300	−0.600	−0.900	−1.200	−3.000
As a Simple Span	+2.000	+3.000	+3.000	+2.000	. . .



12 PANELS **ALL EQUAL.**

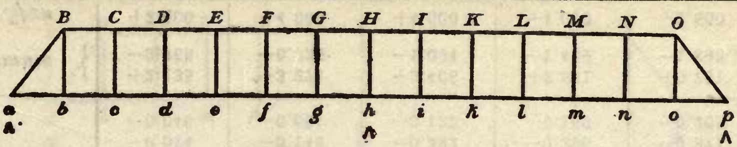
NOTE :—Shear in panel *ab* = reaction at *a*.

LOAD AT :	SHEAR IN PANEL :						REACTION :	
	ab	*bc*	*cd*	*de*	*ef*	*fg*	*g*	*n*
b	+0.793	−0.207	−0.207	−0.207	−0.207	−0.207	+0.247	−0.040
c	+0.592	+0.593	−0.407	−0.407	−0.407	−0.407	+0.482	−0.074
d	+0.406	+0.406	+0.406	−0 594	−0.594	−0.594	+0.687	−0.094
e	+0.241	+0.241	+0.241	+0.241	−0.759	−0.759	+0.852	−0.093
f	+0.103	+0.103	+0.103	+0.103	+0.103	−0.897	+0.961	−0.064
h	−0.064	−0.064	−0.064	−0.064	−0.064	−0.064	+0.961	+0.103
i	−0.093	−0.093	−0.093	−0.093	−0.093	−0.093	+0.852	+0.241
k	−0.094	−0.094	−0.094	−0.094	−0.094	−0.094	+0.687	+0.406
l	−0.074	−0.074	−0.074	−0.074	−0.074	−0.074	+0.482	+0.592
m	−0.040	−0.040	−0.040	−0.040	−0.040	−0.040	+0.247	+0.793
Maximum	+2.135 −0.365	+1.343 −0.572	+0.750 −0.979	+0.344 −1.573	+0.103 −2.332	. . . −3.229	+6.458 . . .	+2.135 −0.365
As a Simple Span	+2.500 . . .	+1.667 −0.167	+1.000 −0.500	+0.500 −1.000	+0.167 −1.167	. . . −2.500	. . . . . .	. . . . . .



12 PANELS ALL EQUAL.

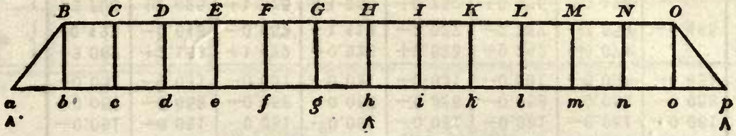
LOAD AT:	MOMENT AT: *b*	*c*	*d*	*e*	*f*	*g*
b	+0.793	+0.586	+0.378	+0.171	−0.036	−0.243
c	+0.592	+1.185	+0.778	+0.370	−0.037	−0.444
d	+0.406	+0.813	+1.219	+0.625	+0.032	−0.563
e	+0.241	+0.481	+0.722	+0.963	+0.204	−0.556
f	+0.103	+0.206	+0.309	+0.412	+0.515	−0.382
h	−0.064	−0.127	−0.191	−0.255	−0.319	−0.382
i	−0.093	−0.185	−0.278	−0.371	−0.463	−0.556
k	−0.094	−0.188	−0.281	−0.375	−0.469	−0.563
l	−0.074	−0.148	−0.222	−0.296	−0.371	−0.444
m	−0.040	−0.081	−0.122	−0.162	−0.203	−0.243
Maximum	+2.135 −0.365	+3.271 −0.729	+3.406 −1.094	+2.541 −1.459	+0.751 −1.898	. . . −4.376
As a Simple Span	+2.500	+4.000	+4.500	+4.000	+2.500	. . .



14 PANELS ALL EQUAL.

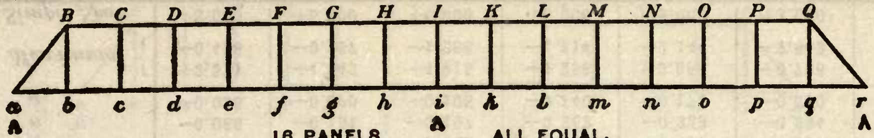
NOTE:—Shear in panel ab = reaction at a.

LOAD AT:	SHEAR IN PANEL:							REACTION:	
	ab	*bc*	*cd*	*de*	*ef*	*fg*	*gh*	*h*	*p*
b	+0.822	−0.178	−0.178	−0.178	−0.178	−0.178	−0.178	+0.213	−0.035
c	+0.649	+0.649	−0.351	−0.351	−0.351	−0.351	−0.351	+0.417	−0.066
d	+0.484	+0.484	+0.484	−0.516	−0.516	−0.516	−0.516	+0.603	−0.087
e	+0.332	+0.332	+0.332	+0.332	−0.668	−0.668	−0.668	+0.764	−0.096
f	+0.198	+0.198	+0.198	+0.198	+0.198	−0.802	−0.802	+0.889	−0.087
g	+0.086	+0.086	+0.086	+0.086	+0.086	+0.086	−0.914	+0.971	−0.057
i	−0.057	−0.057	−0.057	−0 057	−0.057	−0.057	−0.057	+0.971	+0.086
k	−0.087	−0.087	−0.087	−0.087	−0.087	−0.087	−0.087	+0.889	+0.198
l	−0.096	−0.096	−0.096	−0.096	−0.096	−0.096	−0.096	+0.764	+0.332
m	−0.087	−0.087	−0.087	−0.087	−0.087	−0.087	−0.087	+0.603	+0.484
n	−0.066	−0.066	−0.066	−0.066	−0.066	−0.066	−0.066	+0.417	+0.649
o	−0.035	−0.035	−0.035	−0.035	−0.035	−0.035	−0.035	+0.213	+0.822
Maximum	+2.571 −0.428	+1.749 −0.606	+1.100 −0.957	+0.616 −1.473	+0.284 −2.141	+0.086 −2.943	. . . −3.857	+7.714 . . .	+2.571 −0.428
As a Simple Span	+3.000 . . .	+2.143 −0.143	+1.429 −0.429	+0.857 −0.857	+0.429 −1.429	+0.143 −2.143	. . . −3.000	. . . . . .	. . . . . .



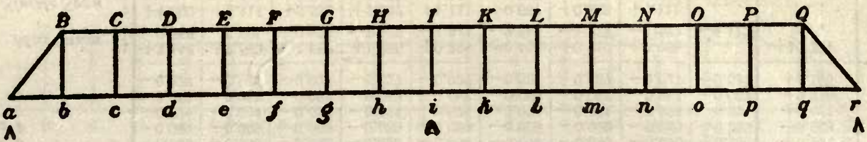
14 PANELS ALL EQUAL.

LOAD AT:	MOMENT AT: b	c	d	e	f	g	h
b	+0.822	+0.644	+0.467	+0.289	+0.111	−0.067	−0.245
c	+0 649	+1.297	+0.946	+0.595	+0.243	−0.108	−0.459
d	+0.484	+0.968	+1.452	+0.936	+0.420	−0.096	−0.612
e	+0.332	+0.665	+0.997	+1.329	+0.662	−0.006	−0.674
f	+0.198	+0.397	+0.595	+0.793	+0.992	+0.190	−0.612
g	+0.086	+0.172	+0.258	+0.344	+0.430	+0.516	−0.398
i	−0.057	−0.114	−0.171	−0 227	−0.285	−0.341	−0.398
k	−0.087	−0.175	−0.262	−0.350	−0.438	−0.525	−0.612
l	−0.096	−0.192	−0.289	−0.385	−0.481	−0.577	−0.674
m	−0.087	−0.175	−0.262	−0.350	−0.437	−0.525	−0.612
n	−0.066	−0.131	−0.197	−0.262	−0.328	−0.394	−0.459
o	−0.035	−0.070	−0.105	−0.140	−0.175	−0.210	−0.245
Maximum	+2.571	+4.143	+4.715	+4.286	+2.858	+0.706	. . .
	−0.428	−0.857	−1.286	−1.714	−2.144	−2.849	−6.000
As a Simple Span	+3.000	+5.000	+6.000	+6.000	+5.000	+3.000	. . .



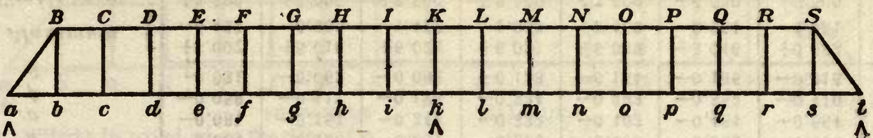
NOTE :—Shear in panel ab = reaction at a.

LOAD AT:	SHEAR IN PANEL:								REACTION:	
	ab	bc	cd	de	ef	fg	gh	hi	i	r
b	+0.844	−0.156	−0.156	−0.156	−0.156	−0.156	−0.156	−0.156	+0.187	−0.031
c	+0.691	+0.691	−0.309	−0.309	−0.309	−0.309	−0.309	−0.309	+0.367	−0.058
d	+0.544	+0.544	+0.544	−0.456	−0.456	−0.456	−0.456	−0.456	+0.537	−0.081
e	+0.406	+0.406	+0.406	+0.406	−0.594	−0.594	−0 594	−0.594	+0.688	−0.094
f	+0.280	+0.280	+0.280	+0.280	+0.280	−0.720	−0.720	−0.720	+0 815	−0.095
g	+0.168	+0.168	+0.168	+0.168	+0.168	+0.168	−0.832	−0.832	+0.914	−0.082
h	+0·074	+0.074	+0.074	+0.074	+0.074	+0.074	+0.074	−0.926	+0.977	−0.051
k	−0.051	−0 051	−0.051	−0.051	−0.051	−0.051	−0.051	−0.051	+0.977	+0.074
l	−0.082	−0.082	−0.082	−0.082	−0.082	−0.082	−0.082	−0.082	+0.914	+0.168
m	−0.095	−0.095	−0.095	−0.095	−0.095	−0.095	−0.095	−0.095	+0.815	+0.280
n	−0.094	−0.094	−0.094	−0.094	−0.094	−0.094	−0.094	−0.094	+0.688	+0.406
o	−0.081	−0.081	−0.081	−0.081	−0.081	−0.081	−0.081	−0.081	+0.537	+0.544
p	−0.058	−0.058	−0.058	−0.058	−0.058	−0.058	−0.058	−0.058	+0.367	+0.691
q	−0.031	−0.031	−0.031	−0.031	−0.031	−0.031	−0.031	−0.031	+0.187	+0.844
Maximum	+3.007	+2.163	+1.472	+0.928	+0.522	+0.242	+0.074	. . .	+8.970	+3.007
	−0.492	−0.648	−0.957	−1.413	−2.007	−2.727	−3.559	−4.485	. . .	−0.492
As a Simple Span	+3.500	+2.625	+1.875	+1.250	+0.750	+0.375	+0.125	. . .	. . .	. . .
	. . .	−0.125	−0.375	−0.750	−1.250	−1.875	−2.625	−3.500	. . .	. . .



16 PANELS ALL EQUAL.

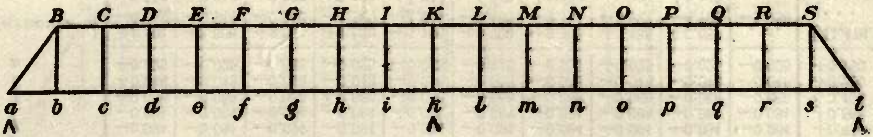
LOAD AT:	MOMENT AT: *b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*
b	+0.844	+0.688	+0.533	+0.377	+0.221	+0.065	−0.090	−0.246
c	+0.691	+1.383	+1.074	+0.766	+0.457	+0.148	−0.160	−0.469
d	+0.544	+1.089	+1.633	+1.177	+0.722	+0.266	−0.189	−0.645
e	+0.406	+0.813	+1.219	+1.625	+1.031	+0.438	−0.156	−0.750
f	+0.280	+0.560	+0.839	+1.119	+1.399	+0.679	−0.041	−0.762
g	+0.168	+0.336	+0.504	+0.672	+0.840	+1.008	+0.176	−0.656
h	+0.074	+0.147	+0.221	+0.295	+0.369	+0.442	+0.516	−0.410
k	−0.051	−0.103	−0.154	−0.205	−0.257	−0.308	−0.359	−0.410
l	−0.082	−0.164	−0.246	−0.328	−0.410	−0.492	−0.574	−0.656
m	−0.095	−0.190	−0.286	−0.381	−0.476	−0.571	−0.666	−0.762
n	−0.094	−0.188	−0.281	−0.375	−0.469	−0.562	−0.656	−0.750
o	−0.081	−0.161	−0.242	−0.322	−0.403	−0.484	−0.564	−0.645
p	−0.058	−0.117	−0.176	−0.234	−0.293	−0.352	−0.410	−0.469
q	−0.031	−0.062	−0.092	−0.123	−0.154	−0.185	−0.216	−0.246
Maximum	+3.007	+5.016	+6.023	+6.031	+5.039	+3.046	+0.692	. . .
	−0.492	−0.985	−1.477	−1.968	−2.462	−2.954	−4.081	−7.876
As a Simple Span	+3.500	+6.000	+7.500	+8.000	+7.500	+6.000	+3.500	. . .



18 PANELS ALL EQUAL.

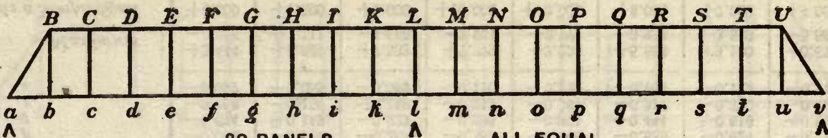
NOTE:—Shear in panel *ab* = reaction at *a*.

LOAD AT:	SHEAR IN PANEL:									REACTION:	
	ab	*bc*	*cd*	*de*	*ef*	*fg*	*gh*	*hi*	*ik*	*k*	*t*
b	+0.861	−0.139	−0.139	−0.139	−0.139	−0.139	−0.139	−0.139	−0.139	+0.166	−0.027
c	+0.725	+0.725	−0.275	−0.275	−0.275	−0.275	−0.275	−0.275	−0.275	+0.328	−0.053
d	+0.593	+0.593	+0.593	−0.407	−0.407	−0.407	−0.407	−0.407	−0.407	+0.481	−0.074
e	+0.466	+0.466	+0.466	+0.466	−0.534	−0.534	−0.534	−0.534	−0.534	+0.623	−0.089
f	+0.348	+0.348	+0.348	+0.348	+0.348	−0.652	−0.652	−0.652	−0.652	+0.748	−0.096
g	+0.241	+0.241	+0.241	+0.241	+0.241	+0.241	−0.759	−0.759	−0.759	+0.852	−0.093
h	+0.145	+0.145	+0.145	+0.145	+0.145	+0.145	+0.145	−0.855	−0 855	+0 932	−0.077
i	+0.065	+0.065	+0.065	+0.065	+0.065	+0.065	+0.065	+0.065	−0.935	+0.982	−0.047
l	−0.047	−0.047	−0.047	−0.047	−0.047	−0.047	−0.047	−0.047	−0.047	+0.982	+0.065
m	−0.077	−0.077	−0.077	−0.077	−0.077	−0.077	−0.077	−0.077	−0.077	+0.932	+0.145
n	−0.093	−0.093	−0 093	−0.093	−0.093	−0.093	−0.093	−0.093	−0.093	+0 852	+0.241
o	−0.096	−0.096	−0.096	−0.096	−0.096	−0.096	−0.096	−0.096	−0.096	+0.748	+0.348
p	−0.089	−0.089	−0.089	−0.089	−0.089	−0.089	−0.089	−0.089	−0 089	+0.623	+0.466
q	−0 074	−0.074	−0.074	−0.074	−0.074	−0.074	−0.074	−0.074	−0.074	+0.481	+0.593
r	−0.053	−0.053	−0.053	−0.053	−0.053	−0.053	−0 053	−0.053	−0.053	+0.328	+0.725
s	−0.027	−0.027	−0.027	−0.027	−0.027	−0.027	−0.027	−0.027	−0.027	+0.166	+0.861
Maximum	+3.444 −0.556	+2.583 −0.695	+1.858 −0.970	+1.265 −1.377	+0 799 −1.911	+0.451 −2.563	+0.210 −3.322	+0.065 −4.177	. . . −5.112	+10 224 . . .	+3.444 −0.556
As a Simple Span	+4.000 . . .	+3.111 −0.111	+2.333 −0.333	+1.667 −0 667	+1.111 −1.111	+0.667 −1.667	+0.333 −2.333	+0.111 −3.111	. . . −4.000	. . . . . .	. . . . . .



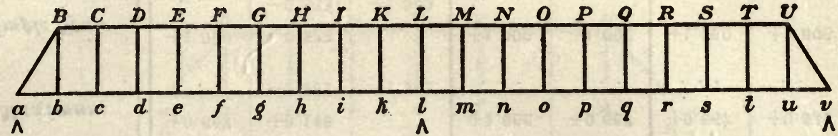
18 PANELS ALL EQUAL.

LOAD AT:	MOMENT AT: b	c	d	e	f	g	h	i	k
b	+0.861	+0.723	+0.584	+0.446	+0.307	+0.168	+0.030	−0.109	−0.247
c	+0.725	+1.450	+1.175	+0.900	+0.625	+0.350	+0.075	−0.200	−0.475
d	+0.593	+1.185	+1.778	+1.370	+0.963	+0.555	+0.147	−0.260	−0.667
e	+0.466	+0.933	+1.399	+1.866	+1.332	+0.798	+0.265	−0.269	−0.802
f	+0.348	+0.697	+1.045	+1.394	+1.742	+1.091	+0.439	−0.213	−0.864
g	+0.241	+0.481	+0.722	+0.963	+1.204	+1.444	+0.685	−0.074	−0.833
h	+0.145	+0.291	+0.436	+0.582	+0.727	+0.873	+1.018	+0.163	−0.692
i	+0.065	+0.129	+0.194	+0.258	+0.323	+0.387	+0.451	+0.516	−0.420
l	−0.047	−0.093	−0.140	−0.186	−0.233	−0.280	−0.326	−0.373	−0.420
m	−0.077	−0.154	−0.230	−0.307	−0.384	−0.461	−0.538	−0.614	−0.692
n	−0.093	−0.185	−0.278	−0.370	−0.463	−0.556	−0.648	−0.741	−0.833
o	−0.096	−0.192	−0.288	−0.384	−0.480	−0.576	−0.672	−0.768	−0.864
p	−0.089	−0.178	−0.268	−0.357	−0.446	−0.535	−0.624	−0.714	−0.802
q	−0.074	−0.148	−0.222	−0.296	−0.371	−0.444	−0.519	−0.593	−0.667
r	−0.053	−0.106	−0.158	−0.211	−0.264	−0.317	−0.370	−0.422	−0.475
s	−0.027	−0.055	−0.082	−0.110	−0.137	−0.164	−0.192	−0.219	−0.247
Maximum	+3.444	+5.889	+7.333	+7.779	+7.223	+5.666	+3.110	+0.679	...
	−0.556	−1.111	−1.666	−2.221	−2.778	−3.333	−3.889	−5.569	−10.000
As a Simple Span	+4.000	+7.000	+9.000	+10.000	+10.000	+9.000	+7.000	+4.000	...



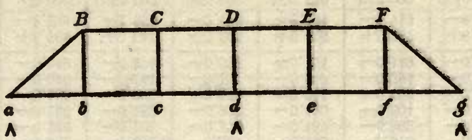
NOTE:—Shear in panel ab = reaction at a.

LOAD AT:	SHEAR IN PANEL:										REACTION:	
	ab	*bc*	*cd*	*de*	*ef*	*fg*	*gh*	*hi*	*ik*	*kl*	*l*	*v*
b	+0.875	−0.125	−0.125	−0.125	−0.125	−0.125	−0.125	−0.125	−0.125	−0.125	+0.150	−0.025
c	+0.752	+0.752	−0.248	−0.248	−0.248	−0.248	−0.248	−0.248	−0.248	−0.248	+0.296	−0.048
d	+0.632	+0.632	+0.632	−0.368	−0.368	−0.368	−0.368	−0.368	−0.368	−0.368	+0.436	−0.068
e	+0.516	+0.516	+0.516	+0.516	−0.484	−0.484	−0.484	−0.484	−0.484	−0.484	+0.568	−0.084
f	+0.406	+0.406	+0.406	+0.406	+0.406	−0.594	−0.594	−0.594	−0.594	−0.594	+0.688	−0.094
g	+0.304	+0.304	+0.304	+0.304	+0 304	+0.304	−0.696	−0.696	−0.696	−0.696	+0.792	−0.096
h	+0.211	+0.211	+0.211	+0.211	+0.211	+0.211	+0.211	−0.789	−0.789	−0.789	+0.878	−0.089
i	+0.128	+0.128	+0.128	+0.128	+0.128	+0.128	+0.128	+0.128	−0.872	−0.872	+0.944	−0.072
k	+0.057	+0.057	+0.057	+0.057	+0.057	+0.057	+0.057	+0.057	+0.057	−0.943	+0.986	−0.043
m	−0.043	−0.043	−0.043	−0.043	−0.043	−0.043	−0.043	−0.043	−0.043	−0.043	+0.986	+0.057
n	−0.072	−0.072	−0.072	−0.072	−0.072	−0.072	−0.072	−0.072	−0.072	−0.072	+0.944	+0.128
o	−0.089	−0.089	−0.089	−0.089	−0.089	−0.089	−0.089	−0.089	−0.089	−0.089	+0.878	+0.211
p	−0.096	−0.096	−0.096	−0.096	−0.096	−0.096	−0.096	−0.096	−0.096	−0.096	+0.792	+0.304
q	−0.094	−0.094	−0.094	−0.094	−0.094	−0.094	−0.094	−0.094	−0.094	−0.094	+0.688	+0.406
r	−0.084	−0.084	−0.084	−0.084	−0.084	−0.084	−0.084	−0.084	−0.084	−0.084	+0.568	+0.516
s	−0.068	−0.068	−0.068	−0.068	−0.068	−0.068	−0.068	−0.068	−0.068	−0.068	+0.436	+0.632
t	−0.048	−0.048	−0.048	−0.048	−0.048	−0.048	−0.048	−0.048	−0.048	−0.048	+0.296	+0.752
u	−0.025	−0.025	−0.025	−0.025	−0.025	−0.025	−0.025	−0.025	−0.025	−0.025	+0.150	+0.875
Maximum	+3.881 −0.619	+3.006 −0.744	+2.254 −0.992	+1.622 −1.360	+1.106 −1.844	+0.700 −2.438	+0.396 −3.134	+0.185 −3.923	+0.057 −4.795	. . . −5.738	+11.476 . . .	+3.881 −0.619
As a Simple Span	+4.500 . . .	+3.600 −0.100	+2.800 −0.300	+2.100 −0.600	+1.500 −1.000	+1.000 −1.500	+0.600 −2.100	+0.300 −2.800	+0.100 −3.600	. . . −4.500	. . . . . .	. . . . . .



20 PANELS ALL EQUAL.

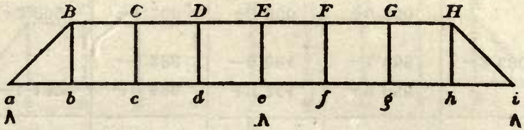
LOAD AT:	MOMENT AT: b	c	d	e	f	g	h	i	k	l
b	+0.875	+0.750	+0.626	+0.501	+0.376	+0.251	+0.127	+0.002	−0.123	−0.248
c	+0.752	+1.504	+1.256	+1.008	+0.760	+0.512	+0.264	+0.016	−0.232	−0.480
d	+0.632	+1.264	+1.895	+1.527	+1.159	+0.791	+0.422	+0.054	−0.314	−0.683
e	+0.516	+1.032	+1.548	+2.064	+1.580	+1.096	+0.612	+0.128	−0.356	−0.840
f	+0.406	+0.813	+1.219	+1.625	+2.031	+1.437	+0.844	+0.250	−0.344	−0.937
g	+0.304	+0.608	+0.912	+1.216	+1.520	+1.824	+1.128	+0.432	−0.264	−0.960
h	+0.211	+0.422	+0.632	+0.843	+1.054	+1.264	+1.475	+0.686	−0.103	−0.892
i	+0.128	+0.256	+0.384	+0.512	+0.640	+0.768	+0.896	+1.024	+0.152	−0.720
k	+0.057	+0.115	+0.172	+0.229	+0.286	+0.344	+0.401	+0.458	+0.515	−0.428
m	−0.043	−0.086	−0.128	−0.171	−0.214	−0.257	−0.299	−0.342	−0.385	−0.428
n	−0.072	−0.144	−0.216	−0.288	−0.360	−0.432	−0.504	−0.576	−0.648	−0.720
o	−0.089	−0.179	−0.268	−0.357	−0.446	−0.536	−0.625	−0.714	−0.803	−0.892
p	−0.096	−0.192	−0.288	−0.384	−0.480	−0.576	−0.672	−0.768	−0.864	−0.960
q	−0.094	−0.188	−0.281	−0.375	−0.469	−0.562	−0.656	−0.750	−0.844	−0.937
r	−0.084	−0.168	−0.252	−0.336	−0.420	−0.504	−0.588	−0.672	−0.756	−0.840
s	−0.068	−0.136	−0.205	−0.273	−0.341	−0.409	−0.478	−0.546	−0.614	−0.683
t	−0.048	−0.096	−0.144	−0.192	−0.240	−0.288	−0.336	−0.384	−0.432	−0.480
u	−0.025	−0.049	−0.074	−0.099	−0.124	−0.149	−0.173	−0.198	−0.223	−0.248
Maximum	+3.881 −0.619	+6.764 −1.238	+8.644 −1.856	+9.525 −2.475	+9.406 −3.094	+8.287 −3.713	+6.169 −4.331	+3.050 −4.950	+0.667 −7.305	. . . −12.376
As a Simple Span	+4.500	+8.000	+10.500	+12.000	+12.500	+12.000	+10.500	+8.000	+4.500	. . .



6 PANELS ALL EQUAL.

NOTE:—Shear in panel *ab* = reaction at *a*.

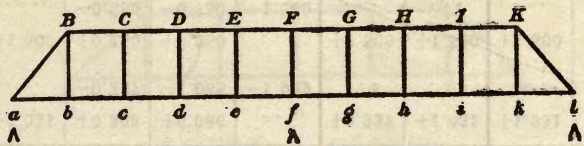
LOAD AT:	SHEAR IN PANEL:			REACTION AT:		MOMENT AT:		
	ab	*bc*	*cd*	*d*	*g*	*b*	*c*	*d*
b and f	+0.519	−0.481	−0.481	+0.962	+0.519	+0.519	+0.037	−0.444
c " *e*	+0.148	+0.148	−0.852	+1.704	+0.148	+0.148	+0.296	−0.556
Maximum	+0.667	+0.148	. . .	+2.666	+0.667	+0.667	+0.333	. . .
	. . .	−0.481	−1.333	. . .	. . .	. . .	. . .	−1.000
As a Simple Span	+1.000	+0.333	. . .	+1.000	+1.000	+1.000	+1.000	. . .
	. . .	−0.333	−1.000	. . .	. . .	. . .	. . .	. . .



8 PANELS ALL EQUAL.

NOTE:—Shear in panel *ab* = reaction at *a*.

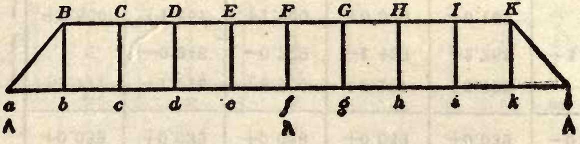
LOAD AT:	SHEAR IN PANEL:				REACTION:		MOMENT AT:			
	ab	*bc*	*cd*	*de*	*e*	*i*	*b*	*c*	*d*	*e*
b and *h*	+0.633	−0.367	−0.367	−0.367	+0.734	+0.633	+0.633	+0.266	−0.102	−0.469
c " *g*	+0.312	+0.312	−0.688	−0.688	+1.375	+0.312	+0.312	+0.624	−0.062	−0.750
d " *f*	+0.086	+0.086	+0.086	−0.914	+1.828	+0.086	+0.086	+0.172	+0.257	−0.656
Maximum	+1.031	+0.398	+0.086	. . .	+3.937	+1.031	+1.031	+1.062	+0.257	. . .
	. . .	−0.367	−1.055	−1.969	. . .	. . .	. . .	. . .	−0.164	−1.875
As a Simple Span	+1.500	+0.750	+0.250	. . .	+1.500	+1.500	+1.500	+2.000	+1.500	. . .
	. . .	−0.250	−0.750	−1.500	. . .	. . .	. . .	. . .	. . .	. . .



10 PANELS ALL EQUAL.

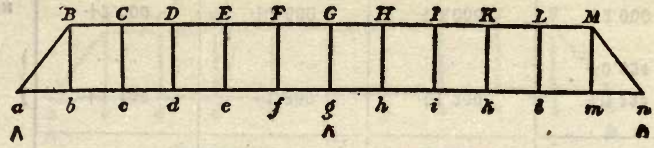
NOTE:—Shear in panel *ab* = reaction at *a*.

LOAD AT:	SHEAR IN PANEL:					REACTION AT:	
	ab	*bc*	*cd*	*de*	*ef*	*f*	*l*
b and k	+0.704	−0.296	−0.296	−0.296	−0.296	+0.592	+0.704
c " *i*	+0.432	+0.432	−0.568	−0.568	−0.568	+1.136	+0.432
d " *h*	+0.208	+0.208	+0.208	−0.792	−0.792	+1.584	+0.208
e " *g*	+0.056	+0.056	+0.056	+0.056	−0.944	+1.888	+0.056
Maximum	+1.400	+0.696	+0.264	+0.056	. . .	+5.200	+1.400
	. . .	−0.296	−0.864	−1.656	−2.600	. . .	. . .
As a Simple Span	+2.000	+1.200	+0.600	+0.200	. . .	+2.000	+2.000
	. . .	−0.200	−0.600	−1.200	−2.000	. . .	. . .



10 PANELS ALL EQUAL.

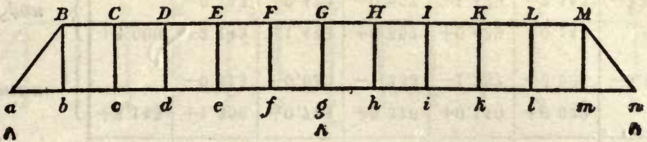
LOAD AT:	MOMENT AT: b	c	d	e	f
b and k	+0.704	+0.408	+0.112	−0.184	−0.480
c " i	+0.432	+0.864	+0.296	−0.272	−0.840
d " h	+0.208	+0.416	+0.624	−0.168	−0.960
e " g	+0.056	+0.112	+0.168	+0.224	−0.720
Maximum	+1.400	+1.800	+1.200	+0.224	. . .
	. . .	. . .	. . .	−0.624	−3.000
As a Simple Span	+2.000	+3.000	+3.000	+2.000	. . .



12 PANELS **ALL EQUAL.**

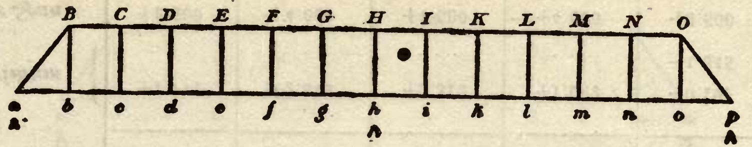
NOTE :—Shear in panel *ab* = reaction at *a*.

LOAD AT:	SHEAR IN PANEL:						REACTION:	
	ab	*bc*	*cd*	*de*	*ef*	*fg*	*g*	*n*
b and m	+0.752	−0.248	−0.248	−0.248	−0.248	−0.248	+0.495	+0.752
c " *l*	+0.519	+0.519	−0.481	−0.481	−0.481	−0.481	+0.963	+0.519
d " *k*	+0.313	+0.313	+0.313	−0.687	−0.687	−0.687	+1.375	+0.313
e " *i*	+0,148	+0.148	+0.148	+0.148	−0.852	−0.852	+1.703	+0.148
f " *h*	+0.039	+0.039	+0.039	+0.039	+0.039	−0.961	+1.921	+0.039
Maximum	+1.771	+1.019	+0.500	+0.187	+0.039	. . .	+6.457	+1.771
	. . .	−0.248	−0.729	−1.416	−2.268	−3.229	. . .	. . .
As a Simple Span	+2.500	+1.667	+1.000	+0.500	+0.167	. . .	. . .	. . .
	. . .	−0.167	−0.500	−1.000	−1.667	−2.500	. . .	. . .



12 PANELS ALL EQUAL.

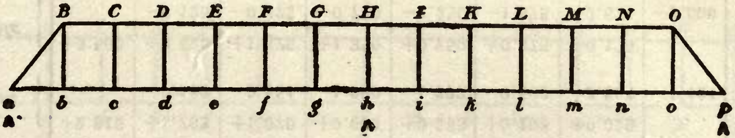
LOAD AT:	MOMENT AT:					
	b	*c*	*d*	*e*	*f*	*g*
b and m	+0.752	+0.505	+0.257	+0.009	−0.239	−0.486
c " *l*	+0.519	+1.037	+0.556	+0.074	−0.408	−0.888
d " *k*	+0.313	+0.625	+0.938	+0.250	−0.438	−1.125
e " *i*	+0.148	+0.296	+0.444	+0.592	−0.260	−1.111
f " *h*	+0.039	+0.079	+0.118	+0.157	+0.197	−0.764
Maximum	+1.771	+2.542	+2.313	+1.082	+0.197	. . .
	. . . .	. . . .	. . . .	. . .	−1.345	−4.374
As a Simple Span	+2.500	+4.000	+4.500	+4.000	+2.500	. . .



14 PANELS **ALL EQUAL.**

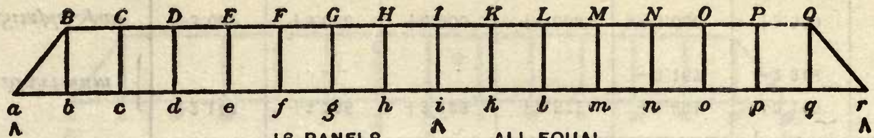
NOTE:—Shear in panel *ab* = reaction at *a*.

LOAD AT:	SHEAR IN PANEL:							REACTION:	
	ab	*bc*	*cd*	*de*	*ef*	*fg*	*gh*	*h*	*p*
b and *o*	+0.787	−0.213	−0.213	−0.213	−0.213	−0.213	−0.213	+0.425	+0.787
c " *n*	+0.583	+0.583	−0.417	−0.417	−0.417	−0.417	−0.417	+0.834	+0.583
d " *m*	+0.397	+0.397	+0.397	−0.603	−0.603	−0.603	−0.603	+1.207	+0.397
e " *l*	+0.236	+0.236	+0.236	+0.236	−0.764	−0.764	−0.764	+1.528	+0.236
f " *k*	+0.111	+0.111	+0.111	+0.111	+0.111	−0.889	−0.889	+1.778	+0.111
g " *i*	+0.029	+0.029	+0.029	+0.029	+0.029	+0.029	−0.971	+1.942	+0.029
Maximum	+2.143	+1.356	+0.773	+0.376	+0.140	+0.029	. . .	+7.714	+2.143
	. . .	−0.213	−0.630	−1.233	−1.997	−2.886	−3.857	. . .	. . .
As a Simple Span	+3.000	+2.143	+1.429	+0.857	+0.429	+0.143	. . .	. . .	. . .
	. . .	−0.143	−0.429	−0.857	−1.429	−2.143	−3.000	. . .	. . .



14 PANELS ALL EQUAL.

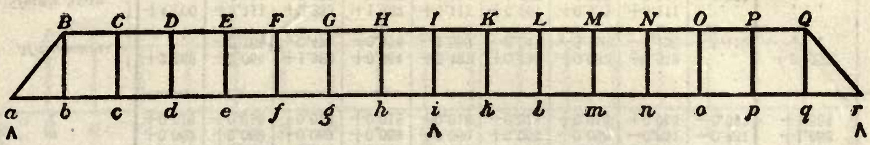
LOAD AT:	MOMENT AT: b	c	d	e	f	g	h
b and o	+0.787	+0.574	+0.362	+0.149	−0.064	−0.277	−0.490
c " *n*	+0.583	+1.166	+0.749	+0.332	−0.085	−0.502	−0.918
d " *m*	+0.397	+0.793	+1.190	+0.586	−0.018	−0.621	−1.224
e " *l*	+0.236	+0.472	+0.709	+0.945	+0.181	−0.583	−1.347
f " *k*	+0.111	+0.222	+0.332	+0.443	+0.554	−0.335	−1.225
g " *i*	+0.029	+0.058	+0.087	+0.116	+0.146	+0.175	−0.796
Maximum	+2.143	+3.285	+3.429	+2.571	+0.881	+0.175	. . .
	. . .	. . .	. . .	. . .	−0.167	−2 318	−6.000
As a Simple Span	+3.000	+5.000	+6.000	+6.000	+5.000	+3.000	. . .



16 PANELS ALL EQUAL.

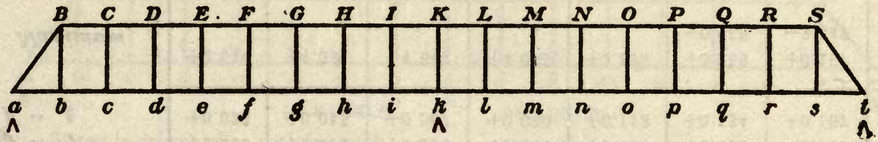
NOTE:—Shear in panel *ab* = reaction at *a*.

LOAD AT:	SHEAR IN PANEL:								REACTION:	
	ab	*bc*	*cd*	*de*	*ef*	*fg*	*gh*	*hi*	*i*	*r*
b and *q*	+0.813	−0.187	−0.187	−0.187	−0.187	−0.187	−0.187	−0.187	+0.373	+0.813
c " *p*	+0.633	+0.633	−0.367	−0.367	−0.367	−0.367	−0.367	−0.367	+0.734	+0.633
d " *o*	+0.464	+0.464	+0.464	−0.536	−0.536	−0.536	−0.536	−0.536	+1.072	+0.464
e " *n*	+0.313	+0.313	+0.313	+0.313	−0.687	−0.687	−0.687	−0.687	+1.375	+0.313
f " *m*	+0.185	+0.185	+0.185	+0.185	+0.185	−0.815	−0.815	−0.815	+1.631	+0.185
g " *l*	+0.086	+0.086	+0.086	+0.086	+0.086	+0.086	−0.914	−0.914	+1.828	+0.086
h " *k*	+0.022	+0.022	+0.022	+0.022	+0.022	+0.022	+0.022	−0.978	+1.955	+0.022
Maximum	+2.516	+1.703	+1.070	+0.606	+0.293	+0.108	+0.022	. . .	+8.968	+2.516
	. . .	−0.187	−0.554	−1.090	−1.777	−2.592	−3.506	−4.484	. . .	. . .
As a Simple Span	+3.500	+2.625	+1.875	+1.250	+0.750	+0.375	+0.125	. . .	. . .	. . .
	. . .	−0.125	−0.375	−0.750	−1.250	−1.875	−2.625	−3.500	. . .	. . .



16 PANELS ALL EQUAL.

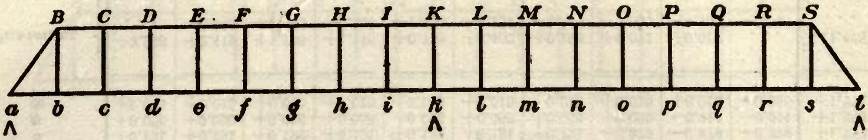
LOAD AT:	MOMENT AT:							
	b	*c*	*d*	*e*	*f*	*g*	*h*	
b and q	+0.813	+0.627	+0.441	+0.254	+0.067	−0.120	−0.306	−0.492
c " *p*	+0.633	+1.266	+0.898	+0.531	+0.164	−0.203	−0.570	−0.938
d " *o*	+0.464	+0.928	+1.391	+0.855	+0.319	−0.217	−0.753	−1.289
e " *n*	+0.313	+0.625	+0.938	+1.250	+0.563	−0.125	−0.812	−1.500
f " *m*	+0.185	+0.369	+0.554	+0.738	+0.923	+0.108	−0.708	−1.524
g " *l*	+0.086	+0.172	+0.258	+0.344	+0.430	+0.516	−0.398	−1.313
h " *k*	+0.022	+0.045	+0.067	+0.090	+0.112	+0.134	+0.157	−0.820
Maximum {	+2.516	+4.032	+4.547	+4.062	+2.578	+0.758	+0.157	. . .
	. . .	. . .	. . .	. . .	. . .	−0.665	−3.547	−7.876
As a Simple Span	+3.500	+6.000	+7.500	+8.000	+7.500	+6.000	+3.500	. . .



18 PANELS ALL EQUAL.

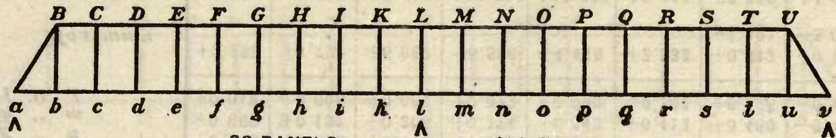
NOTE:—Shear in panel ab = reaction at a.

LOAD AT	SHEAR IN PANEL:									REACTION	
	ab	*bc*	*cd*	*de*	*ef*	*fg*	*gh*	*hi*	*ik*	*k*	*t*
b and *s*	+0.834	−0.166	−0.166	−0.166	−0.166	−0.166	−0.166	−0.166	−0.166	+0.332	+0.834
c " *r*	+0.672	+0.672	−0.328	−0.328	−0.328	−0.328	−0.328	−0.328	−0.328	+0.656	+0.672
d " *q*	+0.518	+0.518	+0.518	−0.482	−0.482	−0.482	−0.482	−0.482	−0.482	+0.963	+0.518
e " *p*	+0.377	+0.377	+0.377	+0.377	−0.623	−0.623	−0.623	−0.623	−0.623	+1.246	+0.377
f " *o*	+0.252	+0.252	+0.252	+0.252	+0.252	−0.748	−0.748	−0.748	−0.748	+1.495	+0.252
g " *n*	+0.148	+0.148	+0.148	+0.148	+0.148	+0.148	−0.852	−0.852	−0.852	+1.704	+0.148
h " *m*	+0.069	+0.069	+0.069	+0.069	+0.069	+0.069	+0.069	−0.931	−0.931	+1.863	+0.069
i " *l*	+0.018	+0.018	+0.018	+0.018	+0.018	+0.018	+0.018	+0.018	−0.982	+1.964	+0.018
Maximum	+2.888 . . .	+2.054 −0.166	+1.382 −0.494	+0.864 −0.976	+0.487 −1.599	+0.235 −2.347	+0.087 −3.199	+0.018 −4.130	. . . −5.112	+10.223 . . .	+2.888 . . .
As a Simple Span	+4.000 . . .	+3.111 −0.111	+2.333 −0.333	+1.667 −0.667	+1.111 −1.111	+0.667 −1.667	+0.333 −2.333	+0.111 −3.111	. . . −4.000	. . . . . .	. . . . . .



18 PANELS ALL EQUAL.

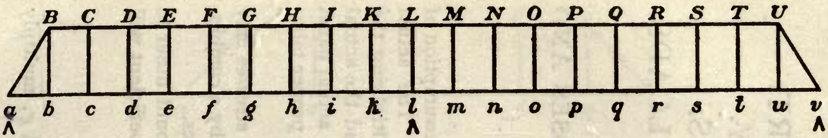
LOAD AT:	MOMENT AT: b	c	d	e	f	g	h	i	k
b and s	+0.834	+0.668	+0.502	+0.336	+0.170	+0.004	−0.162	−0.328	−0.494
c " r	+0.672	+1.344	+1.017	+0.689	+0.361	+0.033	−0.295	−0.622	−0.950
d " q	+0.518	+1.037	+1.555	+1.074	+0.592	+0.110	−0.371	−0.853	−1.334
e " p	+0.377	+0.754	+1.132	+1.509	+0.886	+0.263	−0.360	−0.982	−1.604
f " o	+0.252	+0.505	+0.757	+1.010	+1.262	+0.514	−0.233	−0.981	−1.728
g " n	+0.148	+0.296	+0.444	+0.592	+0.741	+0.889	+0.037	−0.815	−1.667
h " m	+0.069	+0.137	+0.206	+0.274	+0.343	+0.412	+0.480	−0.451	−1.383
i " l	+0.018	+0.036	+0.054	+0.072	+0.090	+0.107	+0.125	+0.143	−0.840
Maximum	+2.888	+4.777	+5.667	+5.556	+4.445	+2.332	+0.642	+0.143	. . .
	. . .	. . .	. . .	. . .	. . .	. . .	−1.421	−5.032	−10.000
As a Simple Span	+4.000	+7.000	+9.000	+10.000	+10.000	+9.000	+7.000	+4.000	. . .



20 PANELS ALL EQUAL.

NOTE:—Shear in panel ab = reaction at a.

LOAD AT:	SHEAR IN PANEL:										REACTION	
	ab	*bc*	*cd*	*de*	*ef*	*fg*	*gh*	*hi*	*ik*	*kl*	*l*	*v*
b and u	+0.851	−0.149	−0.149	−0.149	−0.149	−0.149	−0.149	−0.149	−0.149	−0.149	+0.299	+0.851
c " *t*	+0.704	+0.704	−0.296	−0.296	−0.296	−0.296	−0.296	−0.296	−0.296	−0.296	+0.592	+0.704
d " *s*	+0.563	+0.563	+0.563	−0.437	−0 437	−0.437	−0.437	−0.437	−0.437	−0.437	+0.873	+0.563
e " *r*	+0.432	+0.432	+0.432	+0.432	−0.568	−0.568	−0.568	−0.568	−0.568	−0.568	+1.136	+0.432
f " *q*	+0.313	+0.313	+0.313	+0.313	+0.313	−0.687	−0.687	−0.687	−0.687	−0.687	+1.375	+0.313
g " *p*	+0.208	+0.208	+0.208	+0.208	+0.208	+0.208	−0.792	−0.792	−0.792	−0.792	+1.584	+0.208
h " *o*	+0.121	+0.121	+0.121	+0.121	+0.121	+0.121	+0.121	−0.879	−0.879	−0.879	+1.757	+0.121
i " *n*	+0.056	+0.056	+0.056	+0.056	+0.056	+0.056	+0.056	+0.056	−0.944	−0.944	+1.888	+0.056
k " *m*	+0.015	+0.015	+0.015	+0.015	+0.015	+0.015	+0.015	+0.015	+0.015	−0.985	+1.971	+0.015
Maximum	+3.263 . . .	+2.412 −0.149	+1.708 −0.445	+1.145 −0.882	+0.713 −1.450	+0.400 −2.137	+0.192 −2.929	+0.071 −3.808	+0.015 −4.752	. . . −5.737	+11.475 . . .	+3.263 . . .
As a Simple Span	+4.500 . . .	+3.600 −0.100	+2.800 −0.300	+2.100 −0.600	+1.500 −1.000	+1.000 −1.500	+0.600 −2.100	+0.300 −2.800	+0.100 −3.600	. . . −4.500	. . . . . .	. . . . . .



20 PANELS ALL EQUAL.

LOAD AT:	MOMENT AT: b	c	d	e	f	g	h	i	k	l
b and u	+0.851	+0.701	+0.552	+0.402	+0.253	+0.102	−0.047	−0.196	−0.345	−0.495
c " *t*	+0.704	+1.408	+1.112	+0.816	+0.520	+0.224	−0.072	−0.368	−0.664	−0.960
d " *s*	+0.563	+1.127	+1.690	+1.254	+0.817	+0.381	−0.056	−0.492	−0.929	−1.365
e " *r*	+0.432	+0.864	+1.296	+1.728	+1.160	+0 592	+0.024	−0.544	−1.112	−1.680
f " *q*	+0.313	+0.625	+0.938	+1.250	+1.562	+0.875	+0.188	−0.500	−1.188	−1.875
g " *p*	+0.208	+0.416	+0.624	+0.832	+1.040	+1.248	+0.456	−0.336	−1.128	−1.920
h " *o*	+0.121	+0.243	+0.365	+0.486	+0.608	+0.729	+0.851	−0.028	−0.906	−1.785
i " *n*	+0.056	+0.112	+0.168	+0.224	+0.280	+0.336	+0.392	+0.448	−0.496	−1.440
k " *m*	+0.015	+0·029	+0.043	+0.058	+0.073	+0.087	+0.102	+0.116	+0.131	−0.855
Maximum	+3.263	+5.525	+6.788	+7.050	+6.313	+4.574	+2.013	+0.564	+0.131	. . .
	. . .	. . .	. . .	. . .	. . .	. . .	−0.175	−2.464	−6.768	−12.375
As a Simple Span	+4.500	+8.000	+10.500	+12.000	+12.500	+12.000	+10.500	+8.000	+4.500	. . .

SWING BRIDGES.

FOUR POINTS OF SUPPORT.
PARTIAL CONTINUITY.
TWO EQUAL ARMS.
SYMMETRICAL LOADS.

REACTIONS, SHEARING STRESSES AND BENDING MOMENTS.

The following tables are based on the assumption of a panel load and panel length of unity. The actual shear will, therefore, be obtained by multiplying the actual panel load by the tabular shear, and the actual moment will be found by multiplying the actual panel load by the actual panel length and by the proper tabular coefficient.

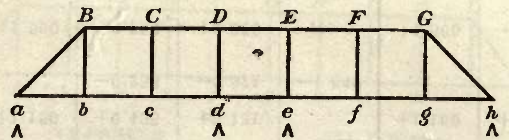
If the chords are not parallel the web stresses may be obtained by the method of moments, or by a combination of the method of moments and graphics.

If the length of the center panel should differ to some extent from the others, the tabular coefficient will not be sensibly changed.

EXAMPLE.

For shear in *cd*, with loads at *b* and *g*, multiply w_b $(= w_g)$ by -0.432.

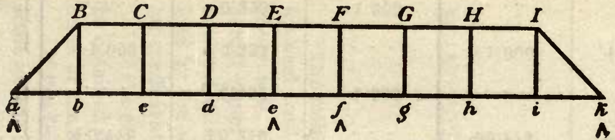
For moment at *c*, and loads at *b* and *g*, multiply w_b $(= w_g)$ by panel length and by $+0.136$.



7 PANELS ALL EQUAL.

NOTE:—Shear in panel *ab* = reaction at *a*, and Shear *cd* = reaction at *d*.

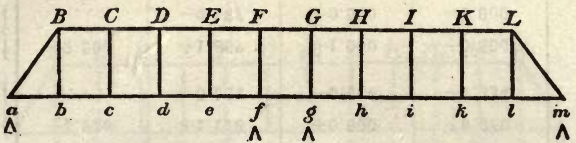
LOADS AT:	SHEAR IN PANEL:			MOMENT AT:		
	ab	*bc*	*cd*	*b*	*c*	*d*
b and g	+0.568	−0.432	−0.432	+0.568	+0.136	−0.296
c " *f*	+0.210	+0.210	−0.790	+0.210	+0.420	−0.370
Maximum	+0.778	+0.210	. . .	+0.778	+0.556	. . .
	. . .	−0.432	−1.222	. . .	. . .	−0.666
As a Simple Span	+1.000	+0.333	. . .	+1.000	+1.000	. . .
	. . .	−0.333	−1.000	. . .	. . .	. . .



9 PANELS ALL EQUAL.

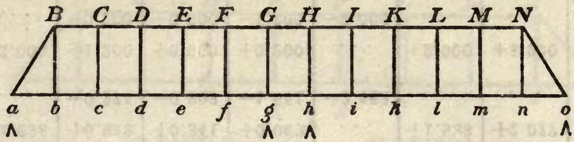
Note:—Shear in panel ab = reaction at a, and Shear de = reaction at e.

LOADS AT:	SHEAR IN PANEL:				MOMENT AT:			
	ab	*bc*	*cd*	*de*	*b*	*c*	*d*	*e*
b and i	+0.665	−0.335	−0.335	−0.335	+0.665	+0.330	−0.005	−0.340
c " *h*	+0.364	+0.364	−0.636	−0.636	+0.364	+0.728	+0.092	−0.544
d " *g*	+0.131	+0.131	+0.131	−0.869	+0.131	+0.262	+0.393	−0.476
Maximum	+1.160	+0.495	+0.131	. . .	+1.160	+1.320	+0.485	. . .
	. . .	−0.335	−0.971	−1.840	. . .	. . .	−0.005	−1.360
As a Simple Span	+1.500	+0.750	+0.250	. . .	+1.500	+2.000	+1.500	. . .
	. . .	−0.250	−0.750	−1.500	. . .	. . .	. . .	. . .



NOTE :—Shear in panel ab = reaction at a, and Shear ef = reaction at f.

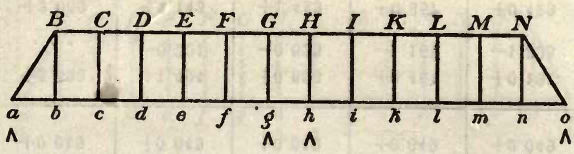
LOADS AT:	SHEAR IN PANEL:					MOMENT AT:				
	ab	*bc*	*cd*	*de*	*ef*	*b*	*c*	*d*	*e*	*f*
b and l	+0.726	−0.274	−0.274	−0.274	−0.274	+0.726	+0.452	+0.178	−0.095	−0.369
c " *k*	+0.471	+0.471	−0.529	−0.529	−0.529	+0.471	+0.942	+0.412	−0.117	−0.646
d " *i*	+0.252	+0.252	+0.252	−0.748	−0.748	+0.252	+0.505	+0.757	+0.009	−0.738
e " *h*	+0.089	+0.089	+0.089	+0.089	−0.911	+0.089	+0.178	+0.268	+0.357	−0.554
Maximum	+1.538	+0.812	+0.341	+0.089	. . .	+1.538	+2.077	+1.615	+0.366	. . .
	. . .	−0.274	−0.803	−1.551	−2.462	. . .	. . .	. . .	−0.212	−2.307
As a Simple Span	+2.000	+1.200	+0.600	+0.200	. . .	+2.000	+3.000	+3.000	+2.000	. . .
	. . .	−0.200	−0.600	−1.200	−2.000	. . .	. . .	. . .	. . .	. . .



13 PANELS ALL EQUAL.

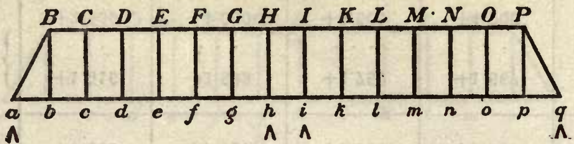
NOTE:—Shear in panel *ab* = reaction at *a*, and Shear *fg* = reaction at *g*.

LOADS AT:	SHEAR IN PANEL: *ab*	*bc*	*cd*	*de*	*ef*	*fg*
b and n	+0.768	−0.232	−0.232	−0.232	−0.232	−0.232
c " *m*	+0.548	+0.548	−0.452	−0.452	−0.452	−0.452
d " *l*	+0.350	+0.350	+0.350	−0.650	−0.650	−0.650
e " *k*	+0.185	+0.185	+0.185	+0.185	−0.815	−0.815
f " *i*	+0.065	+0.065	+0.065	+0.065	+0.065	−0.935
Maximum	+1.916	+1.148	+0.600	+0.250	+0.065	. . .
	. . .	−0.232	−0.684	−1.334	−2.149	−3.084
As a Simple Span	+2.500	+1.667	+1.000	+0.500	+0.167	. . .
	. . .	−0.167	−0.500	−1.000	−1.667	−2.500



13 PANELS ALL EQUAL

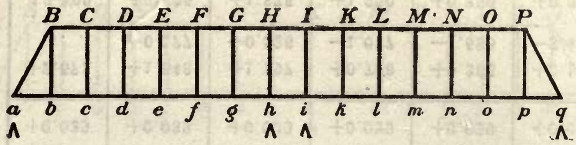
LOADS AT:	MOMENT AT:					
	b	*c*	*d*	*e*	*f*	*g*
b and n	+0.768	+0.537	+0.305	+0.074	−0.158	−0.390
c " *m*	+0.548	+1.097	+0.645	+0.193	−0.259	−0.710
d " *l*	+0.350	+0.700	+1.050	+0.400	−0.250	−0.900
e " *k*	+0.185	+0.370	+0.556	+0.741	−0.074	−0.889
f " *i*	+0.065	+0.129	+0.194	+0.259	+0.323	−0.612
Maximum	+1.916	+2.833	+2.750	+1.667	+0.323	. . .
	. . .	. . .	. . .	. . .	−0.741	−3.501
As a Simple Span	+2.500	+4.000	+4.500	+4.000	+2.500	. . .



15 PANELS **ALL EQUAL**

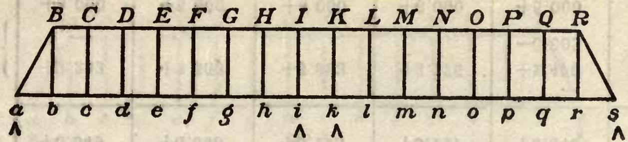
NOTE:—Shear in panel *ab* = reaction at *a*, and Shear *gh* = reaction at *h*.

LOADS AT:	SHEAR IN PANEL:						
	ab	*bc*	*cd*	*de*	*ef*	*fg*	*gh*
b and p	+0.799	−0.201	−0.201	−0.201	−0.201	−0.201	−0.201
c " *o*	+0.606	+0.606	−0.394	−0.394	−0.394	−0.394	−0.394
d " *n*	+0.427	+0.427	+0.427	−0.573	−0.573	−0.573	−0.573
e " *m*	+0.270	+0.270	+0.270	+0.270	−0.730	−0.730	−0.730
f " *l*	+0.142	+0.142	+0.142	+0.142	+0.142	−0.858	−0.858
g " *k*	+0.049	+0.049	+0.049	+0.049	+0.049	+0.049	−0.951
Maximum	+2.293	+1.494	+0.888	+0.461	+0.191	+0.049	. . .
	. . .	−0.201	−0.595	−1.168	−1.898	−2.756	−3.707
As a Simple Span	+3.000	+2.143	+1.429	+0.857	+0.429	+0.143	. . .
	. . .	−0.143	−0.429	−0.857	−1.429	−2.143	−3.000



15 PANELS ALL EQUAL.

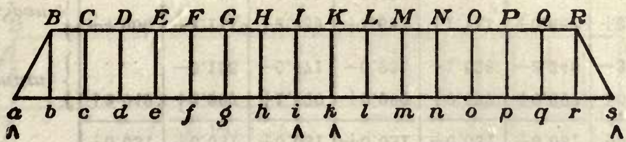
LOADS AT:	MOMENT AT: b	c	d	e	f	g	h
b and *p*	+0.799	+0.600	+0.398	+0.198	−0.003	−0.203	−0.404
c " *o*	+0.606	+1.212	+0.819	+0.425	+0.031	−0.363	−0.757
d " *n*	+0.427	+0.855	+1.282	+0.709	+0.137	−0.436	−1.009
e " *m*	+0.270	+0.540	+0.811	+1.081	+0.351	−0.379	−1.109
f " *l*	+0.142	+0.283	+0.425	+0.566	+0.708	−0.150	−1.009
g " *k*	+0.049	+0.098	+0.148	+0.197	+0.246	+0.295	−0.656
Maximum	+2.293	+3.588	+3.883	+3.176	+1.470	+0.295	. . .
	. . .	. . .	. . .	. . .	−0.003	−1.531	−4.944
As a Simple Span	+3.000	+5.000	+6.000	+6.000	+5.000	+3.000	. . .



17 PANELS **ALL EQUAL.**

NOTE:—Shear in panel *ab* = reaction at *a*, and Shear *hi* = reaction at *i*.

LOADS AT:	SHEAR IN PANEL:							
	ab	*bc*	*cd*	*de*	*ef*	*fg*	*gh*	*hi*
b and r	+0.823	−0.177	−0.177	−0 177	−0.177	−0.177	−0.177	−0.177
c " *q*	+0.651	+0.651	−0.349	−0.349	−0.349	−0.349	−0.349	−0.349
d " *p*	+0.489	+0.489	+0.489	−0.511	−0.511	−0.511	−0.511	−0.511
e " *o*	+0.342	+0.342	+0.342	+0.342	−0.658	−0.658	−0.658	−0.658
f " *n*	+0.215	+0.215	+0.215	+0.215	+0.215	−0.785	−0.785	−0.785
g " *m*	+0.112	+0.112	+0.112	+0.112	+0.112	+0.112	−0.888	−0.888
h " *l*	+0.039	+0.039	+0.039	+0.039	+0.039	+0.039	+0.039	−0.961
Maximum	+2.671	+1.848	+1.197	+0.708	+0.366	+0.151	+0.039	. . .
	. . .	−0.177	−0.526	−1.037	−1.695	−2.480	−3.368	−4.329
As a Simple Span	+3.500	+2.625	+1.875	+1.250	+0.750	+0.375	+0.125	. . .
	. . .	−0.125	−0.375	−0.750	−1.250	−1.875	−2.625	−3.500



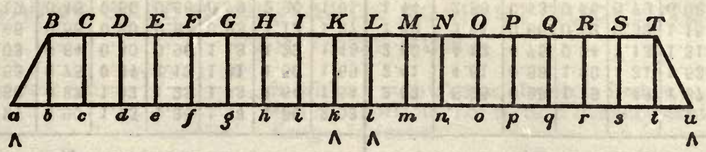
17 PANELS ALL EQUAL.

LOADS AT:	MOMENT AT: b	c	d	e	f	g	h	i
b and r	+0.823	+0.646	+0.470	+0.293	+0.116	−0.061	−0.238	−0.415
c " *q*	+0.651	+1.303	+0.954	+0.605	+0.257	−0.092	−0.441	−0.789
d " *p*	+0.489	+0.979	+1.468	+0.957	+0.447	−0.064	−0.575	−1.086
e " *o*	+0.342	+0.684	+1.026	+1.369	+0.711	+0.053	−0.605	−1.263
f " *n*	+0.215	+0.430	+0.644	+0.859	+1.074	+0.289	−0.497	−1.282
g " *m*	+0.112	+0.224	+0.336	+0.448	+0.559	+0.671	−0.217	−1.105
h " *l*	+0.039	+0.077	+0.116	+0.155	+0.193	+0.232	+0.271	−0.691
Maximum	+2.671	+4.343	+5.014	+4.686	+3.357	+1.245	+0.271	. . .
	. . .	. . .	. . .	. . .	. . .	−0.217	−2.573	−6.631
As a Simple Span	+3.500	+6.000	+7.500	+8.000	+7.500	+6.000	+3.500	. . .

19 PANELS **ALL EQUAL.**

NOTE:—Shear in panel *ab* = reaction at *a*, and Shear *ik* = reaction at *k*.

LOADS AT:	SHEAR IN PANEL:								
	ab	*bc*	*cd*	*de*	*ef*	*fg*	*gh*	*hi*	*ik*
b and t	+0.842	−0.158	−0.158	−0.158	−0.158	−0.158	−0.158	−0.158	−0.158
c " *s*	+0.687	+0.687	−0.313	−0.313	−0.313	−0.313	−0.313	−0.313	−0.313
d " *r*	+0.540	+0.540	+0.540	−0.460	−0.460	−0.460	−0.460	−0.460	−0.460
e " *q*	+0.403	+0.403	+0.403	+0.403	−0.597	−0.597	−0.597	−0.597	−0.597
f " *p*	+0.280	+0.280	+0.280	+0.280	+0.280	−0.720	−0.720	−0.720	−0.720
g " *o*	+0.175	+0.175	+0.175	+0.175	+0.175	+0.175	−0.825	−0.825	−0.825
h " *n*	+0.091	+0.091	+0.091	+0.091	+0.091	+0.091	+0.091	−0.909	−0.909
i " *m*	+0.031	+0.031	+0.031	+0.031	+0.031	+0.031	+0.031	+0.031	−0.969
Maximum	+3.049	+2.207	+1.520	+0.980	+0.577	+0.297	+0.122	+0.031	. . .
	. . .	−0.158	−0.471	−0.931	−1.528	−2.248	−3.073	−3.982	−4.951
As a Simple Span	+4.000	+3.111	+2.333	+1.667	+1.111	+0.667	+0.333	+0.111	. . .
	. . .	−0.111	−0.333	−0.667	−1.111	−1.667	−2.333	−3.111	−4.000



19 PANELS ALL EQUAL

LOADS AT:	MOMENT AT: b	c	d	e	f	g	h	i	k
b and t	+0.842	+0.684	+0.526	+0.368	+0.210	+0.052	−0.106	−0.264	−0.423
c " s	+0.687	+1.374	+1.061	+0.748	+0.435	+0.122	−0.191	−0.504	−0.814
d " r	+0.540	+1.080	+1.620	+1.160	+0.700	+0.240	−0.220	−0.680	−1.142
e " q	+0.403	+0.806	+1.209	+1.612	+1.015	+0.418	−0.179	−0.776	−1.375
f " p	+0.280	+0.560	+0.840	+1.120	+1 400	+0.680	−0.040	−0.760	−1.482
g " o	+0.175	+0.350	+0.525	+0.700	+0.875	+1.050	+0.225	−0.600	−1.428
h " n	+0.091	+0.182	+0.273	+0.364	+0.455	+0.546	+0.637	−0.272	−1.184
i " m	+0.031	+0.062	+0.093	+0.124	+0.155	+0.186	+0.217	+0.248	−0.719
Maximum	+3.049	+5.098	+6.147	+6.196	+5.245	+3.294	+1.079	+0.248	. . .
	. . .	. . .	. . .	. . .	. . .	. . .	−0.736	−3.856	−8.567
As a Simple Span	+4.000	+7.000	+9.000	+10.000	+10.000	+9.000	+7.000	+4.000	. . .

BEARING AND SHEARING AREA OF RIVETS PER FOOT RUN.

Pitch of Rivets Inches	½" RIVETS								⅝" RIVETS								Pitch of Rivets Inches
	SHEARING		BEARING — THICKNESS OF PLATE IN INCHES						SHEARING		BEARING — THICKNESS OF PLATE IN INCHES						
	Single	Double	¼	$\frac{5}{16}$	⅜	$\frac{7}{16}$	½	$\frac{9}{16}$	Single	Double	¼	$\frac{5}{16}$	⅜	$\frac{7}{16}$	½	$\frac{9}{16}$	
1½	1.57	3.14	1.00	1.25	1.50	1.75	2.00	2.25									
2	1.18	2.36	0.75	0.94	1.13	1.31	1.50	1.69	1.84	3.68	0.94	1.17	1.41	1.64	1.88	2.11	2
2½	0.94	1.88	0.60	0.75	0.90	1.05	1.20	1.35	1.47	2.95	0.75	0.94	1.13	1.31	1.50	1.69	2½
3	0.79	1.57	0.50	0.63	0.75	0.88	1.00	1.13	1.23	2.45	0.63	0.78	0.94	1.09	1.25	1.41	3
3½	0.67	1.35	0.43	0.54	0.64	0.75	0.86	0.96	1.05	2.10	0.54	0.67	0.80	0.94	1.07	1.21	3½
4	0.59	1.18	0.38	0.47	0.56	0.66	0.75	0.84	0.92	1.84	0.47	0.59	0.70	0.82	0 94	1.05	4
5	0.47	0.94	0.30	0.38	0.45	0.53	0.60	0.68	0 74	1.47	0.38	0.47	0.56	0 66	0.75	0.84	5
6	0.39	0.79	0.25	0.31	0.38	0.44	0.50	0.56	0.61	1 23	0.31	0.39	0.47	0.55	0.63	0.70	6
	¾" RIVETS								⅞" RIVETS								
2½	2.12	4.24	0.90	1.13	1.35	1.58	1.80	2.03									
2¾	1.93	3.86	0.82	1.02	1.23	1.43	1.64	1.84	2.62	5.25	0.95	1.19	1.43	1.67	1.91	2.15	2¾
3	1.77	3.53	0.75	0.94	1.13	1.31	1.50	1.69	2.41	4.81	0.88	1.09	1.31	1.53	1.75	1.97	3
3½	1.51	3.03	0.64	0.80	0.96	1.13	1 29	1.45	2.06	4.12	0.75	0.94	1.13	1.31	1.50	1.69	3½
4	1.33	2.65	0.56	0.70	0.84	0.98	1.13	1.27	1.80	3.61	0.66	0.82	0.98	1.15	1.31	1.48	4
5	1.06	2.12	0.45	0.56	0.68	0.79	0.90	1.01	1.44	2.89	0.53	0.66	0.79	0.92	1.05	1.18	5
6	0.88	1.77	0.38	0.47	0.56	0.66	0.75	0.84	1.20	2.41	0.44	0.55	0.66	0.77	0.88	0.98	6

TABLE GIVING SAFE RESISTANCE AGAINST BUCKLING OF WEB PER FOOT RUN.

Safe shear per foot run $= \dfrac{10000 \times 12t}{1 + \dfrac{d^2}{3000\,t^2}}$ in which t = thickness of web in inches, and d = horizontal or vertical distance center to center of flanges in inches.

Shear per foot run = total shear ÷ depth c. to c. flanges in feet.

Hor. or Vert. Dist. c. – c. of Flanges	$t = \frac{1}{4}''$		$t = \frac{5}{16}''$		$t = \frac{3}{8}''$		$t = \frac{7}{16}''$		$t = \frac{1}{2}''$	
	$\frac{d}{t}$	Safe Shear	$\frac{d}{t}$	Safe Shear	$\frac{d}{t}$	Safe Shear	$\frac{d}{t}$	Safe Shear	$\frac{d}{t}$	Safe Shear
1′ — 0″	48	16970	38.4	25140	32	33550	27.4	42000	24	50340
1′ — 3″	60	13640	48.0	21220	40	29350	34.3	37720	30	46160
1′ — 6″	72	11000	57.6	17810	48	25470	41.1	33590	36	41900
1′ — 9″	84	8950	67.2	14970	56	22020	48.0	29700	42	37780
2′ — 0″	96	7370	76.8	12640	64	19030	54.9	26190	48	33940
2′ — 3″	108	6140	86.4	10750	72	16500	61.7	23140	54	30430
2′ — 6″	120	5170	96.0	9210	80	14360	68.6	20450	60	27270
2′ — 9″	132	4410	105.6	7950	88	12570	75.4	18140	66	24470
3′ — 0″	144	3790	115.2	6920	96	11050	82.3	16120	72	21990
3′ — 6″	168	2880	134.4	5340	112	8690	96.0	12890	84	17900
4′ — 0″	192	2260	153.6	4230	128	6970	109.7	10480	96	14730
4′ — 6″	216	1810	172.8	3420	144	5690	123.4	8640	108	12280
5′ — 0″	240	1490	192.0	2820	160	4720	137.2	7220	120	10340
5′ — 6″	264	1240	211.2	2360	176	3970	150.9	6110	132	8810
6′ — 0″	288	1050	230.4	2010	192	3390	164.6	5230	144	7580
7′ — 0″	336	780	268.8	1490	224	2540	192.0	3950	168	5760

CENTRIFUGAL FORCE.

Values in per cent. of Weight for Various Velocities and Degrees of Curvature.

Velocity		Degree of Curvature											
Miles per Hour	Feet per Second	1°	2°	3°	4°	5°	6°	7°	8°	9°	10°	11°	12°
10	14.67	0.12	0.23	0.35	0.47	0.58	0.70	0.82	0.94	1.05	1.17	1.29	1.40
15	22.00	0.26	0.53	0.79	1.05	1.31	1.57	1.84	2.10	2.36	2.62	2.88	3.14
20	29.33	0.47	0.93	1.40	1.86	2.33	2.79	3.26	3.72	4.18	4.65	5.11	5.57
25	36.67	0.73	1.46	2.19	2.92	3.65	4.37	5.11	5.82	6.56	7.29	8.00	8.75
30	44.00	1.05	2.10	3.15	4.20	5.25	6.30	7.34	8.39	9.43	10.48	11.55	12.57
35	51.33	1.43	2.86	4.28	5.70	7.13	8.57	9.98	11.40	12.82	14.25	15.70	17.09
40	58.67	1.87	3.73	5.60	7.47	9.34	11.19	13.06	14.90	16.79	18.65	20.50	22.37
45	66.00	2.36	4.72	7.08	9.44	11.80	14.20	16.52	18.90	21.23	23.58	25 90	28.28
50	73.33	2.91	5.83	8.74	11.65	14.56	17.50	20.37	23.30	26.18	29.09	32.00	34.88
55	80.67	3.53	7.05	10.60	14.12	17.65	21.20	24.69	28.20	31.73	35.25	38.70	42.28
60	88.00	4.20	8.39	12.60	16.79	20.98	25.20	29.36	33.60	37.73	41.92	46.10	50.28

FORMULA: $c = \frac{wv^2}{32.2r}$; in which c = centrifugal force, w = weight, v = velocity in feet per second, and r = radius of curve.

Velocity in miles per hour × 1.4667 = velocity in feet per second.

TOP CHORD LOADED TRANSVERSELY.

To proportion chord sections which are subjected to a bending load in addition to direct compression let

M = the bending moment in inch pounds,

C = direct compression due to position as a truss member,

A = required area of section,

I = moment of inertia of section,

d = distance from neutral axis to extreme top fibre; then

$\frac{C}{A}$ = Direct compression per square inch,

$\frac{Md}{I}$ = compression per square inch in extreme fibre due to bending.

$$f = \frac{C}{A} + \frac{M\,d}{I} = \text{resultant fibre stress.....(1)}$$

But $I = A\,r^2$, and substituting in equation (1),

$$f = \frac{C}{A} + \frac{M\,d}{Ar^2} \text{ from which}$$

$$A = \frac{C\,r^2 + M\,d}{f\,r^2}.$$

If the specified unit stresses for bending, live and dead loads have different values, then let,

f_t = unit stress for transverse load,

f_l = unit stress for live load,

f_d = unit stress for dead load, then

$$A_t = \frac{M\,d}{f_t\,r^2} = \text{area required for bending,}$$

$$A_l = \frac{C_l}{f_l} = \text{area required for live load stress,}$$

$$A_d = \frac{C_d}{f_d} = \text{area required for dead load stress,}$$

and $A = A_t + A_l + A_d$ = total area required.

PORTAL BRACING.

Direct stresses and bending moments due to a load W applied at B; assuming the reactions at C and D to be equal to $\frac{1}{2}$W, and assuming that the members AD and BC are free to rotate at C and D.

In Fig. 1 AB and EF are struts and AF and EB tensions members.

In Fig. 2 AB and EF are tension members and AF and EB are struts.

In Fig. 3 all members are struts.

Let *a*, *b*, *c*, *d* and *e* represent the length of the several members as indicated in Figs. 1, 2 and 3, and let the + sign represent a compressive stress and the — sign tensile stress : then

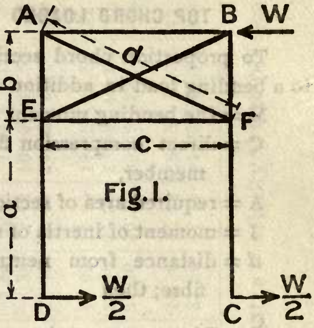


Fig. 1.

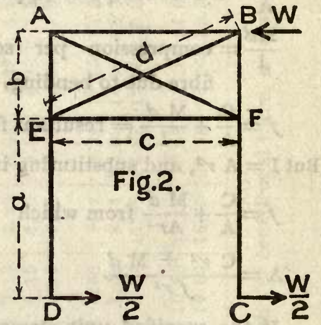


Fig. 2.

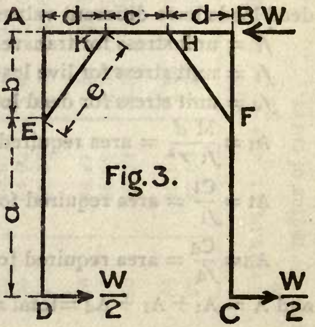


Fig. 3.

Fig. 1. Stress $AB = + W\left(\frac{a}{2b} + 1\right)$

" $EF = + W\left(\frac{a}{2b} + \frac{1}{2}\right)$

" $AED = + W\left(\frac{a+b}{c}\right)$

" $FC = - W\left(\frac{a+b}{c}\right)$

" $AF = - W\frac{(a+b)d}{bc}$

B F has no direct stress, but B F C and A E D are both subjected to bending moments, varying uniformly from

$$M = O \text{ at A, B, C and D to } M = \frac{Wa}{2} \text{ at F and E.}$$

Fig. 2. Stress $AB = - W\frac{a}{2b}$

" $EF = - W\left(\frac{a}{2b} + \frac{1}{2}\right)$

" $ED = + W\left(\frac{a+b}{c}\right)$

" $BFC = - W\left(\frac{a+b}{c}\right)$

" $BE = + W\frac{(a+b)d}{bc}$

A E has no direct stress, but A E D and B F C are both subjected to bending moments, varying uniformly from

$$M = O \text{ at A, B, C and D to}$$
$$M = \frac{Wa}{2} \text{ at E and F.}$$

Fig. 3. Stress $BH = + W\left(\frac{a}{2b} + 1\right)$

" $AK = - W\frac{a}{2b}$

" $HK = + \frac{W}{2}$

" $ED = + W\frac{(a+b)}{(c+2d)}$

" $FC = - W\frac{(a+b)}{(c+2d)}$

" $EK = + \frac{W}{2}\frac{(a+b)e}{bd}$

" $HF = - \frac{W}{2}\frac{(a+b)e}{bd}$

" $BF = + \frac{W}{2}\frac{(a+b)c}{(c+2d)d}$

Bending moments at E and F $= \frac{Wa}{2}$

" " K and H $= \frac{W}{2}\frac{(a+b)c}{(c+2d)}$

CAMBER.

Theoretically a truss should have just sufficient camber to bring the joints of the compression chords to a true square bearing when the truss is fully loaded. The most perfect way of accomplishing this is to calculate the lengths of the various members in the position they are expected to assume when the truss is fully loaded; then calculate the stresses in the web members for the same condition of loading; calculate the elongations of the various tension members and the shortening of the compression members due to the stresses under full load and the actual sections used; then diminish the lengths of the tension members and increase the lengths of the compression members by these amounts.

While this method accomplishes the desired purpose, it does not give directly the amount of camber which the truss will assume when erected and unloaded. This, however, may be calculated if desired.

A shorter method, and the one more generally used, is as follows:

Assume the amount of camber to be given to the truss; that is, the versed sine of the camber curve of the chord; then assume the chords to be arcs of concentric circles and the posts to be intercepts of radii. Knowing the length of bottom chord panel and the depth of truss, the length of top chord panel and the length of diagonal members may be readily obtained.

Let c = camber desired

d = depth of truss

l = length of span

n = number of panels in truss

i = increase of top chord panel over bottom chord panel,

all values being expressed in inches or all in feet.

Then:

$$i = \frac{8\,cdl}{n\,(4c^2 + l^2)}$$

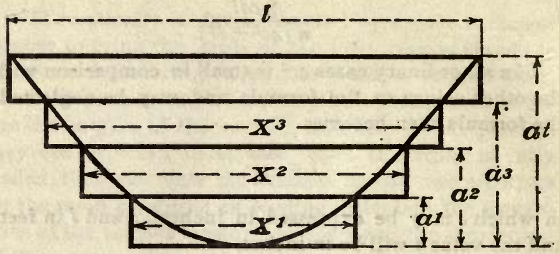
In all ordinary cases $4c^2$ is small in comparison with the other values in the formula and may be neglected; the formula then becomes

$$i = \frac{8cd}{ln}$$

in which c may be expressed in inches, d and l in feet, and the value i will be in inches.

Having now the length of top and bottom chord panels the diagonal may be computed as the hypothenuse of a right angled triangle of which one side is the depth of truss and the other a mean of the top and bottom chord panel lengths.

LENGTH OF FLANGE PLATES, PLATE GIRDERS.



The lengths of flange plates for girders with parallel flanges may be readily obtained analytically, as follows; let

a_1 = area of first flange plate

a_2 = area of first and second plate

a_3 = area of first, second and third plate

a_t = total area of flange

x_1 = length of first flange plate

x_2 = length of second flange plate

x_3 = length of third flange plate

l = length of span.

From the equation of the parabola

$$a_1 : a_2 : a_t : : x_1^2 : x_2^2 : l^2$$

but a_1, a_2, a_t and l being known

$$x_1^2 = l_2 \frac{a_1}{a_t} \text{ or } x_1 = l \sqrt{\frac{a_1}{a_t}}$$

$$x_2^2 = l^2 \frac{a_2}{a_t} \text{ or } x_2 = l \sqrt{\frac{a_2}{a_t}}$$

$$x_3^2 = l^2 \frac{a_3}{a_t} \text{ or } x_3 = l \sqrt{\frac{a_3}{a_t}}$$

These values of x_1, x_2, and x_3 may all be obtained by one setting of the slide rule, as follows:

Set a_t on the slide to

l on scale of squares; then

opposite a_1, a_2 and a_3 on the slide read x_1, x_2 and x_3 on the scale of squares.

BENDING MOMENTS (FOOT POUNDS.)

For Various Loads and Lengths of Span, assuming Joists Spaced 24 Inches Center to Center.

Loads per Sq. Foot	Loads per Lin. Foot	LENGTH OF SPAN IN FEET. 10	11	12	13	14	15	16	17	18	19	20	22
15	30	375	454	540	634	735	844	960	1084	1215	1354	1500	1815
20	40	500	605	720	845	980	1125	1280	1445	1620	1805	2000	2420
25	50	625	756	900	1056	1225	1406	1600	1806	2025	2256	2500	3025
30	60	750	908	1080	1268	1470	1688	1920	2168	2430	2708	3000	3630
40	80	1000	1210	1440	1690	1960	2250	2560	2890	3240	3610	4000	4840
50	100	1250	1513	1800	2113	2450	2813	3200	3613	4050	4513	5000	6050
60	120	1500	1815	2160	2535	2940	3375	3840	4335	4860	5415	6000	7260
70	140	1750	2118	2520	2958	3430	3938	4480	5058	5670	6318	7000	8470
75	150	1875	2269	2700	3169	3675	4219	4800	5419	6075	6769	7500	9075
80	160	2000	2420	2880	3380	3920	4500	5120	5780	6480	7220	8000	9680
100	200	2500	3025	3600	4225	4900	5625	6400	7225	8100	9025	10000	12100
125	250	3125	3781	4500	5281	6125	7031	8000	9031	10125	11281	12500	15125
150	300	3750	4538	5400	6338	7350	8438	9600	10838	12150	13538	15000	18150
175	350	4375	5294	6300	7394	8575	9844	11200	12644	14175	15794	17500	21175
200	400	5000	6050	7200	8450	9800	11250	12800	14450	16200	18050	20000	24200
250	500	6250	7563	9000	10563	12250	14063	16000	18063	20250	22563	25000	30250

TIMBER BEAMS OR JOISTS.

Capacity in Bending Moments (Foot Pounds) for 800 Pounds per Square Inch, Fiber Strain.

Width, Inches	DEPTH OF BEAM IN INCHES.										
	6	7	8	9	10	12	14	15	16	18	20	24
2	800	1089	1422	1800	2222	3200	4356	5000				
2½	1000	1361	1778	2250	2778	4000	5444	6250	7111			
3	1200	1633	2133	2700	3333	4800	6533	7500	8533	10800		
3½	1400	1906	2489	3150	3889	5600	7622	8750	9956	12600	15556	
4	1600	2178	2844	3600	4444	6400	8711	10000	11378	14400	17778	25600
4½	1800	2450	3200	4050	5000	7200	9800	11250	12800	16200	20000	28800
5	2000	2722	3556	4500	5555	8000	10889	12500	14222	18000	22222	32000
5½	2200	2994	3911	4950	6111	8800	11978	13750	15644	19800	24444	35200
6	2400	3267	4267	5400	6667	9600	13067	15000	17067	21600	26667	38400
7		3811	4978	6300	7778	11200	15244	17500	19911	25200	31111	44800
8			5689	7200	8889	12800	17422	20000	22756	28800	35556	51200
9				8100	10000	14400	19600	22500	25600	32400	40000	57600
10					11111	16000	21778	25000	28444	36000	44444	64000
12						19200	26133	30000	34133	43200	53333	76800

TIMBER BEAMS OR JOISTS.

Capacity in Bending Moments (Foot Pounds) for 1000 Pounds per Square Inch, Fiber Strain.

Width, Inches	DEPTH OF BEAM IN INCHES.										
	6	7	8	9	10	12	14	15	16	13	20	24
2	1000	1361	1778	2250	2778	4000	5444	6250				
2½	1250	1701	2222	2813	3472	5000	6806	7813	8889			
3	1500	2042	2667	3375	4167	6000	8167	9375	10667	13500		
3½	1750	2382	3111	3938	4861	7000	9528	10938	12444	15750	19444	
4	2000	2722	3556	4500	5556	8000	10889	12500	14222	18000	22222	32000
4½	2250	3062	4000	5063	6250	9000	12250	14063	16000	20250	25000	36000
5	2500	3403	4444	5625	6944	10000	13611	15625	17778	22500	27778	40000
5½	2750	3743	4889	6188	7639	11000	14972	17188	19556	24750	30556	44000
6	3000	4083	5333	6750	8333	12000	16333	18750	21333	27000	33333	48000
7		4764	6222	7875	9722	14000	19056	21875	24889	31500	38889	56000
8			7111	9000	11111	16000	21778	25000	28444	36000	44444	64000
9				10125	12500	18000	24500	28125	32000	40500	50000	72000
10					13889	20000	27222	31250	35556	45000	55556	80000
12						24000	32667	37500	42667	54000	66667	96000

TIMBER BEAMS OR JOISTS.

Capacity in Bending Moments (Foot Pounds) for 1200 Pounds Per Square Inch, Fiber Strain.

Width, Inches	DEPTH OF BEAM IN INCHES.										
	6	7	8	9	10	12	14	15	16	18	20	24
2	1200	1633	2133	2700	3333	4800	6533	7500				
2½	1500	2042	2667	3375	4167	6000	8167	9375	10667			
3	1800	2450	3200	4050	5000	7200	9800	11250	12800	16200		
3½	2100	2858	3733	4725	5833	8400	11433	13125	14933	18900	23333	
4	2400	3267	4267	5400	6667	9600	13067	15000	17067	21600	26667	38400
4½	2700	3675	4800	6075	7500	10800	14700	16875	19200	24300	30000	43200
5	3000	4083	5333	6750	8333	12000	16333	18750	21333	27000	33333	48000
5½	3300	4492	5867	7425	9167	13200	17967	20625	23467	29700	36667	52800
6	3600	4900	6400	8100	10000	14400	19600	22500	25600	32400	40000	57600
7		5717	7467	9450	11667	16800	22867	26250	29867	37800	46667	67200
8			8533	10800	13333	19200	26133	30000	34133	43200	53333	76800
9				12150	15000	21600	29400	33750	38400	48600	60000	86400
10					16667	24000	32667	37500	42667	54000	66667	96000
12						28800	39200	45000	51200	64800	80000	115200

TIMBER BEAMS OR JOISTS.

Capacity in Bending Moments (Foot Pounds) for 1500 Pounds per Square Inch, Fiber Strain.

Width, Inches	DEPTH OF BEAM IN INCHES.											
	6	7	8	9	10	12	14	15	16	18	20	24
2	1500	2042	2667	3375	4167	6000	8167	9375				
2½	1875	2552	3333	4219	5208	7500	10208	11719	13333			
3	2250	3063	4000	5063	6250	9000	12250	14063	16000	20250		
3½	2625	3573	4667	5906	7292	10500	14292	16406	18667	23625	29167	
4	3000	4083	5333	6750	8333	12000	16333	18750	21333	27000	33333	48000
4½	3375	4594	6000	7594	9375	13500	18375	21094	24000	30375	37500	54000
5	3750	5104	6667	8438	10417	15000	20417	23438	26667	33750	41667	60000
5½	4125	5615	7333	9281	11458	16500	22458	25781	29333	37125	45833	66000
6	4500	6125	8000	10125	12500	18000	24500	28125	32000	40500	50000	72000
7		7146	9333	11813	14583	21000	28583	32813	37333	47250	58333	84000
8			10667	13500	16667	24000	32667	37500	42667	54000	66667	96000
9				15188	18750	27000	36750	42188	48000	60750	75000	108000
10					20833	30000	40833	46875	53333	67500	83333	120000
12						36000	49000	56250	64000	81000	100000	144000

SAFE WORKING STRESSES PER SQ. IN. FOR TIMBER.

Denoted by S in Formula for Timber Columns.

Class	Typical Species	For Transverse Loading	For End Bearing	For Short Columns when $l \leqq 12\,d$	For Bearing Across Fibre	For Shear Along Fibre
1	White Oak	1400	1300	1000	550	300
2	Long Leaf Pine	1600	1300	1000	350	200
3	White Pine	1100	900	700	200	150
4	Hemlock	950	850	650	200	100

TIMBER COLUMNS.

Table giving values of factor $\dfrac{1}{1+\dfrac{l^2}{1000\,d^2}}$ in Column Formula $F = S\dfrac{1}{1+\dfrac{l^2}{1000\,d^2}}$

F = Safe load per sq. in. for column of length l.
S = " " " " " for short column, taken from table above.
l = Length of column, in inches.
d = Least side of column, in inches.

Length of Column in Feet	LEAST SIDE OF COLUMN IN INCHES = d												
	4	5	6	7	8	9	10	11	12	13	14	15	16
4	.87	.91											
6	.75	.82	.87	.90									
8	.63	.73	.79	.85	.87	.89							
10	.52	.63	.71	.78	.80	.84	.87	.89					
12	.43	.54	.63	.70	.75	.79	.82	.85	.87	.89			
14		.46	.56	.63	.69	.74	.77	.81	.83	.85	.87	.88	
16			.49	.57	.63	.68	.73	.76	.79	.81	.84	.86	.87
18			.43	.51	.57	.63	.68	.72	.75	.78	.81	.83	.85
20				.46	.52	.59	.63	.67	.71	.74	.77	.79	.82
22				.41	.47	.53	.58	.63	.67	.70	.74	.76	.78
24					.43	.49	.54	.59	.63	.67	.70	.73	.76
26						.45	.50	.55	.59	.63	.67	.69	.72
28							.46	.51	.56	.60	.63	.67	.69
30							.42	.48	.52	.57	.60	.63	.66
32								.45	.49	.53	.57	.60	.63
34									.46	.50	.54	.57	.61
36									.43	.47	.51	.55	.58
38										.44	.49	.52	.55
40										.42	.46	.49	.53
42											.44	.47	.50
44												.45	.47
46												.43	.46
48													.44

WEIGHTS OF STANDARD RAILWAY BRIDGES.

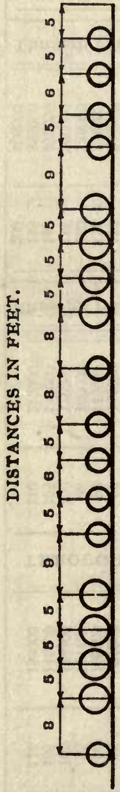
American Bridge Company's Specifications, 1900. Coopers E-50 Loading.

MEDIUM STEEL.

SINGLE TRACK									DOUBLE TRACK		
Kind	Length Out to Out	Total Weight	Kind	Length Out to Out End String	Total Weight With End Struts	Kind	Length Center to Center Bearings	Total Weight with End Struts	Kind	Length Center to Center Bearings	Total Weight With End Struts
DECK PLATE GIRDER SPANS	15′	5200	THROUGH PLATE GIRDER SPANS			Through Lattice Spans	100′	132000	Through Lattice Spans	100′	261000
	20	7800					105	143000		105	284000
	25	11900					110	154000		110	307000
	30	14500		30′	24500		115	165000		115	330000
	35	18800		35	33000		120	176000		120	353000
	40	23300		40	37000		125	187000		125	376000
	45	27300		45	47500		130	200000		130	401000
	50	32400		50	53500		135	213000		135	426000
	55	38800		55	63500		140	226000		140	451000
	60	45500		60	70000		145	239000		145	477000
	65	51300		65	82500	Through Pin Spans	150	252000	Through Pin Spans	150	503000
	70	59500		70	91000		155	266000		155	530000
	75	67100		75	102500		160	280000		160	558000
	80	76300		80	113500		165	294000		165	586000
	85	94200		85	134000		170	308000		170	614000
	90	105300		90	145500		175	322000		175	642000
	95	114100		95	160000		180	338000		180	674000
	100	128800		100	177000		185	355000		185	706000
	105	146000		105	199000		190	372000		190	739000
	110	158000		110	212000		195	389000		195	772000
							200	406000		200	805000

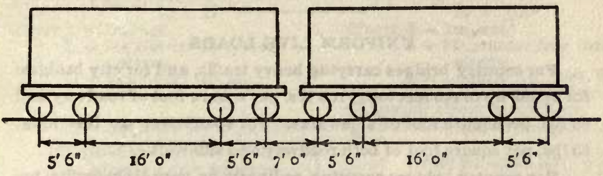
Note:—Weights given are for Structural Steel only, and do not include weight of track.

COOPER'S STANDARD LOADING
FOR RAILROAD BRIDGES.



Uniform Load	5000 lbs. per lin. ft.	4500 lbs. per lin. ft.	4000 lbs. per lin. ft.	3000 lbs. per lin. ft.	
	32500	29250	26000	19500	
	32500	29250	26000	19500	
	32500	29250	26000	19500	
	32500	29250	26000	19500	
	50000	45000	40000	30000	
	50000	45000	40000	30000	
	50000	45000	40000	30000	
	50000	45000	40000	30000	
	25000	22500	20000	15000	
	32500	29250	26000	19500	
	32500	29250	26000	19500	
	32500	29250	26000	19500	
	32500	29250	26000	19500	
	50000	45000	40000	30000	
	50000	45000	40000	30000	
	50000	45000	40000	30000	
	50000	45000	40000	30000	
	25000	22500	20000	15000	
Class	E 50	E 45	E 40	E 30	E

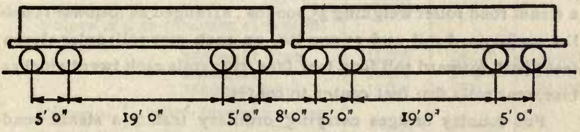
THE OSBORN ENGINEERING COMPANY'S STANDARD LOADING FOR ELECTRIC RAILWAY BRIDGES.



LIVE LOAD "A."

Train of 74-ton Coal Cars.

Weight of Car = 38,000 lbs.
Rated Capacity = 100,000 "
10% Overload = 10,000 "
Total Load = 148,000 "
Axle " = 37,000 "



LIVE LOAD "B."

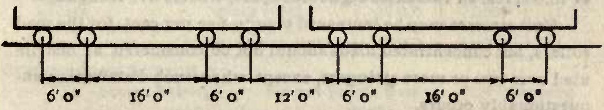
Train of 62-ton Coal Cars.

Weight of Car = 36,000 lbs.
Rated Capacity = 80,000 "
10% Overload = 8,000 "
Total Load = 124,000 "
Axle " = 31,000 "

LIVE LOAD "C."

Train of 46-ton Flat Cars—Same wheel spacing as for 62-ton Coal Cars.

Weight of Car = 26,000 lbs.
Rated Capacity = 60,000 "
10% Overload = 6,000 "
Total Load = 92,000 "
Axle " = 23,000 "



LIVE LOAD "D."

Train of 40-ton Motors.

Axle Load = 20,000 lbs.

NOTE.—Live Load "A" should be used for roads designed for heavy coal traffic, etc.
Live Load "B" " " " " to carry occasional coal cars.
Live Load "C" " " " " " " ordinary freight traffic, but not cars of over 60,000 lbs capacity This excludes coal traffic.
Live Load "D" should be used for roads designed for passenger and express traffic only

THE OSBORN ENGINEERING COMPANY'S STANDARD LIVE LOADS FOR HIGHWAY BRIDGES.

UNIFORM LIVE LOADS

For country bridges carrying heavy traffic, and for city bridges: for spans up to 150 feet long, 100 lbs. per square foot of roadway and 80 lbs. per square foot of sidewalks. For spans over 150 feet long, 80 lbs. per square foot of both roadway and sidewalks.

For country bridges carrying ordinary or very light traffic: for spans up to 150 feet long, 80 lbs. per square foot of both roadway and sidewalks. For spans over 150 feet long, 60 lbs. per square foot of both roadway and sidewalks.

CONCENTRATED LIVE LOADS.

For country bridges carrying heavy traffic, and for city bridges: a steam road roller weighing 35,000 lbs., arranged as follows: 15 000 lbs. on forward roll and 10,000 lbs. on each rear roll; axles eleven feet apart, forward roll four feet face, rear rolls each twenty inches face, rear rolls five feet center to center.

For country bridges carrying ordinary traffic: a steam road roller weighing 21,000 lbs., arranged as follows: 9,000 lbs. on forward roll and 6,000 lbs. on each rear roll; axles eleven feet apart, forward roll four feet face, rear rolls each twenty inches face, rear rolls five feet center to center.

For country bridges carrying very light traffic: a single horse roller weighing 12,000 lbs., the roll five feet face; or a wagon load of 10,00q lbs. on two axles eight feet apart, wheels five feet gauge.

Unit stresses may be increased twenty-five per cent. for the road rollers, but concentrated loads should not be considered as distributed over two or more stringers, except when such distribution unquestionably occurs.

If a paved floor of sufficient width be used, the rollers should be considered when turned at right angles to the axis of the bridge.

If the structure is to be designed for the present or future accommodation of electric railways, suitable concentrations should be selected from page 171, and the structure proportioned for these concentrations also.

IMPACT FORMULÆ.

THE OSBORN ENGINEERING CO.

$$I = L \frac{L}{L + D}$$

where I = Impact.
L = Maximum live load stress.
D = Dead load stress.

THE AMERICAN BRIDGE CO.

$$I = S \frac{300}{L + 300}$$

Where I = Impact.
S = Maximum live load stress.
L = Length in feet of loaded distance which produces maximum stress in member.

THE OSBORN ENGINEERING COMPANY'S STANDARD UNIT STRESSES	Pounds per Square Inch		
NATURE OF STRESS	For Railroad Bridges	For Electric Railway Bridges	For Highway Bridges
TENSION			
Wrought Iron,	13,000	15,000	18,000
Soft Steel,	15,000	17,000	20,000
Medium Steel,	17,000	19,000	22,000
COMPRESSION			
Values of C in formulæ at bottom of page,			
Wrought Iron,	13,000	15,000	18,000
Soft Steel,	15,000	17,000	20,000
Medium Steel,	17,000	19,000	22,000
Values of $\frac{l^2}{r^2}$ in the formulæ below should not exceed:			
for main members,	100	100	125
for subordinate members,	120	120	150
BENDING			
Pins, closely packed, medium steel,	25,000	25,000	25,000
BEARING			
Pins, medium steel,	22,000	24,000	24,000
Rivets, rivet steel,	20,000	22,000	22,000
SHEARING			
Pins, medium steel,	11,000	12,000	12,000
Rivets, rivet steel,	10,000	11,000	11,000
Webs of plate girders, soft steel,	9,000	10,000	10,000
" " " medium steel,	10,000	11,000	11,000

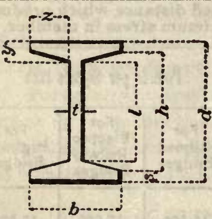
COMPRESSION FORMULÆ:

	Square Bearing.	Pin and Square Bearing.	Pin Bearing.
Soft Steel,	$S = \frac{12500}{1 + \frac{l^2}{36000 r^2}}$	$S = \frac{12500}{1 + \frac{l^2}{24000 r^2}}$	$S = \frac{12500}{1 + \frac{l^2}{18000 r^2}}$
Medium Steel,	$S = \frac{15000}{1 + \frac{l^2}{36000 r^2}}$	$S = \frac{15000}{1 + \frac{l^2}{24000 r^2}}$	$S = \frac{15000}{1 + \frac{l^2}{18000 r^2}}$

S = Working strength in lbs. per sq. in.; l = length in inches; r = least radius of gyration in inches.

VALUES OF MOMENTS OF INERTIA FOR STANDARD SHAPES OF THE CARNEGIE STEEL COMPANY.

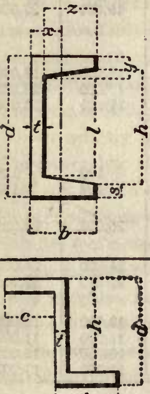
I = Moment of Inertia neutral axis parallel to flange.
I′ = " " " " " " " web.



Area $= A = dt + (s+y)2z.$

$$I = \tfrac{1}{12}[bd^3 - \tfrac{3}{2}(h^4 - l^4)].$$

$$I' = \tfrac{1}{12}[b^3(d-h) + lt^3 + \tfrac{1}{24}(b^4 - t^4)]$$

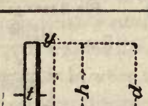


Area $= A = dt + (s+y)z.$

$$x = [b^2s + \tfrac{1}{2}ht^2 + \tfrac{1}{18}(b-t)^2(b+2t)] \div A.$$

$$I = \tfrac{1}{12}[bd^3 - \tfrac{3}{4}(h^4 - l^4)].$$

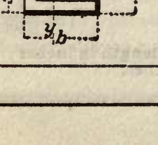
$$I' = \tfrac{1}{3}[2sb^3 + lt^3 + \tfrac{1}{12}(b^4 - t^4)] - Ax^2.$$



Area $= A = (d + 2c)t.$

$$I = \tfrac{1}{12}[bd^3 - 8c(h - \tfrac{d}{2})^3].$$

$$I' = \tfrac{1}{12}[d(b+c)^3 - 2hc^3 - 6hcb^2].$$

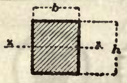
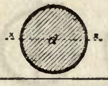
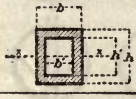
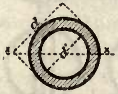
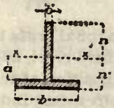
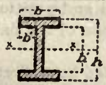


Area $= A = (b + d - t)t.$

$$x = \frac{t(2h+b) + h^2}{2(h+b)}.$$

$$I = \tfrac{1}{3}[bx^3 + t(d-x)^3 - (b-t)(x-t)^3].$$

VALUES OF I (Moment of Inertia) AND S (Section Modulus) FOR USUAL SECTIONS.

SECTIONS	I	S
	$I=\frac{bh^3}{12}.$	$\frac{bh^2}{6}.$
	$I'=\frac{bh^3}{3}.$	
	$I=\frac{bh^3}{36}.$	$\text{Min.}=\frac{bh^2}{24}.$
	$I'=\frac{bh^3}{12}.$	
	$I=\frac{\pi d^4}{64}$ $=0.0491\,d^4.$	$\frac{\pi d^3}{32}$ $=0.0982\,d^3$
	$I=\frac{bh^3-b'h'^3}{12}.$	$\frac{I}{0.5h}.$
	$I=0.0491\,(d^4-d'^4).$	$0.0982\left(d^3-\frac{d'^4}{d}\right)$
	$I=\frac{b'n^3+bn'^3-(b-b')a^3}{3}.$	$\text{Min.}=\frac{I}{n}.$
	$I=\frac{bh^3-2b'h'^3}{12}.$	$\frac{I}{0.5\,h}.$

x x Denotes position of neutral axis.

CONVENTIONAL SIGNS FOR BRIDGE RIVETS.

Two Full Heads.

Countersunk Inside and Chipped.

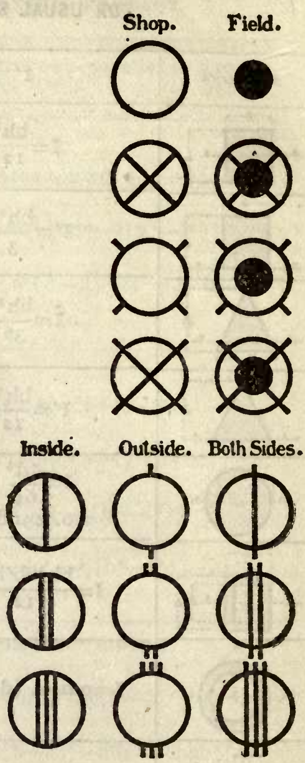
Countersunk Outside and Chipped.

Countersunk Both Sides and Chipped.

Flattened to 1/8″ high or Countersunk and not Chipped.

Flattened to 1/4″ high.

Flattened to 3/8″ high.



The foundation of the above system is the diagonal cross to represent a countersink, the blackened circle for a field rivet, and the verticle stroke to indicate a flattened head. The position of the cross with respect to the circle (inside, outside or both sides) indicates the location of the countersink, and the number and position of the verticle strokes indicate the height and position of the flattened heads.

Any combination of field, countersunk and flattened head rivets liable to occur may be readily indicated by the proper combination of the above signs.

BRIDGES.

SOME HISTORICAL AND OTHER INTERESTING DATA.

HISTORICAL.

Ancient bridges are known to have existed in China, Assyria and India long before the Christian Era. Stone bridges, built of slabs on piers, were built by the Greeks.

The origin of the arch may be traced back to the Chaldeans and Assyrians. Crude arches of brick have been found in ruins of Thebes, probably built about 2900 B. C. The Romans, however, were probably the first to use the arch understandingly, about the second century B. C.

The first bridge in the United States, so far as known, was a pile trestle, built in 1660, across Charles River, near Boston.

A noted long wooden span was the bridge "Colossus," 340′ 3¾″ long, built by Louis Wernwag, about 1812, at Philadelphia, on the site of the present Callowhill bridge.

The first iron bridge in the world was built over the Severn River at Ironbridge, England, in 1779. It was a cast iron arch of 100′ 6″ span and 40′ rise. The next was the "Buildwas Bridge," a similar structure, built over the same river by Telford in 1796; span 130′, rise 17′.

The first iron railway bridge was built in 1823, for the Stockton and Darlington Railway, over the Gaundless River, a tributary of the Wear River, in England, a cast iron trestle consisting of four spans 12′ 6″ each.

The first plate girders were made in England in 1846, by Fairbairn, from designs by Stephenson. They had cast iron flanges.

The first bridge across the Mississippi River was a suspension bridge, built 1855, at Minneapolis, 620′ span. There are now forty-six bridges across that river.

Suspension bridges are said to have been built in China over 2000 years ago. Such structures were built in Europe as early as 1615.

The first chain bridge in England was a foot bridge of 70′ span built about 1741, over Tees River.

The first chain bridge in the United States was built by Finlay, in 1796, over Jacob's Creek, near Uniontown, Pa. The first wire suspension bridge in the United States was built in 1816, over the Schuylkill River, in Philadelphia.

The first suspension bridge over the Niagara River was built by Charles Ellet, in 1848. The only railway suspension bridge in the world was built by Roebling at Niagara, in 1855.

Wooden cantilever bridges were built by the Assyrians as early as 2000 B. C.

The first cantilever bridge of importance to be built in the United States was the Kentucky River Bridge, built by C. Shaler Smith, in 1877. Total length, 1125'; being three equal spans of 375'. The second was the Minnehaha Bridge over the Mississippi River at St. Paul, built in 1880, with center span of 324'. The third was the Niagara cantilever, built in 1883, with center span of 420'.

The Romans built cement arches; remains of them still exist. Since their times the earliest was a concrete arch of 31' span, built by John C. Goodrich in 1871, in Prospect Park, Brooklyn, known as the Cleftridge Bridge.

Reinforced concrete was first used by Monier in 1876.

The first reinforced concrete bridge in the United States was built according to the Ransome system, in 1889, at Golden Gate Park, San Francisco. Span 20'.

EVOLUTION OF TYPES IN THE UNITED STATES.

The first known patent for a bridge was granted to Chas. W. Prale, Jan. 2, 1797.

Patents were also granted to Timothy Palmer, Dec. 17, 1797; to Thomas Pope, April 18, 1807; to Louis Wernwag, and several others; but the Patent Office records were burned in 1836 and could not be restored.

The first patent for a truss bridge was granted to Theodore Burr, in 1817. The designs consisted of trusses reinforced with wood arches.

Three noted names connected with early bridge building in the United States are Theodore Burr, Timothy Palmer and Louis Wernwag.

Ithiel Towne patented the lattice girder bridge in 1820.

Long patented his types in 1830 and 1839.

The first iron truss bridge was patented in 1833, by Augustus Canfield. The first one built was over the Erie Canal at Frankfort, N. Y., in 1840, by Earl Trumbull. It was a combination of cast iron segments and suspension rods, with an anchored top chord in tension.

Wm. Howe patented his type in 1840.

Squire Whipple built his first bridge in 1840. It was a bow-string truss with cast iron compression members and wrought iron tension members. He secured a patent on the type April 24, 1841.

Thos. W. and Caleb Pratt patented the Pratt truss April 4, 1841.

Wendell Bollman's first bridge was built over the Potomac River at Harper's Ferry, in 1852. It was a 124' span.

Albert Fink built a three span bridge over the Monongahela River in 1852.

The first pin connected span was built by John W. Murphy in 1859, over a canal at Phillipsburg, N. J. It was a 165' span and was called a "Whipple-Murphy" bridge.

The first bridge in which wrought iron was used for both tension and compression members was built by Murphy over the Lehigh River, at Mauchchunk, for the Lehigh Valley R. R.

The first riveted lattice girders were built in 1859 for the New York Central R. R., by Howard Carroll.

S. S. Post built the first bridge of his type in 1865, for the Erie R. R., at Washingtonville.

In 1874, James B. Eades built the Mississippi River Bridge at St. Louis. It consists of three trussed arches, one of 520' and two of 502' span.

THE LONGEST BRIDGE STRUCTURES.

Longest wooden structure—a pile trestle across Lake Pontchartrain, near New Orleans, La., 21 miles long.

Longest metal structure—the Tay Viaduct, Scotland, 10,800 feet long, iron lattice girders. The bridge across the St. Lawrence River at Montreal has a total length of 8,791 feet.

Longest masonry structure—the Lion Bridge in China, across an arm of the Yellow Sea, 22,968 feet long, composed of 300 arches.

THE HIGHEST BRIDGE STRUCTURES.

Name	Country	Length, Feet	Height, Feet
St. Giustina	Switzerland	197	460
Garabit	France	1852	406
Du Viaur	France	1508	382
Stoney Creek	British Columbia	336	340
Loa	Bolivia	800	336
Pecos River	United States	2180	328
Gokteik	Burmah	2260	320
Kinzua	United States	2052	302

SOME OF THE LONGEST TRUSS SPANS.

Name	Location	Over	Date	Span, Feet	Remarks
	Elizabethtown, O.	Great Miami River	1905	585	Highway
C. &. O. R. R.	Cincinnati, O.	Ohio River	1888	550	Highway and 2 track railway
L'ville & Jeff'ville	Louisville, Ky.	Ohio River	1894	546½	1 track railway
Ohio River	Cincinnati, O.	Ohio River	1889	542½	Highway and 2 track railway
Penn'a R. R.	Philadelphia, Pa.	Delaware River	1896	533	2 track railway
Ohio Conn.	Pittsburgh, Pa.	Ohio River	1890	523	1 track railway
Leck				507	Longest in Europe
Saltash	Plymouth, Eng.	Tamar River	1859	456	1 track railway
Hoogly	India		1886	420	
Hawksbury	Australia		1889	416	

SOME OF THE LONGEST DRAW SPANS.

Name	Location	Over	Date	Span, Feet	Remarks
Interstate	Omaha, Neb.	Missouri River	1893	520	Highway and 2 track railway
Thames	New London, Conn.	Thames River	1890	503	2 track railway
Arthur Kill	Staten Island, N.Y.	Arthur Kill	1889	500	1 track railway
	Duluth, Minn.	St. Louis River	1900	491	Highway and 2 track railway
C., M. & N. R'y.	Chicago, Ill.	Drainage Canal	1900	474	Highway and 2 track railway

SOME OF THE LONGEST PLATE GIRDER SPANS.

Name	Location	Over	Date	Span, Feet	Depth, Inches	Remarks
Britannia	England	Menai Straits	1850	460		Tubular
Conway	England		1848	400		Tubular
N. Y. C. & H. R. R. R.	Jersey Shore, Pa.	Pine Creek	1904	128	114	2 track deck
L. & N. R. R.	Carmi, Ill.	Okaw River	1902	119	108	1 track through
C., M. & St. P. R. R.	Janesville, Wis.	Mill Race	1900	114½	114	1 track deck
L. V. R. R.	Phillipsburg, N. J.	P. R. R. & Morris Canal	1902	114	114	2 track through

SOME OF THE LONGEST SUSPENSION BRIDGE SPANS.

Location	Over	Date	Channel Span, Feet	Location	Over	Date	Channel Span, Feet
New York	East River		1600	Queenstown	Niagara River		1040
New York	East River	1883	1595½	Wheeling	Ohio River	1848	1010
Niagara Falls	Niagara River	1869	1268	Friburg, Switz.		1834	870
Cincinnati	Ohio River	1866	1057	Niagara Falls	Niagara River	1855	821

SOME OF THE LONGEST CANTILEVER BRIDGES.

Name	Location	Over	Date	Channel Span, Feet	Total Length not including Approaches, Feet	Remarks
Quebec	Canada	St. Lawrence River		1800	3300	Highway & 2 track Ry.
Forth	Scotland	Firth of Forth	1890	1710	8098	2 track railway
Blackwell's Island	New York	East River		1182		
Sukkur	India			820		2 track railway
Wabash	Pittsburg, Pa.	Monongahela River		812		
Memphis	Memphis, Tenn.	Mississippi River	1892	790	2597	1 track railway

SOME OF THE LONGEST METAL ARCHES.

Name	Location	Over	Date	Span, Feet	Rise, Feet	Remarks
Clifton	Niagara Falls	Niagara River	1899	840.0	137.0	Steel
Viaur	France	Viaur River	1899	721.6	176.2	"
Bonn	Germany	Rhine River	1898	614.0	105 0	"
Southwark	London, Eng.	Thames River	1819	240.0	24.0	Cast Iron
Wearmouth	Sunderland, Eng.	Wear River	1796	236.0	34.0	" "
St. Louis	Paris, France	Seine River	1862	210.0		" "
Rock Creek	Washington, D. C.	Rock Creek	1858	200.0	20.0	" "

SOME NOTABLE MASONRY ARCHES.

Name	Location	Over	Date	Span, Feet	Rise, Feet	Remarks
Luxemburg	Germany	Petrusse River	1903	277.7	101.7	The longest span
Trezzo	Italy	Adda River	1380	251.0	87.8	Destroyed 1416
Cabin John	Washington, D. C.	Cabin John Creek	1864	220.0	57.3	Aqueduct
Jaremcze	Austria	Pruth River	1893	213.0	59.0	
Bourbonnais	France			124.0	6.9	Flattest masonry arch

SOME NOTABLE CONCRETE AND CONCRETE-STEEL ARCHES.

Name	Location	Over	Date	Span, Feet	Rise, Feet	Remarks
Munderkingen	Wurtemburg	Danube River	1893	164.0	16.4	Concrete
Chatellerault	France	Vienne River	1899	164.0	15.8	Hennebique
Vauxhall	London, Eng.	Thames River	1900	144.6	18.6	Concrete
Inzigkofen	Germany	Danube River	1896	141.0	14.4	Concrete
I. C. R. R.	Grand Tower, U. S.	Big Muddy River	1903	140.0	30.0	Concrete [arch
Y Bridge	Zanesville, U. S.	Muskingum River	1901	99.0	6.3	Thatcher: Flattest concrete
Schwimmschul	Sleyer, Hungary		1897	138.4	9.4	Melan : Second flattest

Although the above bridge data are the result of diligent search and inquiry, and although the greatest care has been taken in compiling the same, it is possible that some errors may still exist, or that some long spans of the various types may have been overlooked. The author would greatly appreciate any information that will lead to the correction of the data in future editions, either regarding other notable structures or concerning the statements above.

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