

channels used in floors of railroad bridges shall be sub-punched and reamed, or drilled from the solid.

34. Punching shall be accurately done. Slight inaccuracy in the matching of holes may be corrected with reamers. Drifting to enlarge unfair holes will not be allowed. Poor matching of holes will be cause for rejection at the option of the inspector.

35. Riveted members shall have all parts well pinned up and firmly drawn together with bolts before riveting is commenced. Contact surfaces to be painted (see paragraph 65).

36. Lattice bars shall have neatly rounded ends, unless otherwise called for.

37. Stiffeners shall fit neatly between flanges of girders. Where tight fits are called for the ends of the stiffeners shall be faced and shall be brought to a true contact bearing with the flange angles.

38. Web splice plates and fillers under stiffeners shall be cut to fit within  $\frac{1}{8}$  inch of flange angles.

39. Web plates of girders, which have no cover plates, shall be flush with the backs of angles or project above the same not more than  $\frac{1}{8}$  inch, unless otherwise called for. When web plates are spliced, not more than  $\frac{1}{4}$  inch clearance between ends of plates will be allowed.

40. Connection angles for floor girders shall be flush with each other and correct as to position and length of girder. In case milling is required after riveting, the removal of more than 1-16 inch from their thickness will be cause for rejection.

41. Rivets shall be driven by pressure tools wherever possible. Pneumatic hammers shall be used in preference to hand driving.

42. Rivets shall look neat and finished, with heads of approved shape, full and of equal size. They shall be central on shank and grip the assembled pieces firmly. Recupping and calking will not be allowed. Loose, burned or otherwise defective rivets shall be cut out and replaced. In cutting out rivets great care shall be taken not to injure the adjacent metal. If necessary they shall be drilled out.

43. Wherever bolts are used in place of rivets which transmit shear, the holes shall be reamed parallel and the bolts turned to a driving fit. A washer not less than  $\frac{1}{4}$  inch thick shall be used under nut.

44. The several pieces forming one built member shall be straight and fit closely together, and finished members shall be free from twists, bends or open joints.

45. Abutting joints shall be cut or dressed true and straight and fitted close together, especially where open to view. In compression joints depending on contact bearing the surfaces shall be truly faced, so as to have even bearings after they are riveted up complete and when perfectly aligned.

46. Holes for floor girder connections shall be sub-punched and reamed with twist drills to a steel template 1 inch thick. Unless otherwise allowed, all other field connections shall be assembled in the shop and the unfair holes reamed; and when so reamed the pieces shall be match-marked before being taken apart.

47. Eye-bars shall be straight and true to size, and shall be free from twists, folds in the neck or head, or any other defect. Heads shall be made by upsetting, rolling or forging. Welding will not be allowed. The form of heads will be determined by the dies in use at the works where the eye-bars are made, if satisfactory to the engineer, but the manufacturer shall guarantee the bars to break in the body with a silky fracture, when tested to rupture. The thickness of head and neck shall not vary more than 1-16 inch from the thickness of the bar.

48. Before boring, each eye-bar shall be properly annealed and carefully straightened. Pin holes shall be in the centre line of bars and in the centre of heads. Bars of the same length shall be bored so accurately that, when placed together, pins 1-32 smaller in diameter than the pin holes can be passed through the holes at both ends of the bars at the same time.

49. Pin holes shall be bored true to gauges, smooth and straight; at right angles to the axis of the member and parallel to each other, unless otherwise called for. Wherever possible, the boring shall be done after the member is riveted up.

50. The distance centre to centre of pin holes shall be correct within 1-32 inch, and the diameter of the hole not more than 1-50 inch larger than that of the pin, for pins up to 5 inches diameter, and 1-32 inch for larger pins.

51. Pins and rollers shall be accurately turned to gauges and shall be straight and smooth and entirely free from flaws.

52. At least one pilot and driving nut shall be furnished for each size of pin for each structure.

53. Screw threads shall make tight fits in the nuts and shall be United States standard, except at ends of pins and for bolts over  $1\frac{1}{2}$  inches in diameter, for which six threads per inch shall be used.

54. Steel, except in minor details, which has been partially heated, shall be properly annealed.

55. All steel castings shall be annealed.

56. Welds in steel will not be allowed.

57. Expansion bed plates shall be planed true and smooth. Cast wall plates shall be planed top and bottom. The cut of the planing tool shall correspond with the direction of expansion.

58. Pins, nuts, bolts, rivets and other small details shall be boxed or crated.

59. The weight of every piece and box shall be marked on it in plain figures.

#### ADDITIONAL SPECIFICATIONS WHEN GENERAL REAMING AND PLANING ARE REQUIRED.

60. Sheared edges and ends shall be planed off at least  $\frac{1}{4}$  inch.

61. Punched holes shall be made with a punch 3-16-inch smaller in diameter than the nominal size of the rivets and shall be reamed to a finished diameter of not more than 1-16 inch larger than the rivet.

62. Wherever practicable, reaming shall be done after the pieces forming one built member have been assembled and firmly bolted together. If necessary to take the pieces apart for shipping and handling, the respective pieces reamed together shall be so marked that they may be reassembled in the same position in the final setting up. No interchange of reamed parts will be allowed.

63. The burrs on all reamed holes shall be removed by a tool countersinking about 1-16 inch.

#### SHOP PAINTING.

64. Steel work, before leaving the shop, shall be thoroughly cleaned and given one good coating of pure linseed oil, or such paint as may be called for, well worked into all joints and open spaces.

65. In riveted work, the surfaces coming in contact shall each be painted before being riveted together.

66. Pieces and parts which are not accessible for painting after erection, including tops of stringers, eye-bar heads, ends of posts and chords, etc., shall have a good coat of paint before leaving the shop.

67. Painting shall be done only when the surface of the metal is perfectly dry. It shall not be done in wet or freezing weather, unless protected under cover.

68. Machine finished surfaces shall be coated with white lead and tallow before shipment or before being put out into the open air.

#### INSPECTION AND TESTING AT THE SHOPS.

69. The manufacturer shall furnish all facilities for inspecting and testing weight and the quality or workmanship at the shop where material is manufactured. He shall furnish a suitable testing machine for testing full-sized members if required.

70. The purchaser shall be furnished complete shop plans, and must be notified well in advance of the start of the work in the shop, in order that he may have an inspector on hand to inspect material and workmanship. Complete copies of shipping invoices shall be furnished to the purchaser with each shipment.

71. When an inspector is furnished by the purchaser, he shall have full access, at all times, to all parts of the shop where material under his inspection is being manufactured.