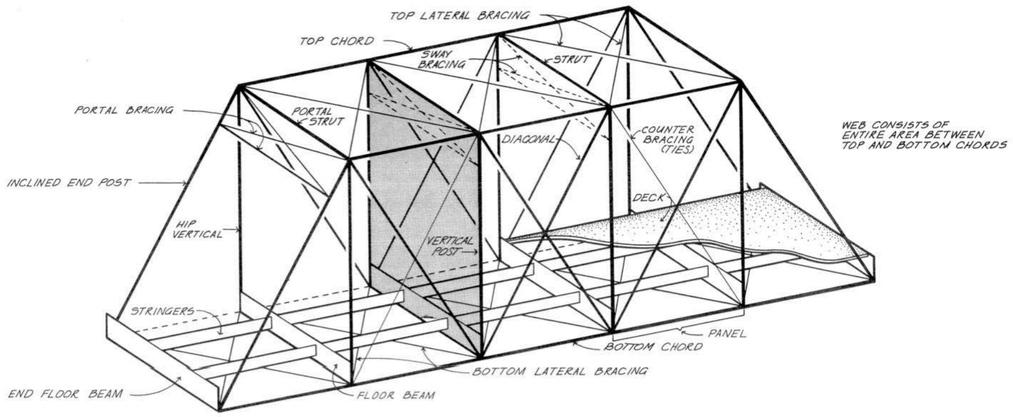


TRUSSES

A STUDY BY THE

HISTORIC AMERICAN ENGINEERING RECORD

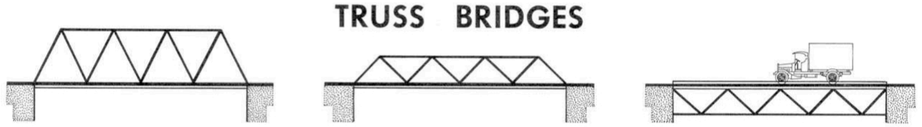
A TRUSS IS COMPOSED OF STRUCTURAL TRIANGLES JOINED TOGETHER WITH PINNED OR RIVETED CONNECTIONS. THE MAIN PIECES OR MEMBERS MAY BE EITHER STIFF HEAVY STRUTS, POSTS OR THIN FLEXIBLE RODS. IT IS THE ARRANGEMENT OF THESE MEMBERS THAT DETERMINES THE SPECIFIC TRUSS TYPE.

STRUCTURAL MEMBERS RESIST FORCES IN TWO PRIMARY WAYS — COMPRESSION AND TENSION. HEAVY RIGID MEMBERS MAY RESIST BOTH COMPRESSIVE AND TENSILE FORCES BUT THIN RODS CAN ONLY RESIST TENSION AND THESE CHARACTERISTICS ARE MAJOR CLUES IN TRUSS IDENTIFICATION. NOTE THAT THE MAIN STRUCTURAL MEMBERS OF A TRUSS PANEL MAY BE SUPPLEMENTED BY THIN DIAGONAL TIES. BECAUSE TRUSS TYPES ARE DETERMINED BY THEIR MAIN STRUCTURAL MEMBERS, THESE COUNTER BRACES (INDICATED BY BROKEN LINES, ON THE IDENTIFICATION SHEET) MAY BE IGNORED. AFTER MATCHING THE STRUCTURAL OUTLINE OF THE TRUSS IN QUESTION WITH THE DIAGRAM IT MOST RESEMBLES, CHECK TO MAKE SURE THE ARRANGEMENT OF HEAVY COMPRESSION AND LIGHT TENSION MEMBERS IS COMPATIBLE WITH THE DIAGRAM. IF THERE IS AGREEMENT, THEN THE BASIC TRUSS TYPE IS IDENTIFIED.

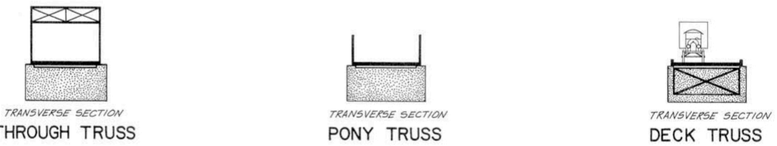
THE SHEET OF TRUSS DIAGRAMS PRESENTS ONLY THE STANDARD FORMS OF THE MOST COMMON TRUSSES. THERE ARE ALSO MANY "HYBRID" TRUSSES THAT DO NOT FALL INTO EASILY-DEFINED CATEGORIES. IN SUCH CASES, IDENTIFICATION SHOULD BE MADE AS CLOSELY AS POSSIBLE IN TERMS OF THE STANDARD DESIGNS. ADDITIONALLY, TRUSSES OFTEN ARE INVERTED, CREATING OUTLINES QUITE DIFFERENT FROM THE ORIGINAL — TENSION MEMBERS BECOMING COMPRESSION MEMBERS AND VICE VERSA. BEFORE ASSUMING A TRUSS IS NOT REPRESENTED ON THE DIAGRAM, CHECK TO SEE IF IT IS AN INVERTED FORM.

MOST BRIDGE TRUSSES ARE OF THREE BASIC TYPES. IF THE DECK AND/OR RAILS ARE LEVEL WITH THE BOTTOM CHORDS, IT IS A THROUGH TRUSS. A PONY TRUSS IS A THROUGH TRUSS WITH NO LATERAL BRACING BETWEEN TOP CHORDS. A DECK TRUSS CARRIES ITS TRAFFIC LOAD LEVEL WITH THE TOP CHORDS.

TRUSS BRIDGES



LONGITUDINAL ELEVATION — LONGITUDINAL ELEVATION — LONGITUDINAL ELEVATION

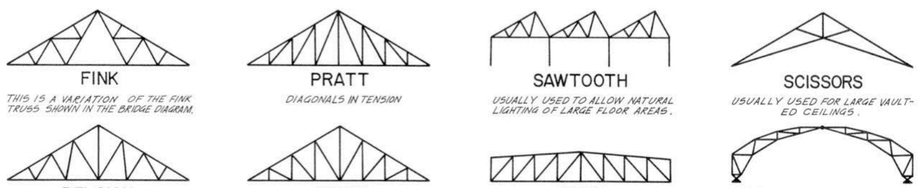


TRANSVERSE SECTION — THROUGH TRUSS

TRANSVERSE SECTION — PONY TRUSS

TRANSVERSE SECTION — DECK TRUSS

ROOF TRUSSES



FINK
THIS IS A VARIATION OF THE FINK TRUSS SHOWN IN THE BRIDGE DIAGRAM.

PRATT
DIAGONALS IN TENSION

SAWTOOTH
USUALLY USED TO ALLOW NATURAL LIGHTING OF LARGE FLOOR AREAS.

SCISSORS
USUALLY USED FOR LARGE VAULTED CEILINGS.

BELGIAN
DIAGONALS PERPENDICULAR TO TOP CHORDS.

HOWE
DIAGONALS IN COMPRESSION

HOWE
DIAGONALS IN COMPRESSION

THREE-HINGED ARCH
USED FOR EXCEPTIONALLY LONG SPANS.

STRUCTURAL CONNECTIONS

PIN CONNECTION — RIVETED CONNECTION

1ST. PRINTING 1976; REVISED OCT. 1976

OFFICE OF ARCHEOLOGY AND HISTORIC PRESERVATION TECHNICAL INFORMATION PROJECT UNDER DIRECTION OF THE NATIONAL PARK SERVICE, UNITED STATES DEPARTMENT OF THE INTERIOR	TRUSS IDENTIFICATION: NOMENCLATURE	RECORD NO. HAER TI-1	HISTORIC AMERICAN ENGINEERING RECORD SHEET 1 OF 2 SHEETS	LIBRARY OF CONGRESS INDEX NUMBER

PRINTED BY THE MONTGOMERY C. MEIGS ORIGINAL CHAPTER OF THE SOCIETY FOR INDUSTRIAL ARCHEOLOGY
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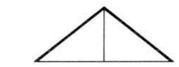
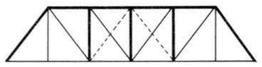
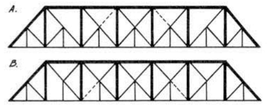


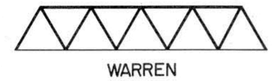
KING POST
(WOOD)
A TRADITIONAL TRUSS TYPE WITH ITS ORIGINS IN THE MIDDLE AGES.
LENGTH: 20-60 FEET
6-18 METERS



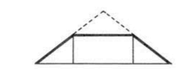
PRATT
1844 - 20TH CENTURY
DIAGONALS IN TENSION, VERTICALS IN COMPRESSION, (EXCEPT FOR HIP VERTICALS ADJACENT TO INCLINED END POSTS).
LENGTH: 30-250 FEET
9-75 METERS



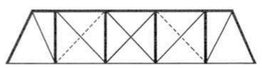
BALTIMORE (PETIT)
1871 - EARLY 20TH CENTURY
A. A PRATT WITH SUB-STRUTS.
B. A PRATT WITH SUB-TIES.
LENGTH: 250-600 FEET
75-180 METERS



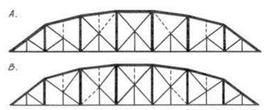
WARREN
1848 - 20TH CENTURY
TRIANGULAR IN OUTLINE, THE DIAGONALS CARRY BOTH COMPRESSIVE AND TENSILE FORCES. A TRUE WARREN TRUSS HAS EQUILATERAL TRIANGLES.
LENGTH: 50-400 FEET
15-120 METERS



QUEEN POST
(WOOD)
A LENGTHENED VERSION OF THE KING POST.
LENGTH: 20-80 FEET
6-24 METERS

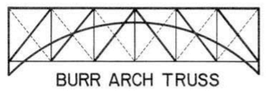


PRATT HALF-HIP
LATE 19TH-EARLY 20TH CENTURY
A PRATT WITH INCLINED END POSTS THAT DO NOT HORIZONTALLY EXTEND THE LENGTH OF A FULL PANEL.
LENGTH: 30-150 FEET
9-45 METERS

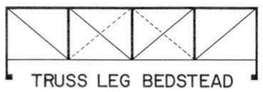


PENNSYLVANIA (PETIT)
1875-EARLY 20TH CENTURY
A. A PARKER WITH SUB-STRUTS.
B. A PARKER WITH SUB-TIES.
LENGTH: 250-600 FEET
75-180 METERS

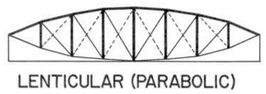
WARREN
WITH VERTICALS
MID 19TH-20TH CENTURY
DIAGONALS CARRY BOTH COMPRESSIVE AND TENSILE FORCES. VERTICALS SERVE AS BRACING FOR TRIANGULAR WEB SYSTEM.
LENGTH: 50-400 FEET
15-120 METERS



BURR ARCH TRUSS
1804-LATE 19TH CENTURY
(WOOD)
COMBINATION OF A WOODEN ARCH WITH A MULTIPLE KING POST. (ARCH ALSO COMBINED WITH LATER WOODEN TRUSSES).
LENGTH: 50-175 FEET
15-50 METERS

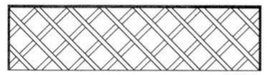


TRUSS LEG BEDSTEAD
LATE 19TH-EARLY 20TH CENTURY
A PRATT WITH VERTICAL END POSTS IMBEDDED IN THEIR FOUNDATIONS.
LENGTH: 30-100 FEET
9-30 METERS

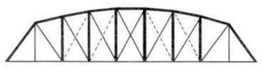


LENTICULAR (PARABOLIC)
1878-EARLY 20TH CENTURY
A PRATT WITH BOTH TOP AND BOTTOM CHORDS PARABOLICLY CURVED OVER THEIR ENTIRE LENGTH.
LENGTH: 50-360 FEET
5-110 METERS

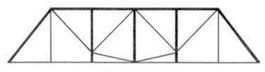
DOUBLE INTERSECTION WARREN
(LATTICE)
MID 19TH-20TH CENTURY
STRUCTURE IS INDETERMINATE. MEMBERS ACT IN BOTH COMPRESSION AND TENSION. TWO TRIANGULAR WEB SYSTEMS ARE SUPERIMPOSED UPON EACH OTHER WITH OR WITHOUT VERTICALS.
LENGTH: 75-400 FEET
23-120 METERS



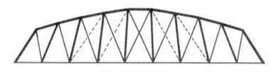
TOWN LATTICE
1820-LATE 19TH CENTURY
(WOOD)
A SYSTEM OF WOODEN DIAGONALS WITH NO VERTICALS. MEMBERS TAKE BOTH COMPRESSION AND TENSION.
LENGTH: 50-220 FEET
15-66 METERS



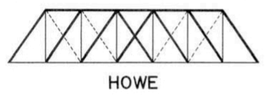
PARKER
MID-LATE 19TH-20TH CENTURY
A PRATT WITH A POLYGONAL TOP CHORD
LENGTH: 40-250 FEET
12-75 METERS



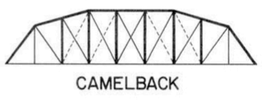
GREINER
1894-EARLY 20TH CENTURY
PRATT TRUSS WITH THE DIAGONALS REPLACED BY AN INVERTED BOWSTRING TRUSS
LENGTH: 75-250 FEET
23-75 METERS



PEGRAM
1887-EARLY 20TH CENTURY
A HYBRID BETWEEN THE WARREN AND PARKER TRUSSES, UPPER CHORDS ARE ALL OF EQUAL LENGTH.
LENGTH: 150-650 FEET
45-195 METERS

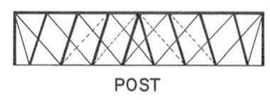


HOWE
1840 - 20TH CENTURY
(WOOD, VERTICALS OF METAL)
DIAGONALS IN COMPRESSION, VERTICALS IN TENSION.
LENGTH: 30-150 FEET
9-45 METERS

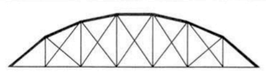


CAMELBACK
LATE 19TH-20TH CENTURY
A PARKER WITH A POLYGONAL TOP CHORD OF EXACTLY FIVE SLOPES.
LENGTH: 100-300 FEET
30-90 METERS

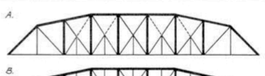
DOUBLE INTERSECTION PRATT
1847 - 20TH CENTURY
(WHIPPLE, WHIPPLE-MURPHY, LINVILLE)
AN INCLINED END POST PRATT WITH DIAGONALS THAT EXTEND ACROSS TWO PANELS.
LENGTH: 70-300 FEET
21-90 METERS



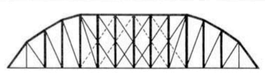
POST
1865 - LATE 19TH CENTURY
A HYBRID BETWEEN THE WARREN AND THE DOUBLE INTERSECTION PRATT.
LENGTH: 100-300 FEET
30-90 METERS



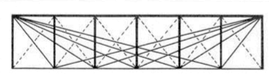
BOWSTRING ARCH-TRUSS
1840 - LATE 19TH CENTURY
A TIED ARCH WITH THE DIAGONALS SERVING AS BRACING AND THE VERTICALS SUPPORTING THE DECK.
LENGTH: 50-130 FEET
15-40 METERS



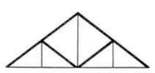
CAMELBACK
WITH STABILIZING PANELS
LATE 19TH-EARLY 20TH CENTURY
A. A PENNSYLVANIA TRUSS WITH A POLYGONAL TOP CHORD OF EXACTLY FIVE SLOPES
B. SAME AS A, WITH HORIZONTAL STRUTS.
LENGTH: 100-500 FEET
30-150 METERS



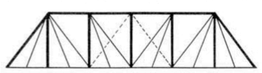
SCHWEDLER
LATE 19TH CENTURY
A DOUBLE INTERSECTION PRATT POSITIONED IN THE CENTER OF A PARKER.
LENGTH: 100-300 FEET
30-90 METERS



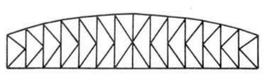
BOLLMAN
1852 - MID-LATE 19TH CENTURY
(RARE)
VERTICALS IN COMPRESSION, DIAGONALS IN TENSION. DIAGONALS RUN FROM END POSTS TO EVERY PANEL POINT.
LENGTH: 75-100 FEET
23-30 METERS



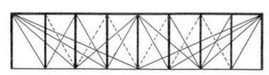
WADDELL "A" TRUSS
LATE 19TH-EARLY 20TH CENTURY
EXPANDED VERSION OF THE KING POST TRUSS. USUALLY MADE OF METAL
LENGTH: 25-75 FEET
8-23 METERS



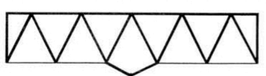
KELLOGG
LATE 19TH CENTURY
A VARIATION ON THE PRATT WITH ADDITIONAL DIAGONALS RUNNING FROM UPPER CHORD PANEL POINTS TO THE CENTER OF THE LOWER CHORDS.
LENGTH: 75-150 FEET
23-30 METERS



K-TRUSS
EARLY 20TH CENTURY
SO CALLED BECAUSE OF THE DISTINCTIVE OUTLINE OF THE STRUCTURAL MEMBERS.
LENGTH: 200-800 FEET
60-240 METERS



FINK
1851 - MID-LATE 19TH CENTURY
(RARE)
VERTICALS IN COMPRESSION, DIAGONALS IN TENSION, LONGEST DIAGONALS RUN FROM END POSTS TO CENTER PANEL POINTS.
LENGTH: 75-100 FEET
23-45 METERS



WICHERT
1932 - MID-LATE 20TH CENTURY
IDENTIFIED BY A CHARACTERISTIC PIN-CONNECTED SUPPORT SYSTEM OVER THE PIERS. TRUSS IS CONTINUOUS OVER PIERS.
LENGTH: 400-1000 FEET
122-305 METERS

TRUSSES

A STUDY BY THE

HISTORIC AMERICAN ENGINEERING RECORD

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DEVELOPED BY: T. ALLAN COMP • DONALD C. JACKSON • ARNOLD DAVID JONES • APPRECIATION TO: CHARLES T.G. LOONEY • ROBERT M. VOGEL • ERIC N. DELONY

1ST. PRINTING 1976; REVISED OCT. 1976

STEARNS
1890 - EARLY 20TH CENTURY
SIMPLIFICATION OF FINK TRUSS WITH VERTICALS OMITTED AT ALTERNATE PANEL POINTS.
LENGTH: 50-200 FEET
15-60 METERS

OFFICE OF ARCHEOLOGY AND HISTORIC PRESERVATION TECHNICAL INFORMATION PROJECT UNDER DIRECTION OF THE NATIONAL PARK SERVICE, UNITED STATES DEPARTMENT OF THE INTERIOR	TRUSS IDENTIFICATION: BRIDGE TYPES	RECORD NO. HAER TI-1	HISTORIC AMERICAN ENGINEERING RECORD SHEET 2 OF 2 SHEETS	LIBRARY OF CONGRESS INDEX NUMBER

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Pratt

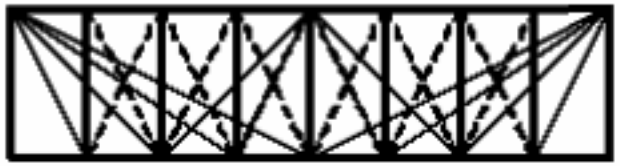
Parker

K-Truss

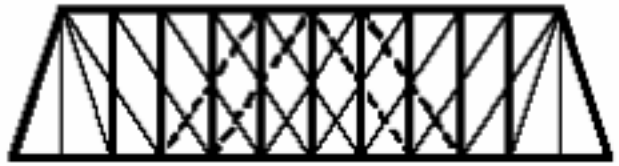
Howe

Camelback

Warren



Fink



Double Intersection Pratt

Warren (with Verticals)

Bowstring

Baltimore

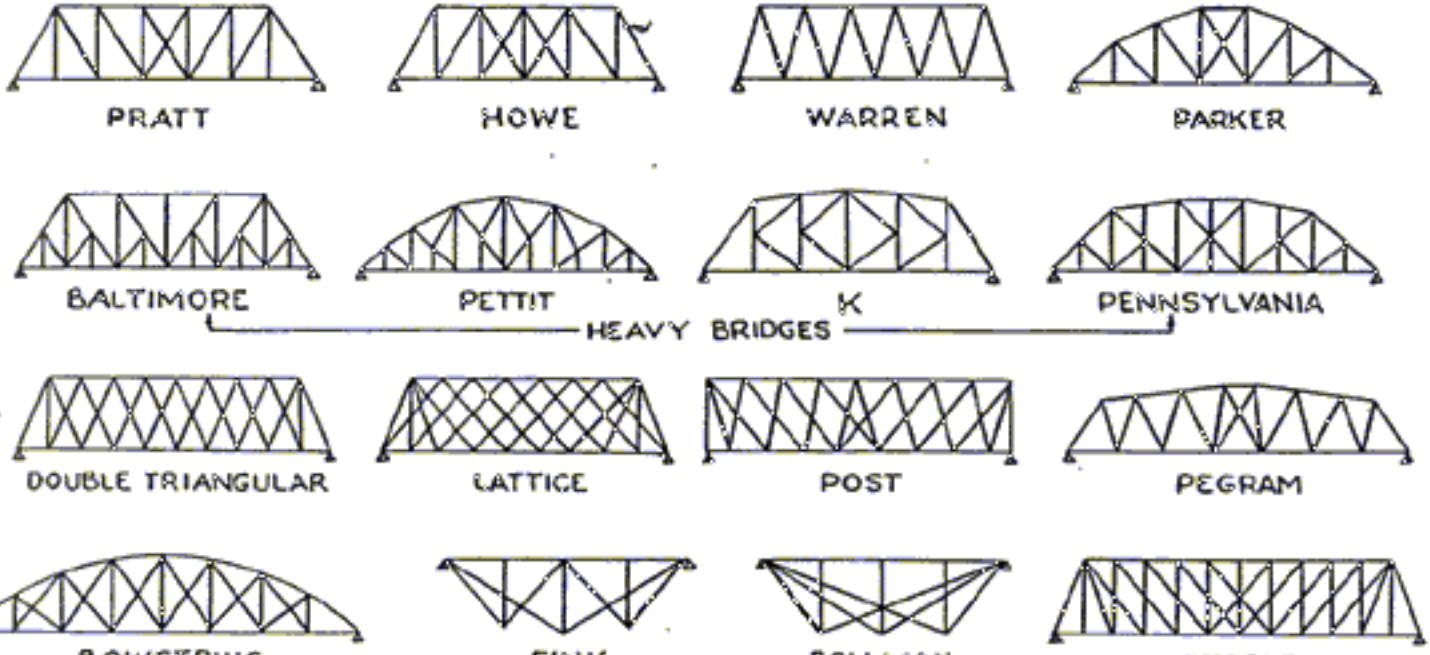
Double Intersection Warren

Waddell "A" Truss

Pennsylvania

Lattice

FIG. A ROOF TRUSSES



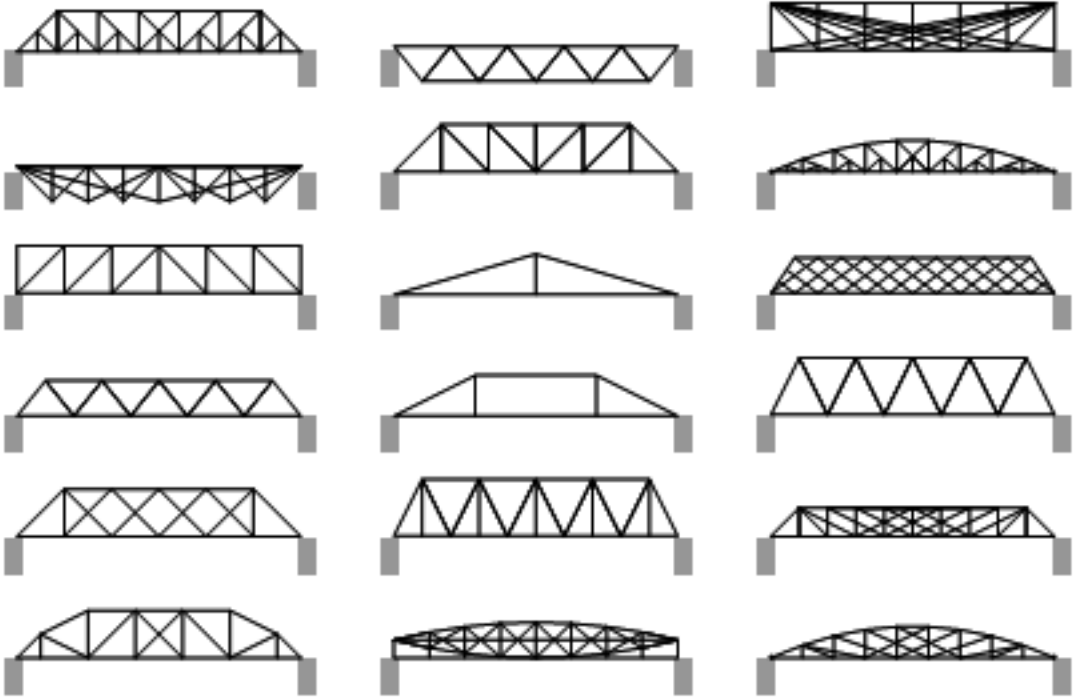


Fig. 55. Fink

Fig. 56. Bollman

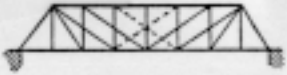


Fig. 57. Whipple

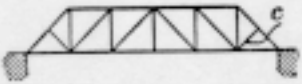


Fig. 58. Through Howe

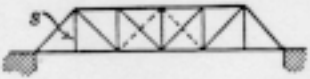


Fig. 59. Through Pratt

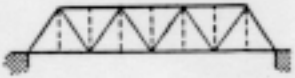


Fig. 60. Through Warren

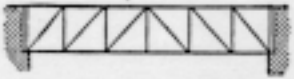


Fig. 61. Deck Howe

Fig. 62. Deck Pratt

Fig. 63. Deck Warren

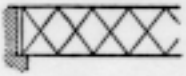


Fig. 64

Fig. 65

Fig. 66

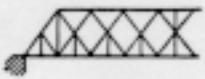


Fig. 67

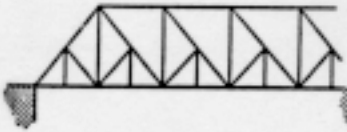


Fig. 68. Baltimore

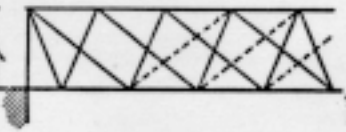


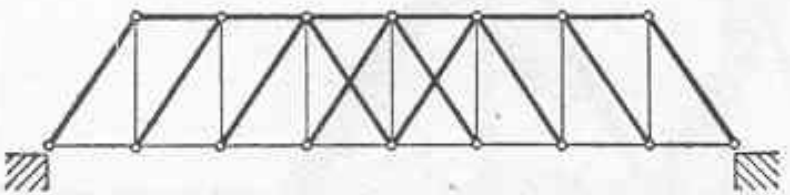
Fig. 69. Post.

Fig. 70. K Truss

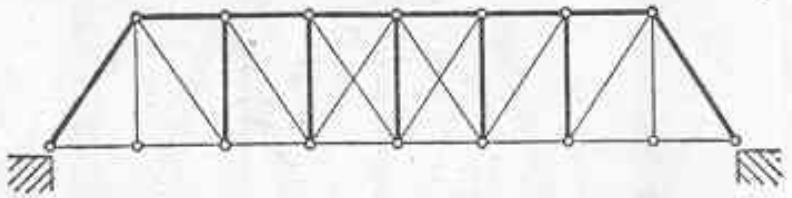
Fig. 71. Bowstring

Fig. 72. Parker

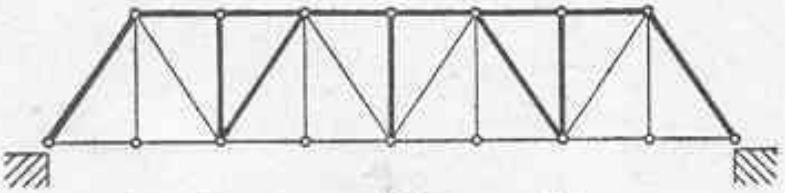
Fig. 73. Pennsylvania



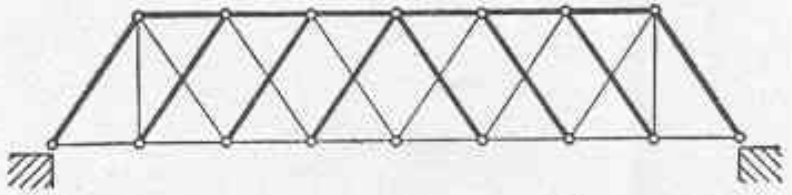
(a) THROUGH HOWE TRUSS



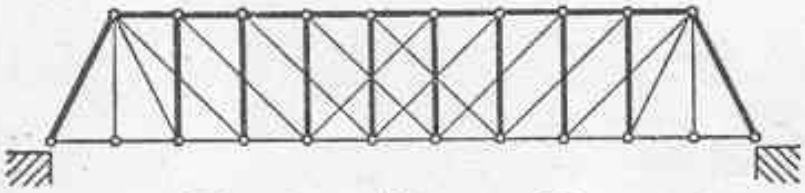
(b) THROUGH PRATT TRUSS



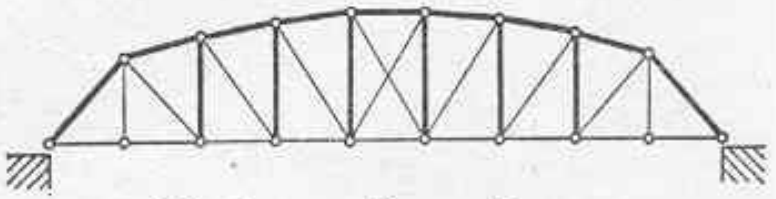
(c) THROUGH WARREN TRUSS



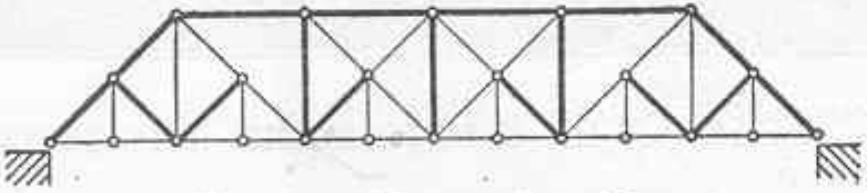
(d) QUADRANGULAR THROUGH WARREN TRUSS



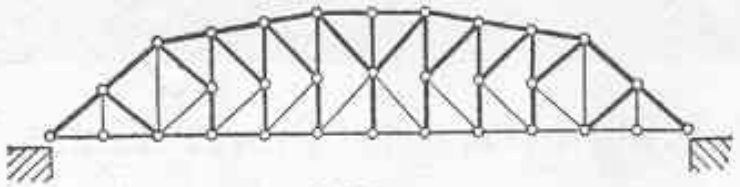
(e) THROUGH WHIPPLE TRUSS



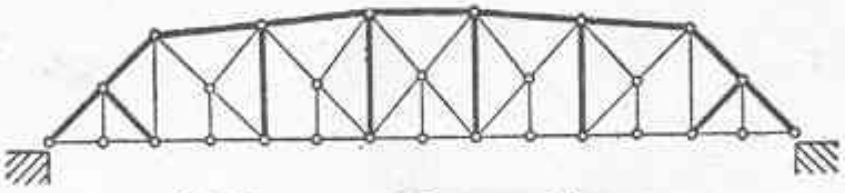
(f) CAMEL BACK TRUSS



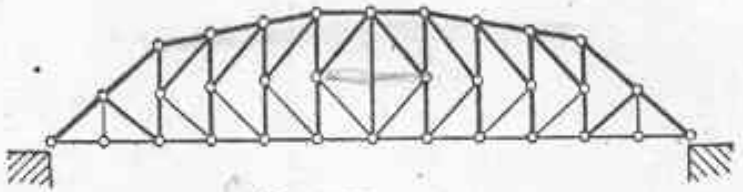
(g) THROUGH BALTIMORE TRUSS



(h) K-TRUSS



(i) THROUGH PETIT TRUSS

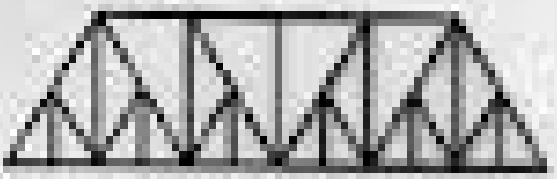


(j) K-TRUSS

TRUSS BRIDGE DESIGNS

Pratt

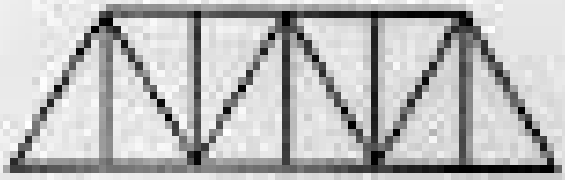
Curved chord Pratt



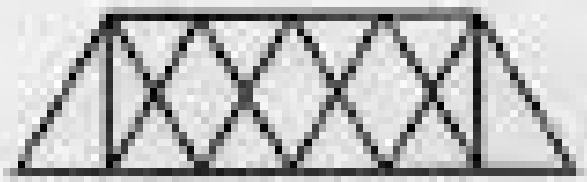
Baltimore (Pratt)

Pennsylvania (Pratt)

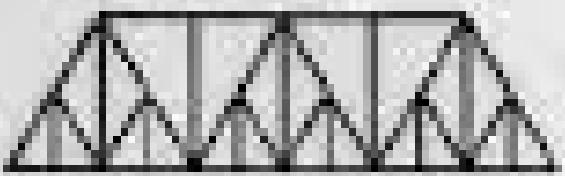
Warren
(without vertical supports)

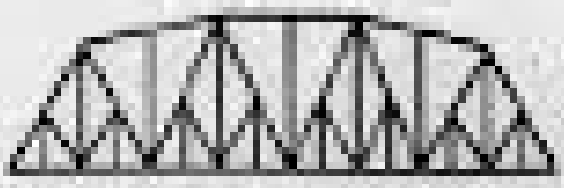


Warren
(with vertical supports)

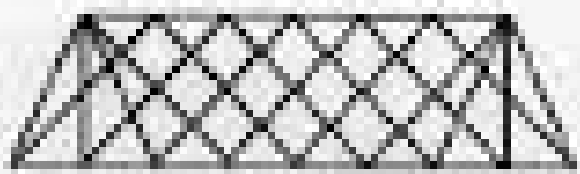


Quadrangular Warren

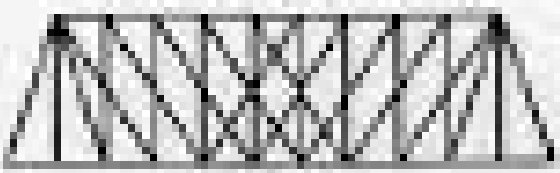




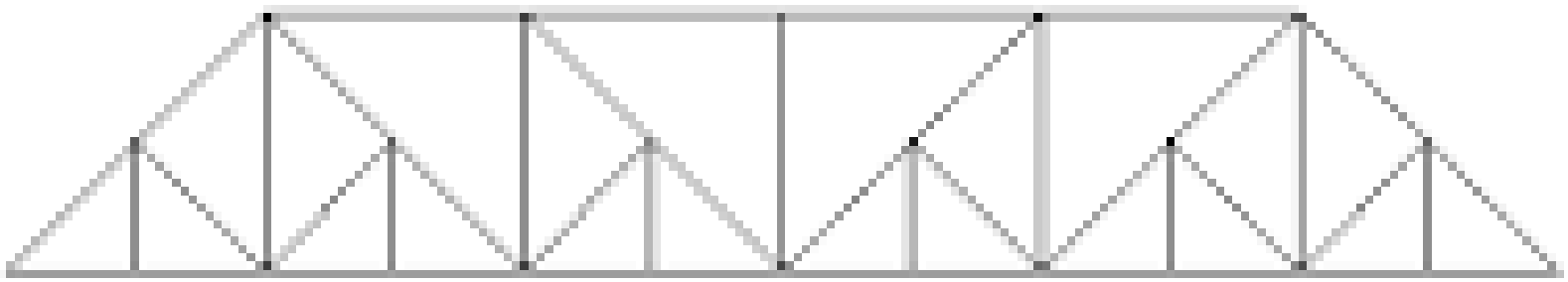
Subdivided Warren types



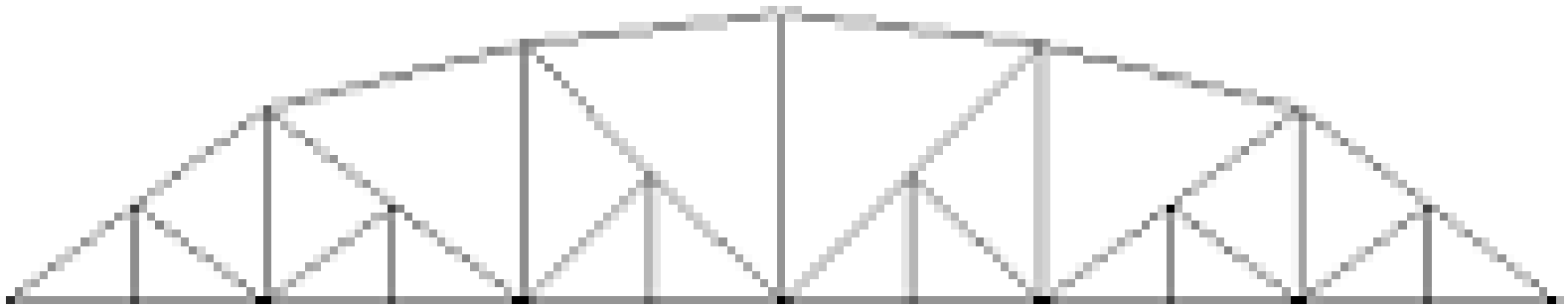
Lattice



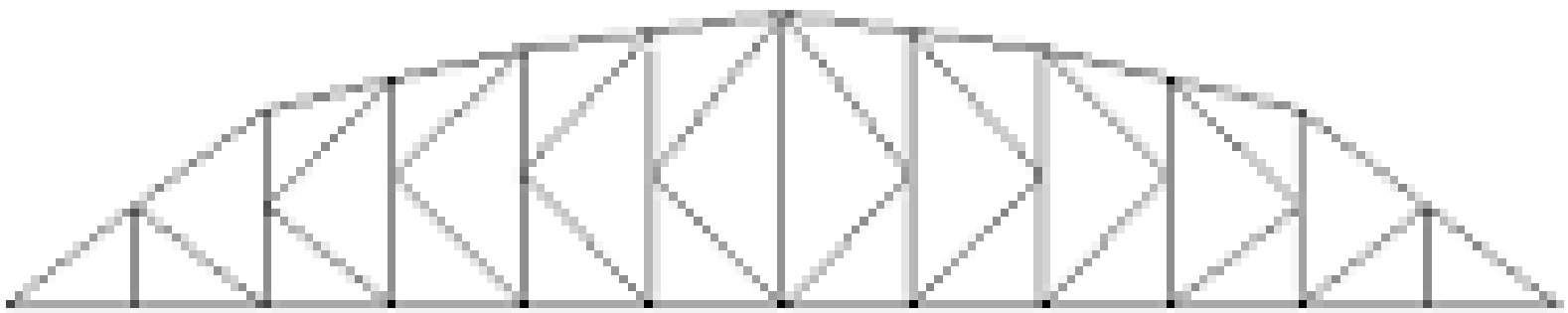
Whipple



Baltimore

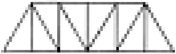


Pennsylvania or Petit



K truss

Types of Truss Bridges



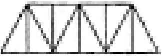
Pratt

Curved Chord Pratt

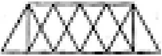
Baltimore Pratt

Pennsylvania Pratt

Warren
(without vertical supports)



Warren
(with vertical supports)



Quadrangular Warren

Subdivided Warren types