

→ Retainer ring: 4 ea., low alloy steel, to finish 12 in O.D. x 10" I.D. x 1.75" thick, hardness Rc 28-32

H. J. Hall
Oct 30, 1964
Revised May 25, 1965

TETRAHEDRAL X-RAY PRESS, 300 TON
Bill of Materials, etc.

1. Ram base: 4 ea., 4340 steel, aircraft quality, magnafluxed forging, hardness Rc 28-32 throughout, to finish 19 in. diam. x ⁸/₇ in. thick; Alternates material: Hepenstahl Hardtem B.
2. Main nut: 12 ea., 4340 steel, aircraft quality, hardness Rc 28-32, magnafluxed, pierced forging to finish 5-1/2 in. O.D. x 3-1/4 in I.D. x 3-1/2 in. long, 12 T.P.I.
3. Spacer nut: 12 ea., low alloy steel, hardness Rc 28-32, bar stock to finish 4-1/4 in O.D. x 3-1/4 in I.D. x 2 in. long, 12 T.P.I.
4. Cylinder: 4 ea, seamless, hydraulic cylinder tubing, honed and polished I.D., to finish 10 in. O.D. x 8 in. I.D. x 9-1/2 in. long, hardness Rc ^{45 ± 3}/~~28-40~~.
5. Cylinder top plate: 4 ea., low alloy steel plate or bar stock, to finish 10 in. O.D. x 4 in. I.D. x ²/~~1-1/2~~ in. thick. Hardness Rc 28-32
6. Piston: 4 ea., 4340 steel, aircraft quality, magnafluxed forging, hardness Rc ⁵⁵⁻⁵⁹/~~40-45~~ to finish 8 in. O.D. x 2 in. I.D. x ⁶/~~5-1/2~~ in. long.
7. Piston rod: 4 ea., 4340 steel, aircraft quality, magnafluxed, ^{45 ± 3} ~~bar stock or forging~~, upset head, hardness Rc ~~28-32~~, to finish 9-3/4 in. O.D. x ^{4 in. diam.}/_{4 in. stem} x 13-1/2 in. long.
8. Positioning ^{er} ring: 4 ea., low alloy steel, hardness Rc 28-32, to finish 5 in. O.D. x 3 in I.D. x 1 in. thick, bar stock or plate.
9. Binding ring: 12 ea., (includes 3 spares), 4340 steel, aircraft quality, magnafluxed, forging, hardness Rc 51-55, to finish 4 in. O.D. x 1-1/2 in. I.D. x 2-3/4 in. long. Same as McCartney dwg. no. C-545 Aug 7, 1963
10. Anvil: 12 ea., (includes 3 spares), cobalt cemented (6-8%) virgin tungsten carbide, 1/2 in. size (see H. T. Hall drawing "Tetrahedral

→ Split ring: 4 ea, low alloy steel, Rc 28-32, to finish 10.38 O.D. x 9.62 I.D. x .743 thick.

Anvils, " Sept. 19, 1962.

11. Ditto, 3/4 in. size.

12. Ditto, 1 in. size.

3 in. O.D. x 2 in I.D. x 1.5 in long

13. Piston-rod nut: 4 ea., low alloy steel, ~~hex or spanner type, 16 T.P.I.~~

14. O-ring (seal ^B ~~A~~): 4 ea., Series no. 9021-443, Buna N compound, 90 Shore durometer hardness, 8 in. O.D., 1/4 in. wide.

15. Leather back-up washers for item 14 above, 8 ea., Chicago Rawhide Co., part number-70, 8 in. O.D. x 7-1/2 in. I.D. x 1/8 in. thick,

16. O-ring (seal ^A ~~B~~): 4 ea., Series no. 9021-⁴⁴⁵~~74~~, Buna N compound, 90 Shore durometer, ^{8.5}9 in. O.D. x 1/4 in. wide.

17. O-ring (seal C): 4 ea., same as item 14.

18. O-ring (seal D): 4 ea., Series no. 9021-345, Buna N compound, 90 Shore durometer, 4-3/8 in. O.D. x 3/16 in. wide.

19. ~~Leather back-up washers for item 18 above: 8 ea., Chicago Rawhide Co., part no. -48, 4-3/8 in. O.D. x 4 in. I.D. x 0.094 in. thick.~~

20. Cylinder top plate hold down screws: 48 ea., 3/8 in. -16 x 1-1/2 in. long, socket head cap screws.

21. Positioner hold-down screws: 20 each, size 10-32 x 1-1/2 in. long, socket head cap screws.

22. Binding ring hold-down screws: 12 ea., 1/4 - 20 x 1-1/2 in. long, socket head cap screws.

23. Guide Pins: 4 ea., 1.2500 + 0.0000 - 0.0002" diam. x 7-~~1/4~~ in. long, Lamina no. TN-125. ~~with 1/8 in. radius each end. "Case 60-Hardened and Ground".~~

24. Pressure tubing: 3 lengths, stainless steel 9/16 in. O.D. x 5/16 in. I.D. x 20 ft.

→ Retainer Ring hold-down screws: 48 ea, 1/2"-20 thd x 3" long, socket head cap screws.

25. Autoclave "Slimline" 15,000 psi fittings and valves for 9/16 in. x 5/16 in. pressure tubing as follows:
 - a. nipples, 4 in., 5 ea.
 - b. cross, 2 ea.
 - c. tee, 3 ea.
 - d. elbow, 6 ea.
 - e. adapter, tubing to 1/4 in. NPT male, 1 ea.
 - f. adapter, tubing to 3/8 in. NPT male, 1 ea.
 - g. valve, 2-way angle, 2 ea.
 - h. valve, 2-way straight, 2 ea.
 - i. gland, 45 ea.
 - j. collar, 45 ea.
26. Sprague pump: 1 ea., no. S-216C-300.
27. Air mufflers; 2 ea., Sprague Engineering Co., Model 0-5.
28. Lubro control unit: 1 ea., Sprague no. P/N 21-009-002 (for use with pump).
29. Relief valve: 1 ea., Sprague no. 005-023A-1.
30. Oil reservoirs: 2 ea., welded steel cans, 8 in. O.D. x 20 in. long x 3/16 in. wall with one 1/2 in. NPT female side oil outlet 1 in. from bottom and one 1/2 in. NPT female top outlet near rim for air inlet, and also 1-1/2 in. NPT female top outlet near rim with pipe plug for filling.
31. Air filter, regulator unit: 1 ea., Sprague, model 0-7 without lubricator (for oil reservoirs).
32. Air valve, 1/2 in. NPT (to control Sprague pump), panel mount, Lukenheimer Fig. 907BS.
33. Air valve, 1 ea., (to admit and exhaust air to reservoirs), plug, Republic no. 721-4Tx four way reversing, flanged, 1/2 in. tube connections for air service, lubricant # 3.

34. Pipe fittings (galvanized) as follow:

- a. street elbows, 3/8 in., 6 ea.
- b. elbows, 3/8 in., 4 ea.
- c. short nipples, 3/8 in., 4 ea.
- d. Tees, 3/8 in., 2 ea.
- e. cross, 3/8 in., 1 ea.
- f. elbows, 1/2 in., 4 ea.
- g. street elbows, 1/2 in., 2 ea.
- h. tees, 1/2 in., 2 ea.
- i. short nipples, 1/2 in., 4 ea.
- j. 3/8 in. pipe, galvanized, 1 length.
- k. 1/2 in. pipe galvanized, 1 length.

35. Parker, Push-lok-82 fittings and hose as follows:

- a. Push-lok 3/8 - 3/8 - 30182-4, 8 ea.
- b. Push-lok 3/8 - 6 - 30682-4, 8 ea.
- c. Push-lok hose # 3/8-831, 20 ft.
- d. Push-lok 1/2-1/2-30182-4, 6 ea.
- e. Push-lok 1/2 - 8 - 30682-4, 6 ea.
- f. Push-lok hose # 1/2 -831, 20 ft.

36. Tubing to pipe adapter, 3/8 NPT to 3/8 -37°, straight through,
Parker no. 6-6-0103-1, 8 ea.

37. Tubing to pipe adapter, 1/2 NPT to 1/2 - 37°, straight through,
Parker no. 8-8-0103-1, 8 ea.

38. Gauge: Heise, 12 in., 12,000 psi max., with automatic thermal
compensator and slotted link, port opening in back of case to connect
to Autoclave Engineers 5/16 - 9/16 in. "Slimline" tubing for 15,000 psi
use. Gage divisions 0-12,000 in steps of 10 psi.

39. Press stand: 1 ea., consists of steel cylinder 20 in. O. D. x 19 in. I. D. x 30 in. long. A ring 18 in. I. D. x 19 in. O. D. x ²1 in. wide is welded into one end of the steel cylinder 3 in. from one end. The upright ram base is inserted into the 19 in. I. D. cylinder to a depth of 3 in. and rests on this ^{1/2}1 in. wide ring. The other end of the cylinder is welded to a 1" thick circular steel plate 24 in. in diameter. This forms the base that rests on the floor. Two equispaced ^{oval} holes about 12 in. wide x 24 in. long ~~with rounding ends~~ are flame cut into the sides of the 20 in. diameter cylinder to provide access to the bottom side of the ram base.

40. Control console: Standard Electronics rack.

41. Insulating disks: plastic, fiber reinforced, hard, electrical, 5 in. O. D. x ^{.025}0.030 in. thick, 4 ea. (for use beneath positioning ring and back-up block).

42. Fiber washers: # 10 screw size, flat, electrical insulating (for use with positioning ring). 1 box.

43. Washers: nickel or cadmium plated, # 10 screw size (for use in mounting positioning ring). 1 box.

44. Tie bars: 6 ea., stress proof (LaSalle Steel Co.), 100,000 psi minimum yield, to finish ^{4 in}3-1/4 in. diameter x ³⁷38 in. long.

45. Tie bar set screws: 12 ea, 1/2"-20 x 1/2" long, oval point.

46. Hydraulic oil: 10 gals, Enerpac premium. (Wichita Hydraulic Equip. Co., 314 W. Water St.)

~~Total weight of press (estimated): 5060 lbs.~~

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47. ① Electrical insul. sleeves \rightarrow $.248 \pm .002$ O.D. \times $.025 \pm .002$ wall \times $1 \pm .015$ long,
 (20 each) for placement within $\frac{1}{4}$ " holes in Positioner.
- 48 ② Cooling water inlet & outlet pipes, 8 each, stainless steel $.250 \pm .001$ O.D. \times about $.156$ I.D. \times $3\frac{1}{2}$ " long. Threaded one end $\frac{1}{4}$ -28 thd for $\frac{1}{2}$ " length
- ~~③ Connector for above pipes, 8 each,~~
- 49 ④ Keys, hard plastic laminate, 4 each, $.1865 \pm .0010$ wide \times $.219 \pm .005$ high \times $2.375 \pm .020$ " long. must be electrically insulating.
- 50 ⑤ Anvil Back-up block - Same as H.J. Hall drawing #1, Jan 30, 1962. 4 each.
- ~~⑥ Anvils 4 each $\frac{1}{2}$ " face, 4 each $\frac{3}{4}$ " face, 4 each 1" face according to H.J. Hall dwg of Sept 19, 1962 - No. shoulder or face modifications or hole.~~
- ~~⑦ Anvil Binding rings, 12 ea. same as McCartney dwg. no. C-545 August 7, 1963~~
- 51 ⑧ Electrical connector: 4 ea. of brass, $6\frac{1}{2}$ " O.D. \times 4 " I.D. \times $\frac{3}{4}$ " thick \times 2" wide
52. Welding Cable: 4 ea. No. 2, 6 ft long.

Total Press Weight (est.): 5060 pounds.