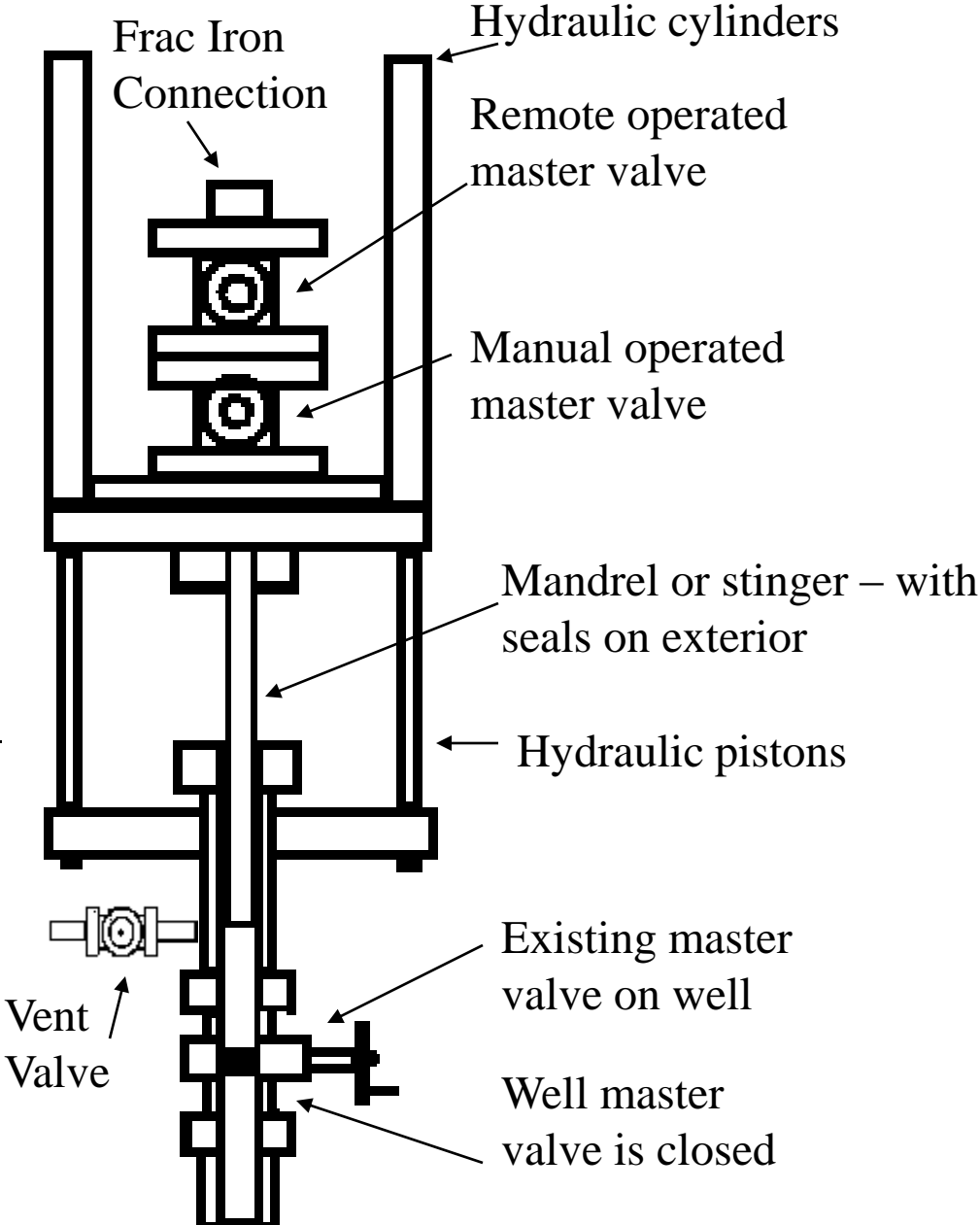


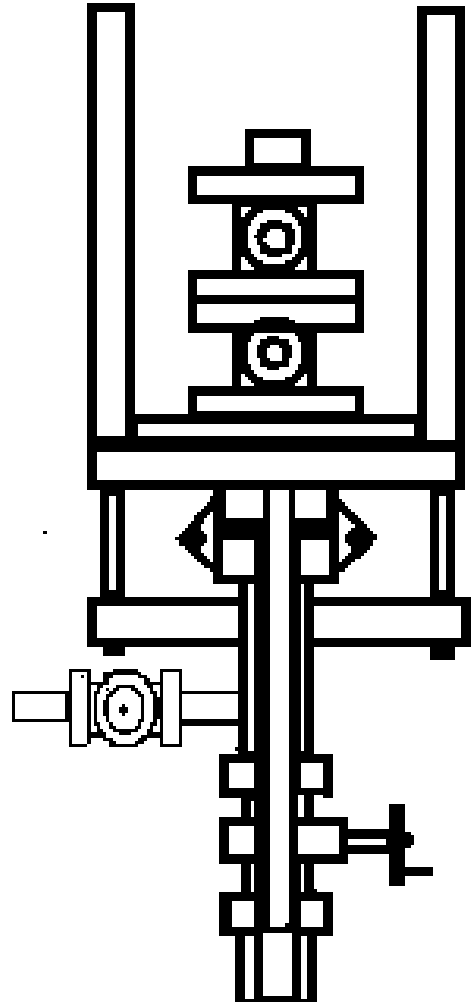
Special cases, continued

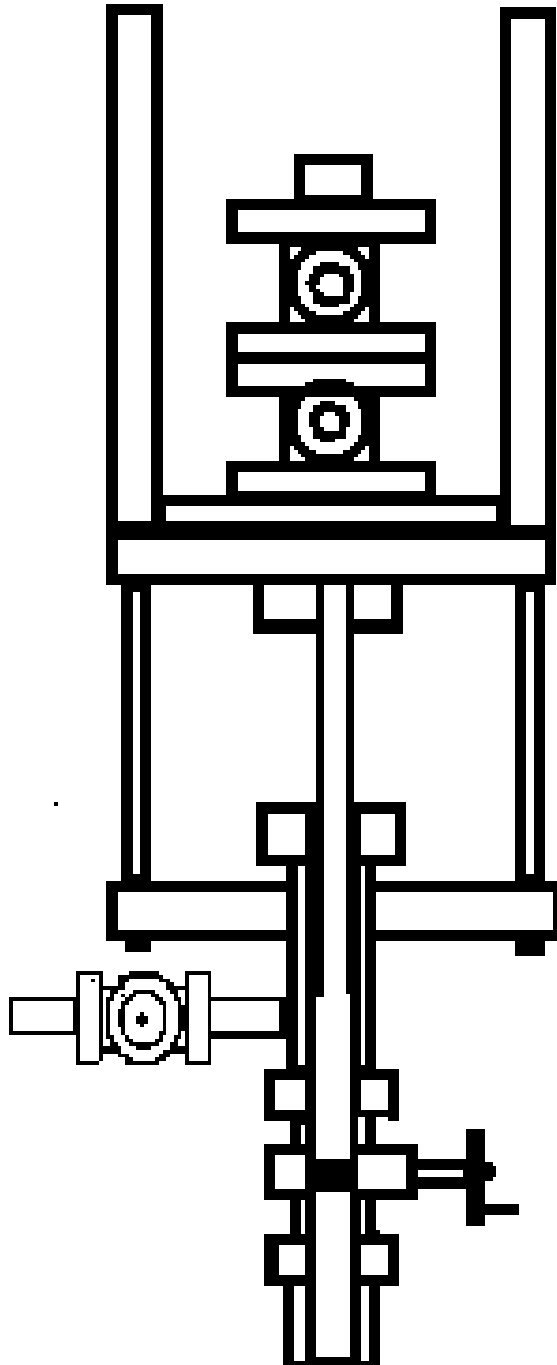
- Fracturing Tree Saver
 - Hydraulic deployment
 - Second set of valves – temporarily replaces wellhead valve control
 - Stinger with seal isolates and “locks-out” wellhead valves

Tree Saver – isolates existing wellhead with hydraulically deployed stinger with external seals and second set of valves.

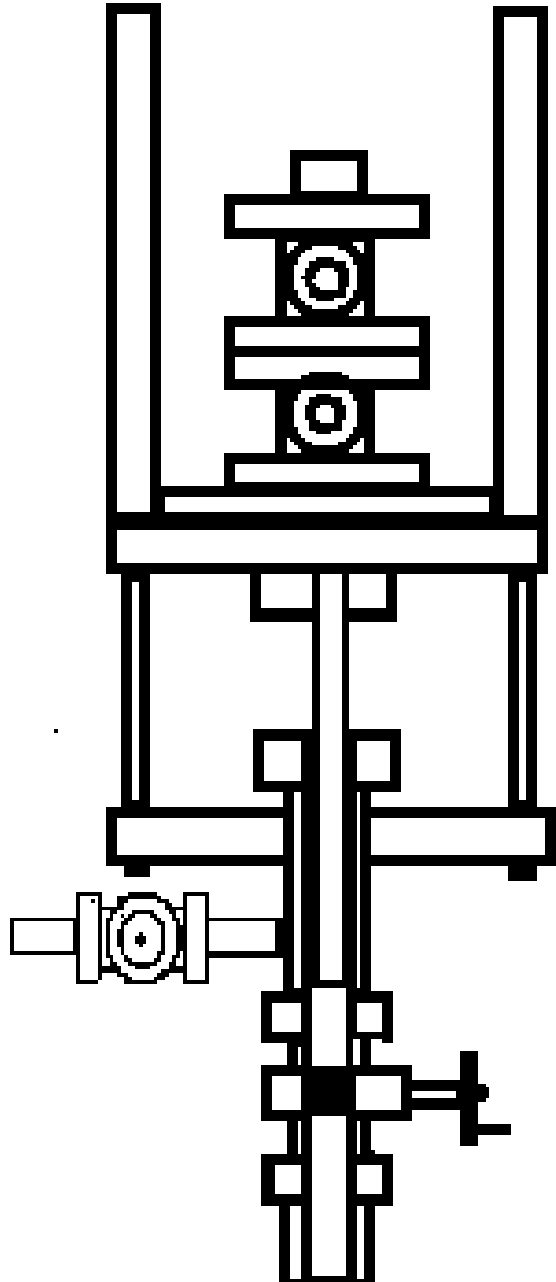


Tree saver inserted and locked down.

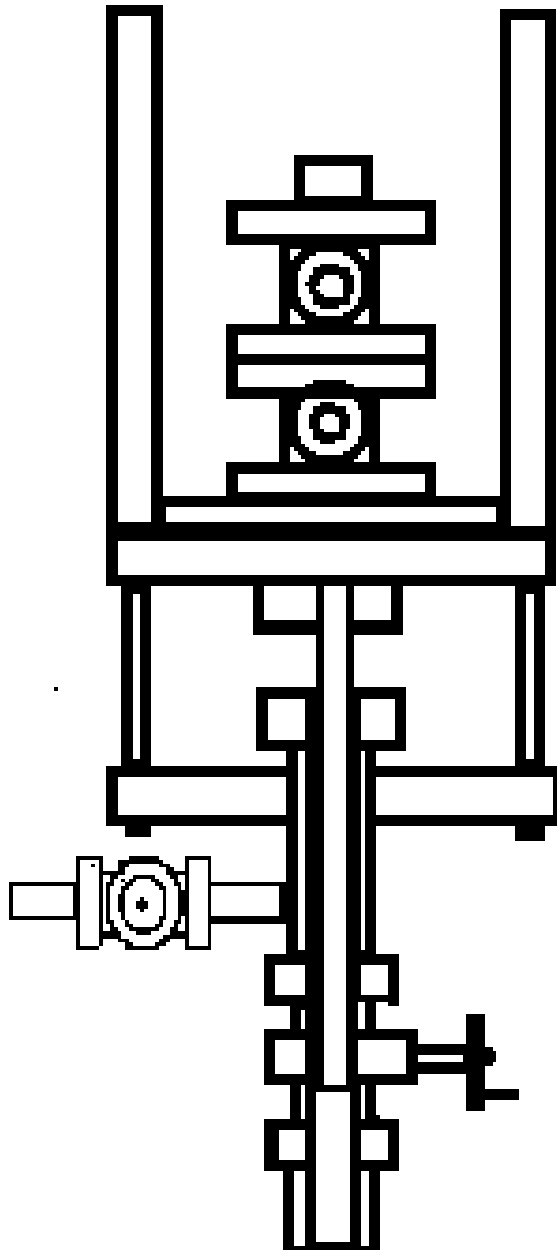




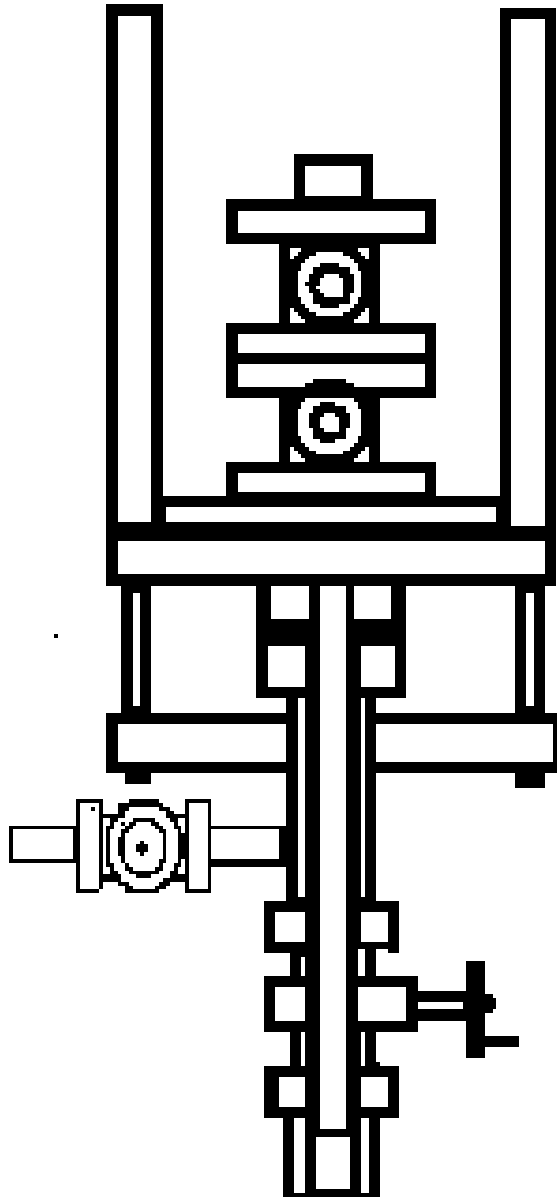
Tree saver at the start of the insertion. Wellhead master valve is closed. Side vent valve or both upper valves are open to prevent hydraulic lock.



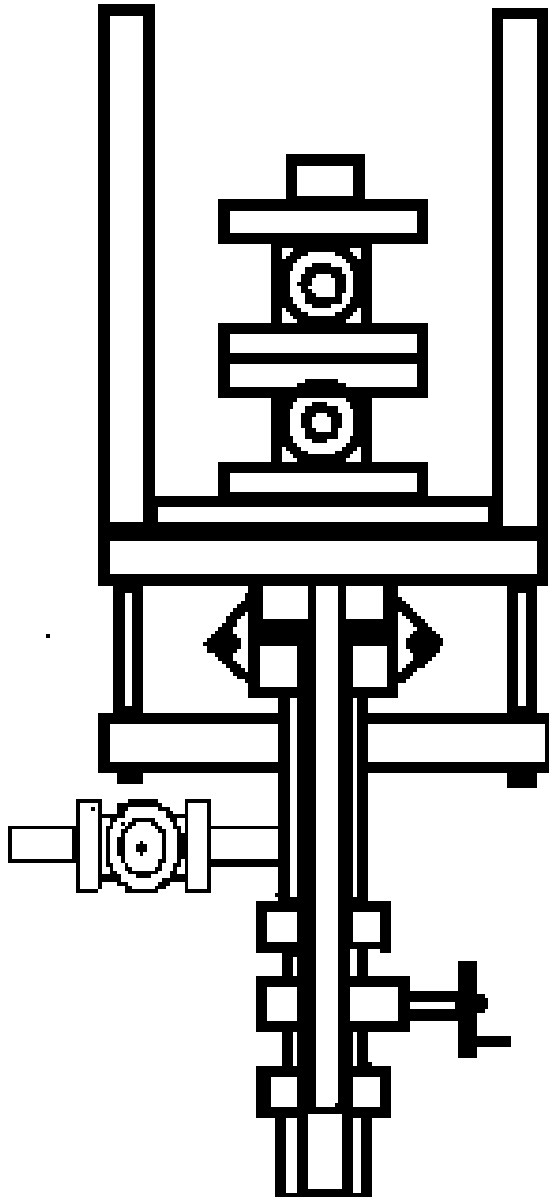
Tree saver being inserted.
Well head master valve is
opened as stinger approaches.
Stinger must be beyond side
vent valve before opening
side vent valve.



Tree saver being inserted



Tree saver is fully inserted.
Hydraulic cylinders maintain
down force.



Tree saver inserted and locked down. Vent valve is open to prevent trapped annular pressure.

Tree Savers

- Reasons to run a tree saver?
 - Protects existing wellhead from high treating pressures (for example, frac pressures of 5,000 psi on a 2,000 psi tree).
 - Protects existing wellhead from contact with corrosive fluids.
 - Protects existing wellhead from abrasion and erosion of fracturing slurries.