

BENCH DRILL

The figure shows a Bench Drill. The motor shaft carries a stepped sheave (not shown) which is linked to the spindle sheave (shown) through a V-Belt. Spindle feed is controlled by rotating the handle which turns the pinion meshing with the rack thereby causing the latter to descend as required.

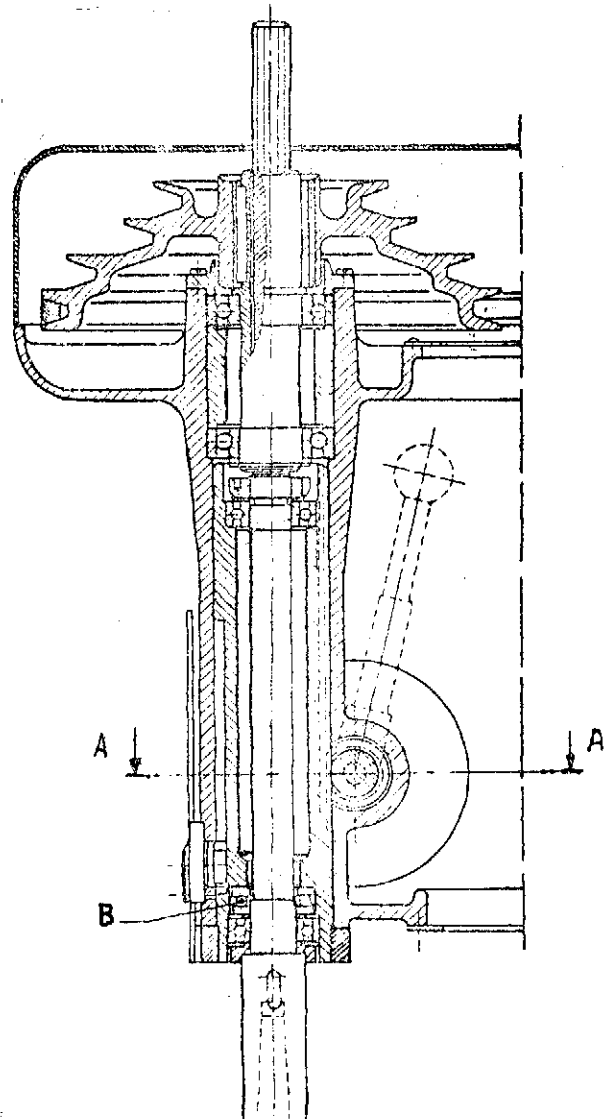
* Given Data :

The motor Power : 0.6 KW
Motor Speed : 1440 RPM
Maximum Thrust Force : 4 KN
Spindle Speeds in RPM : 500, 1000, 2000, 4000 .

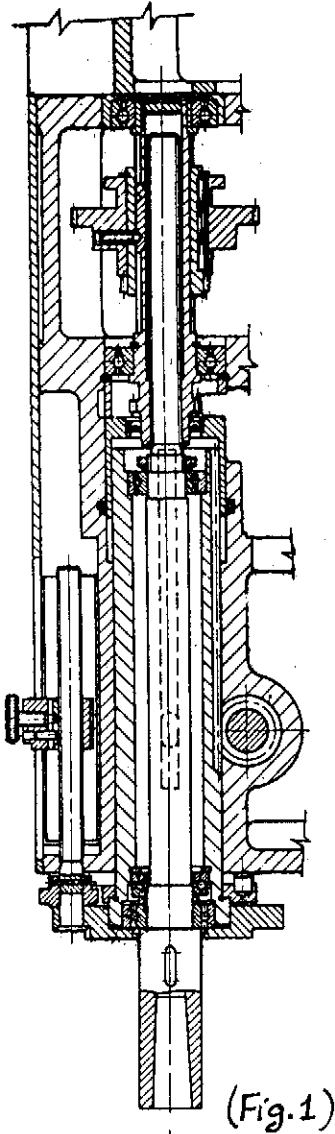
* Requirements :

1. Detailed design calculation of the *Spindle* taking rigidity into consideration .
2. Detailed design calculation of the *Pinion* .
3. Selection of the proper *Thrust Bearing* in position (B) .
4. Selection of the *V-Belt* for the power transmission .
5. Submit a full constructional drawing for the shown figure and a sectional view at A-A .
6. Submit complete working drawings of the components used including tolerances, surface roughness and all necessary specifications .

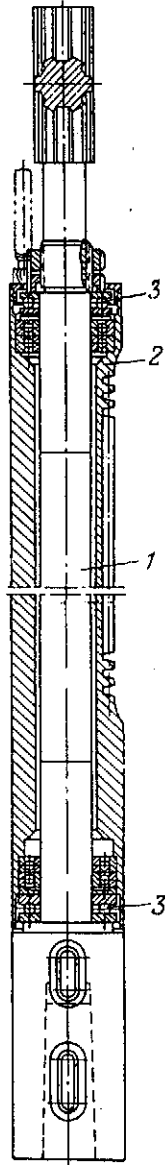
Assume Any Missing Data



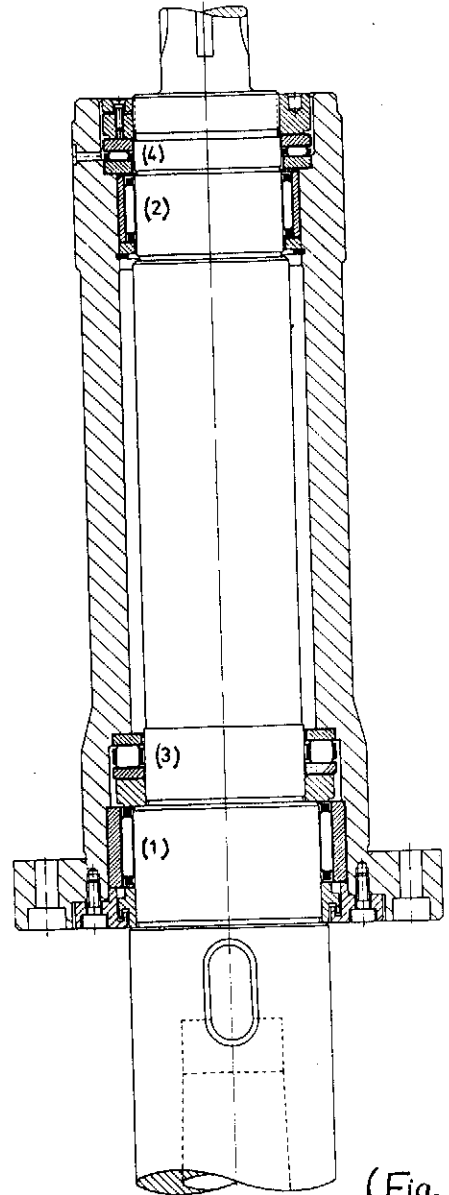
EXAMPLES OF DRILLING MACHINE SPINDLES



(Fig. 1)



(Fig. 2)



(Fig. 3)

(Fig. 2)

1. Spindle
2. Quill
3. Ball or Roller thrust Bearings

Selection of Fits : (Fig. 3)

- | | |
|---------|-----------------|
| (1 & 2) | Shaft : $n 4$ |
| | Housing : $H 7$ |
| (3) | Shaft : $h 6$ |
| | Housing : $H 7$ |
| (4) | Shaft : $j 6$ |
| | Housing : $H 7$ |