FIG. 1a

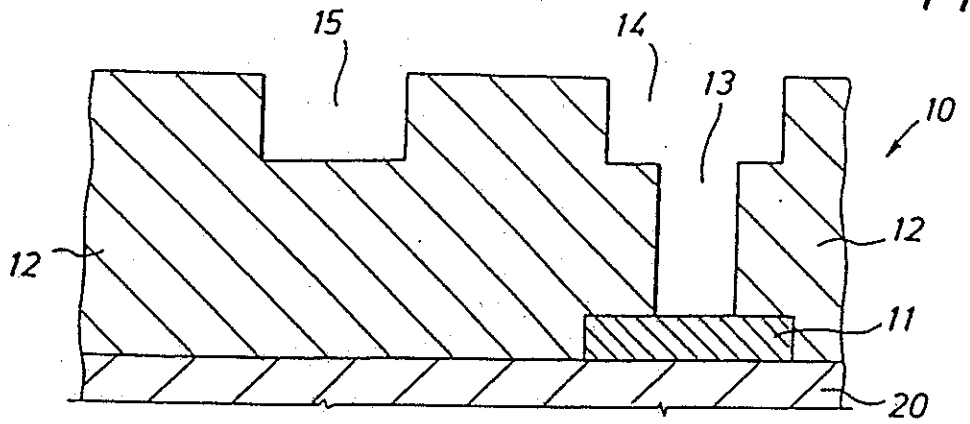


FIG. 1b

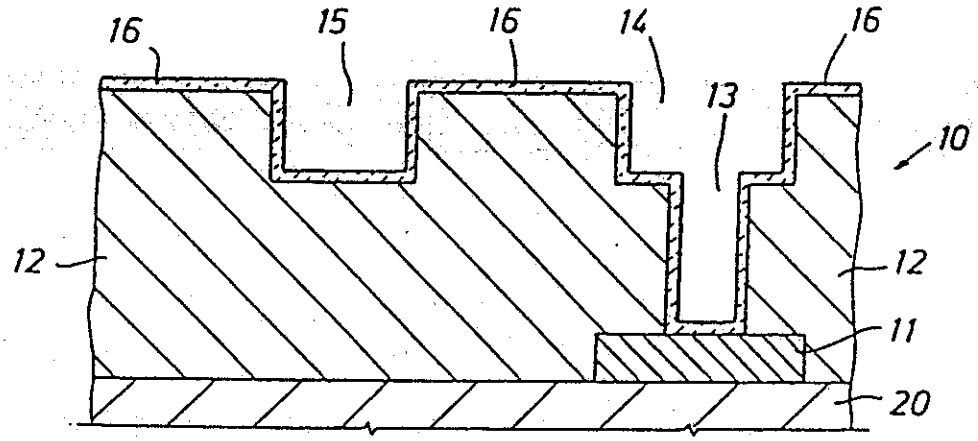


FIG. 1c

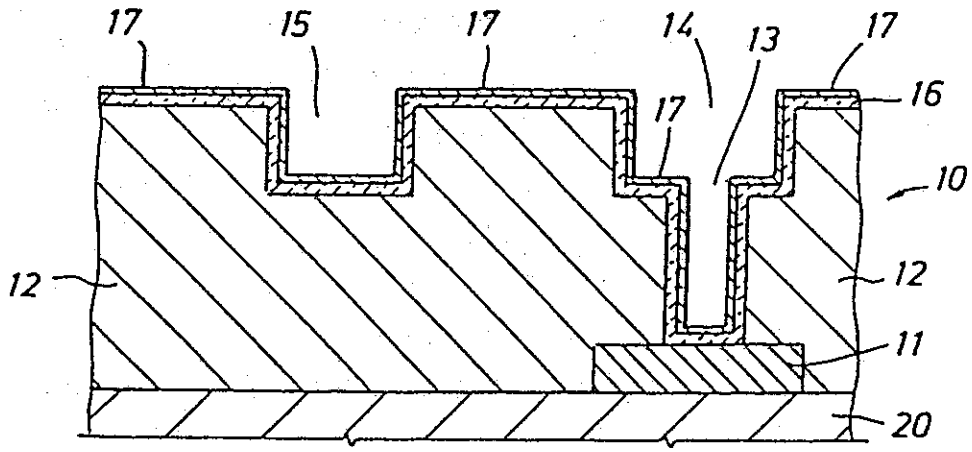


FIG. 1d

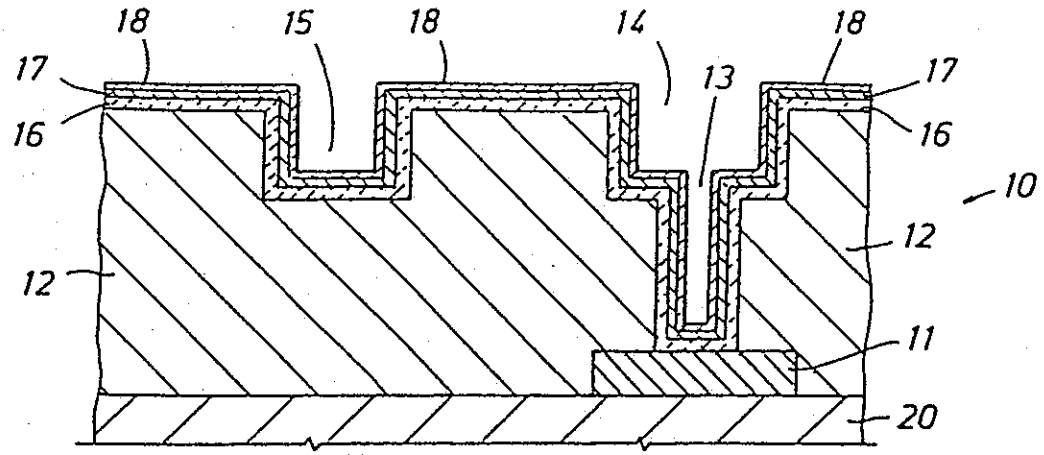


FIG. 1e

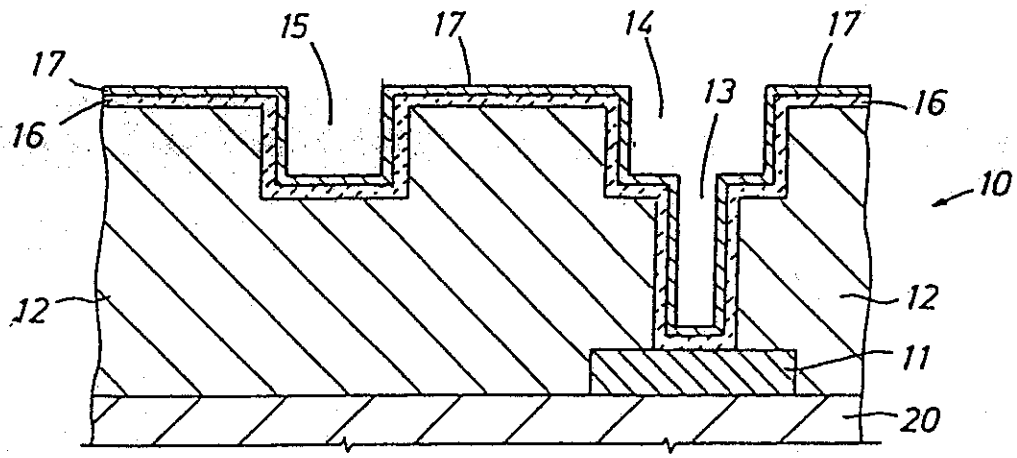
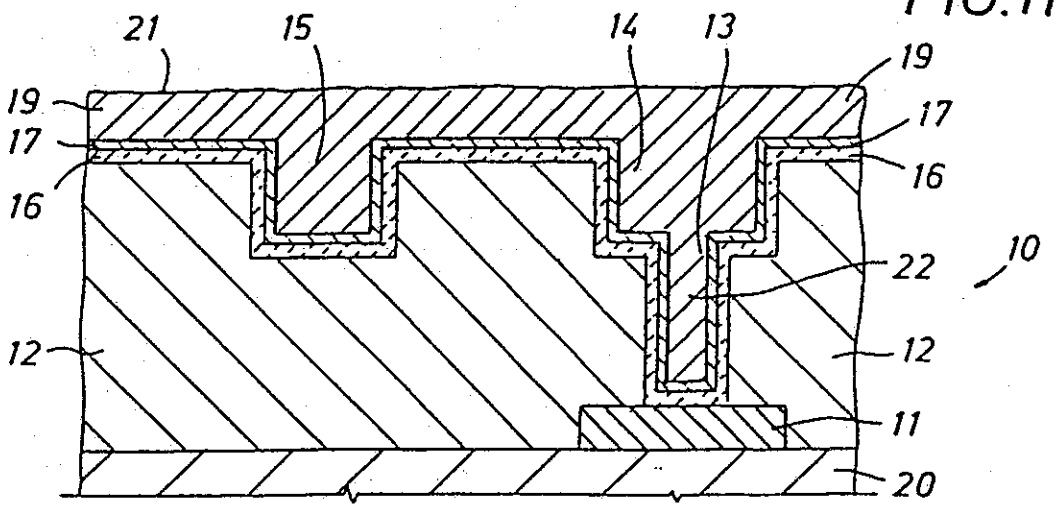


FIG. 1f



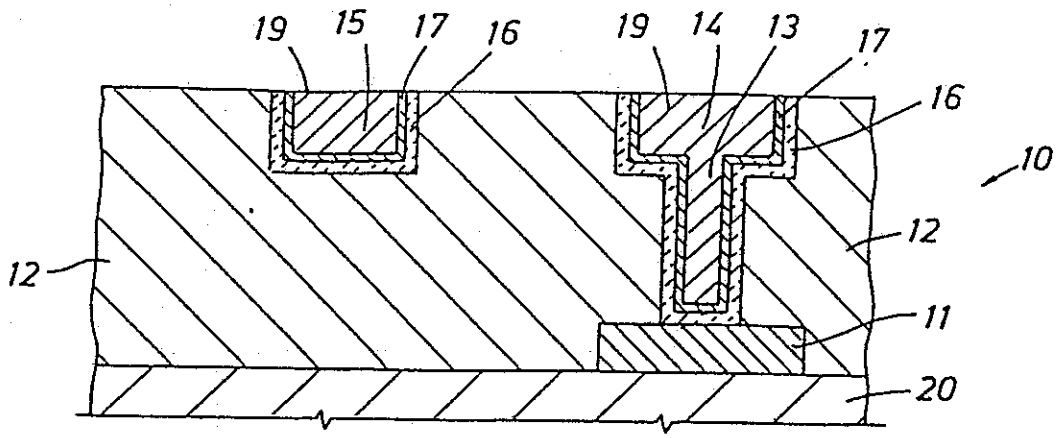


FIG. 1g

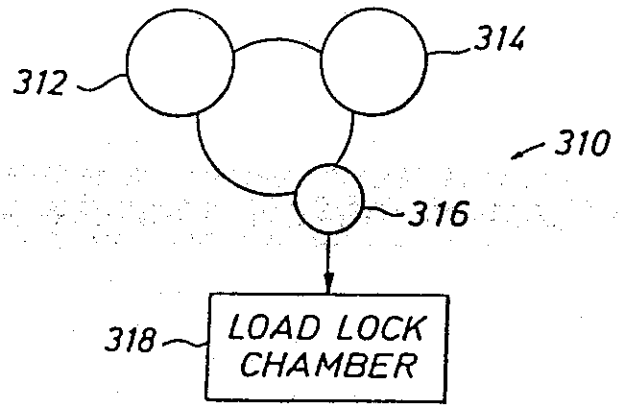


FIG. 3a

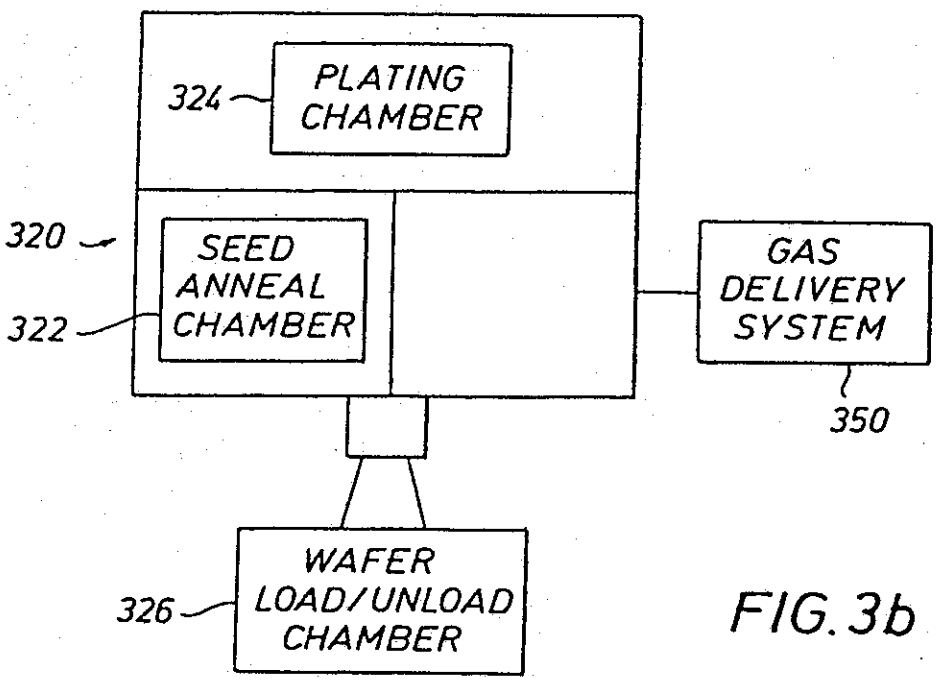


FIG. 3b

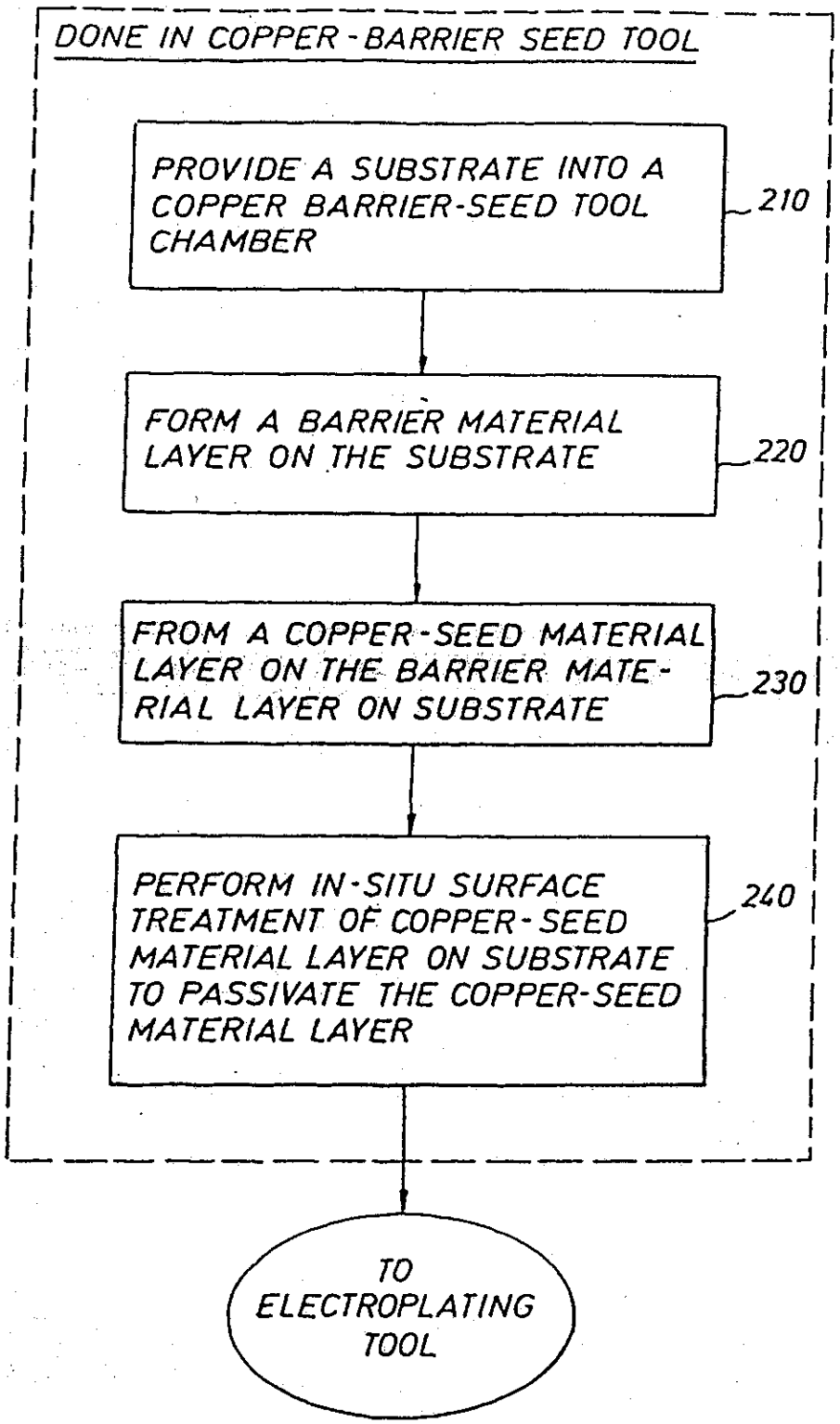
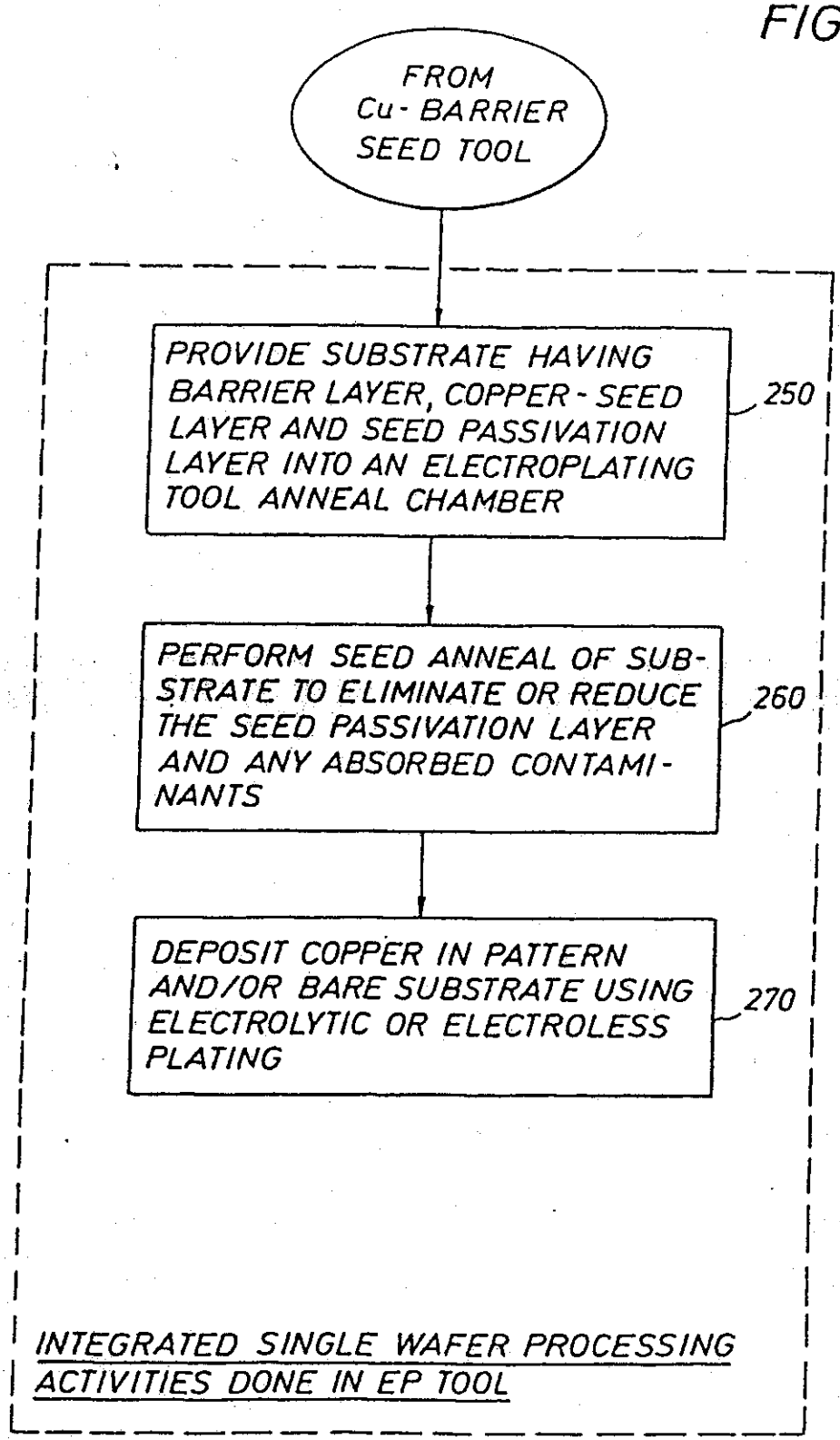

DONE IN COPPER-BARRIER SEED TOOL
PROVIDE A SUBSTRATE INTO A COPPER BARRIER-SEED TOOL CHAMBER
210
FORM A BARRIER MATERIAL LAYER ON THE SUBSTRATE
220
FROM A COPPER-SEED MATERIAL LAYER ON THE BARRIER MATERIAL LAYER ON SUBSTRATE
230
PERFORM IN-SITU SURFACE TREATMENT OF COPPER-SEED MATERIAL LAYER ON SUBSTRATE TO PASSIVATE THE COPPER-SEED MATERIAL LAYER
240
TO ELECTROPLATING TOOL

FIG. 2a

FIG. 2b


FROM Cu-BARRIER SEED TOOL
PROVIDE SUBSTRATE HAVING BARRIER LAYER, COPPER-SEED LAYER AND SEED PASSIVATION LAYER INTO AN ELECTROPLATING TOOL ANNEAL CHAMBER
250
PERFORM SEED ANNEAL OF SUBSTRATE TO ELIMINATE OR REDUCE THE SEED PASSIVATION LAYER AND ANY ABSORBED CONTAMINANTS
260
DEPOSIT COPPER IN PATTERN AND/OR BARE SUBSTRATE USING ELECTROLYTIC OR ELECTROLESS PLATING
270
INTEGRATED SINGLE WAFER PROCESSING ACTIVITIES DONE IN EP TOOL