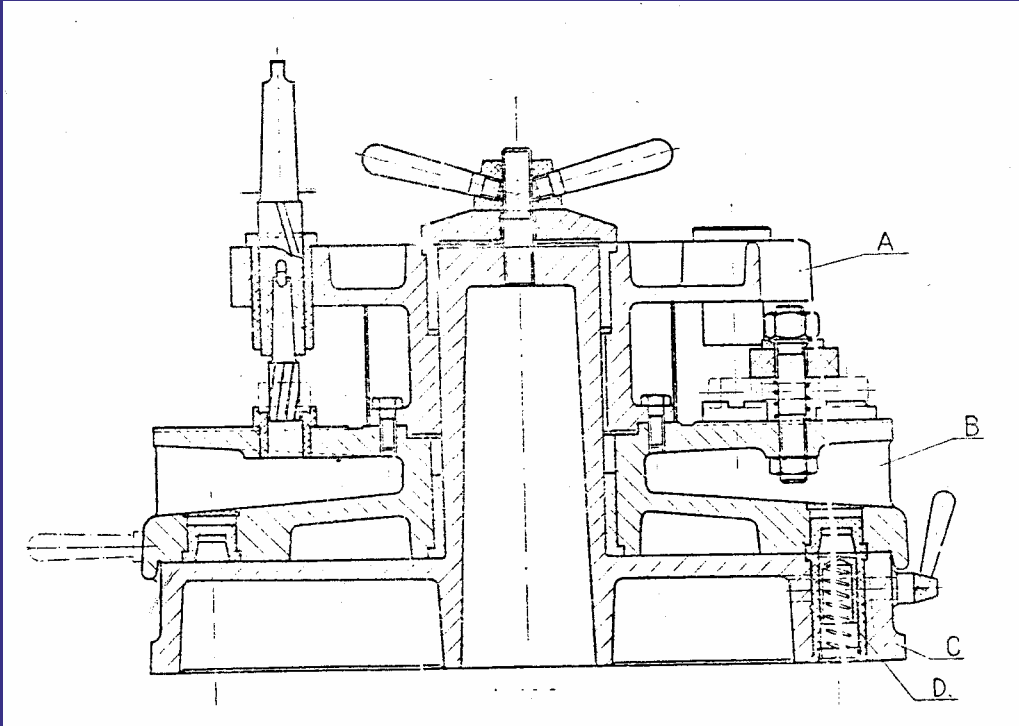


Talaşlı Seri İmalat Teknolojisinde
APARAT
ve
BAĞLAMA TASARIMLARI
(Jig and Fixture)
Endüstride Uygulanmış Örnekleri ile



COŞKUN KIRMIZI

APARAT VE BAĞLAMA TASARIMLARI

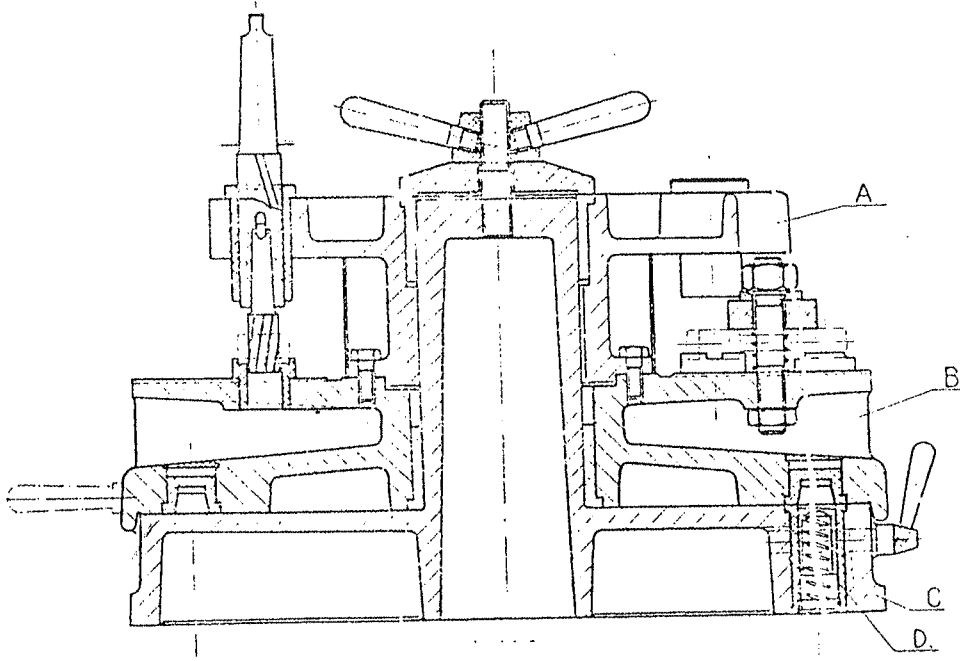
Konusu;

Bu eser talaşlı seri imalatta kullanılan aparat ve delme kalıplarından operasyonel örneklerle okuyucuya kılavuzluk edecek ve difüzyon yaratacak niteliğindedir.

Ayrı bazı bağlama elemanları çizim ve ölçüleriyle imalatın standartlaşmasında yardımcı olacaktır.

Coşkun KIRMIZI

Talaşlı Seri İmalat Teknolojisinde
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Coşkun KIRMIZI

ÖNSÖZ

Gelişen Türkiye'mizin endüstri sahasında son yıllarda katettiği ilerleme, küçümsenmeyecek boyutlarda ve hızda olmuştur. Endüstrinin önemli bir sahasında makina imalatı olup, bu sahada seri imalatın fevkalâde şekilde desteklenmeside teknik dökümana dayanmaktadır.

Bugünkü ortamda yabancı dildeki bir eserin teminindeki güçlük, pahalılığı ve ayrıca yazıldığı lisana vakıf olmakta oldukça büyük çabayı gerektirmektedir.

Hazırlamış olduğum bu eser; seri imalatta kullanılan aparatlardan örneklerle, teknik elemana bir görüş vererek yeni hazırlayacağı aparatlara teknik yönde kılavuz edecek karakterdedir. Ayrıca bu aparatlardaki temel elemanların resim ve ölçülerle verilmeside zaman kazandırıp belirli bir standard'ın oluşmasına yol açacaktır.

Bu eserin endüstriye sağlayacağı fayda, emeklerimin karşılığı olarak beni mutlu edip, sevindirecektir.

Saygılarımla,

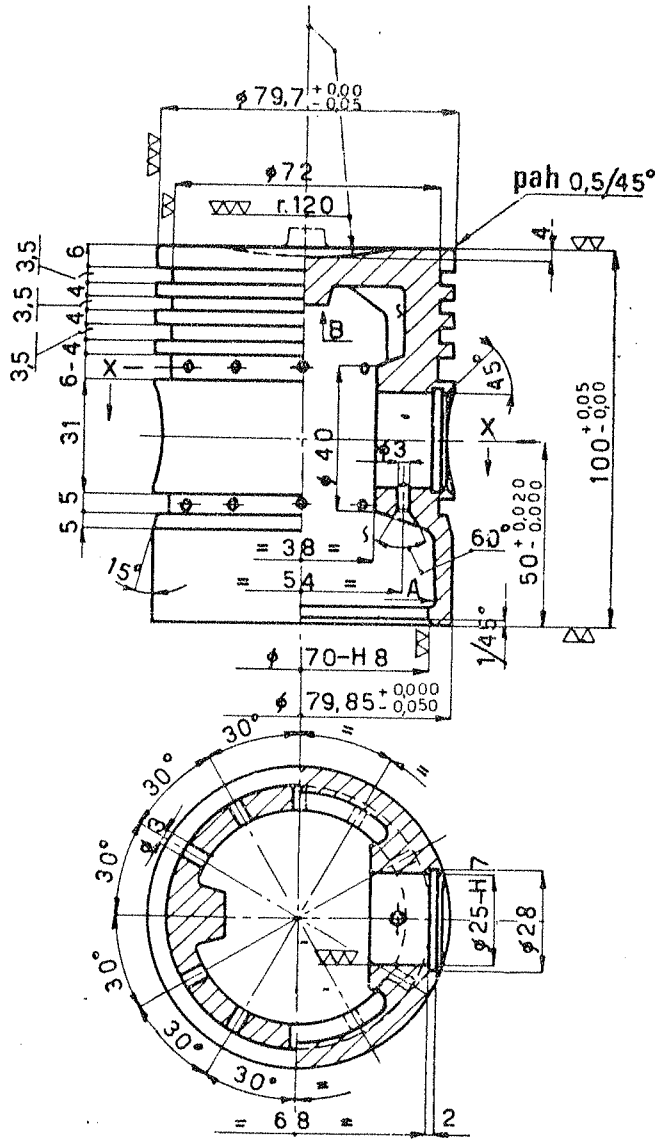
COŞKUN KIRMIZI

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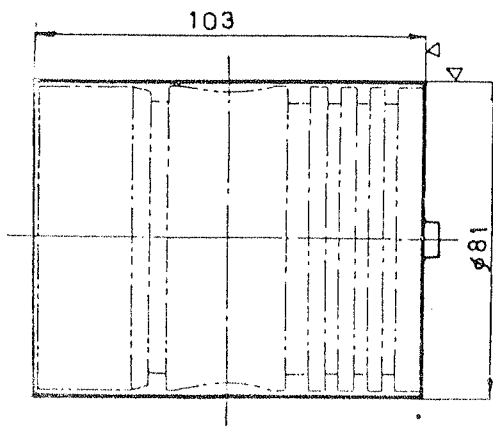
SERİ ÜRETİMDE APARATLAR



X-X Kesiti

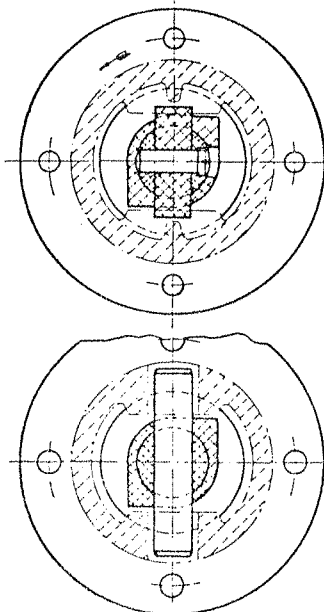
İmali istenen motor pistonu

X-X Kesiti

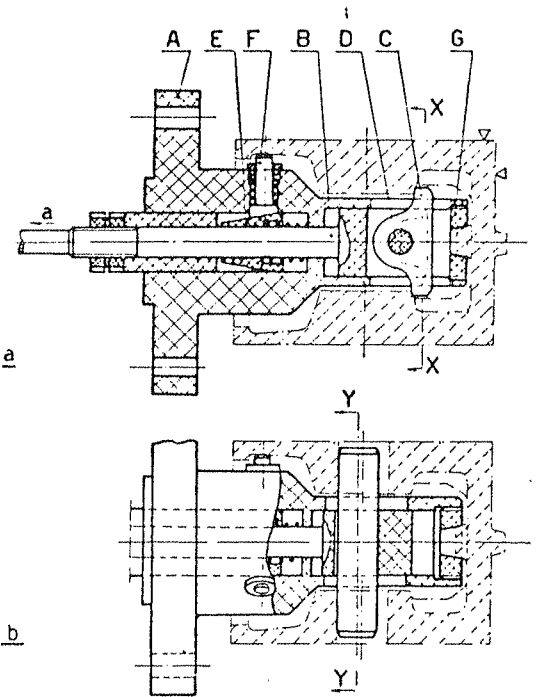


1. OPERASYON

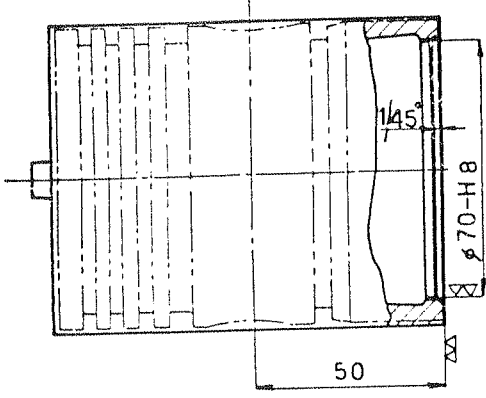
Ø 81 mm ye tornalama



Y-Y Kesiti

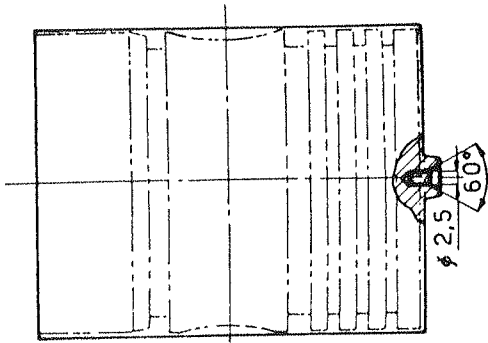
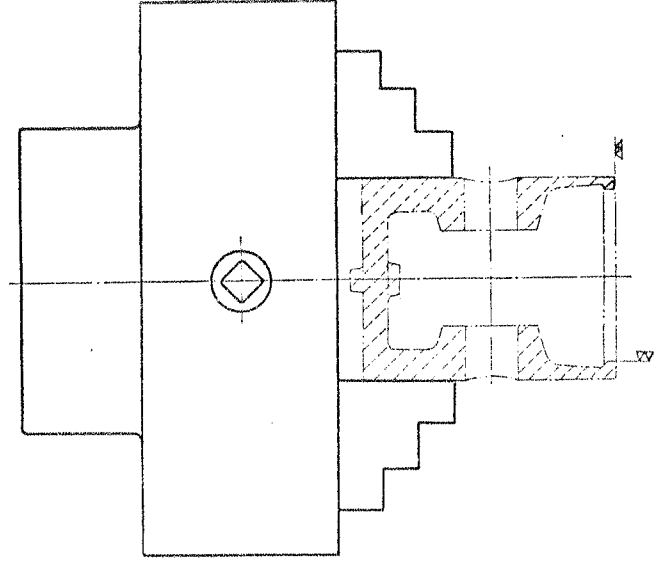


Tornalama Aparatı



2. OPERASYON

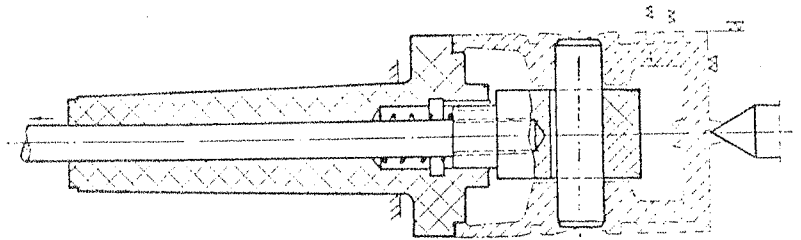
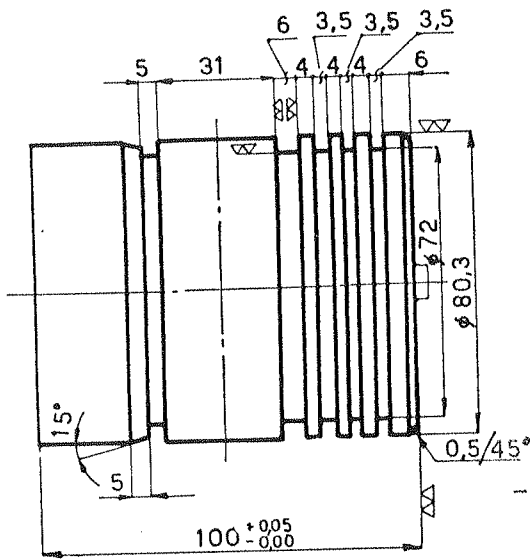
Alın tornalama , $\emptyset 70 H8$ ve pah



2. ve 3. Operasyonlar torna aynasında yapılacaktır.

3. OPERASYON

Punta deliği delme

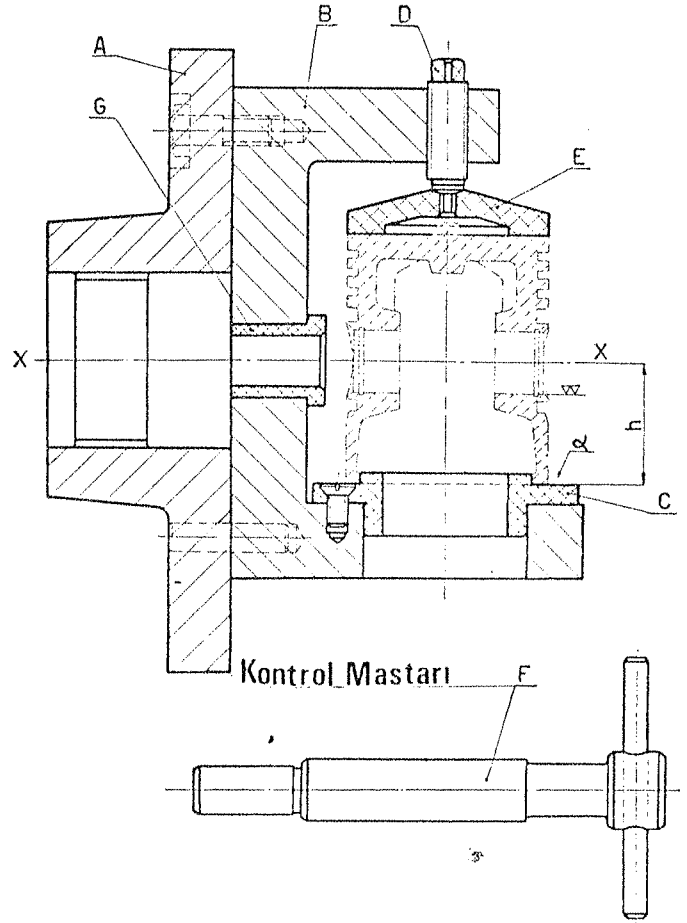
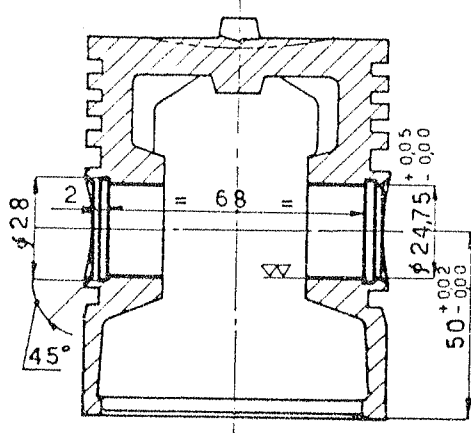


Kullanılan mandren

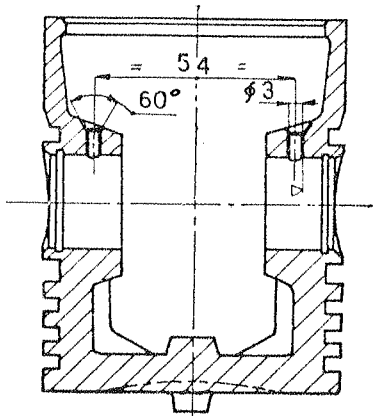
4. OPERASYON

$\emptyset 80,3$ Ölçüsü, segman kanalları ve boy ölçüsünün tornalanması.

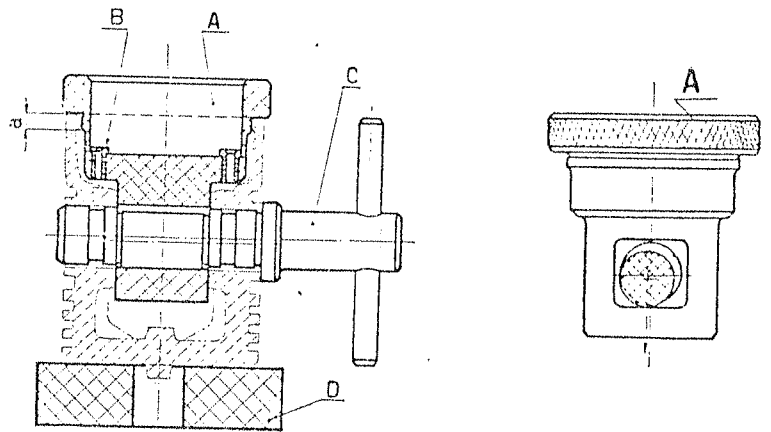
A ve B parçaları G G 22
 C, F, G .. Ç 1010
 D .. Ç 1020
 E .. Ç 1050 malzemesinden
 yapılmıştır.

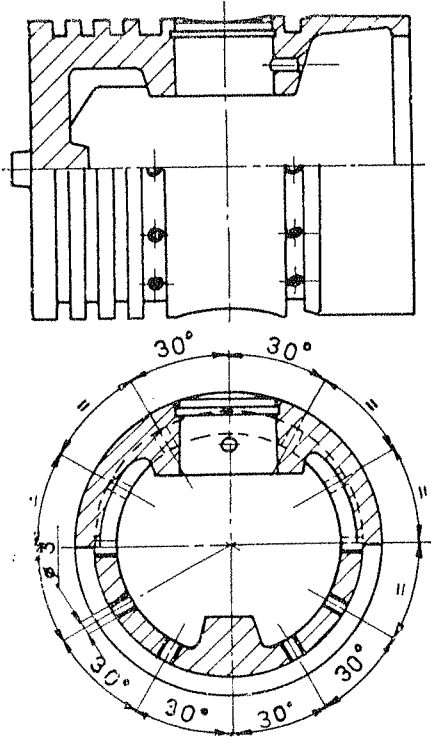


5. OPERASYON
 Perno deliğinin tornalanması



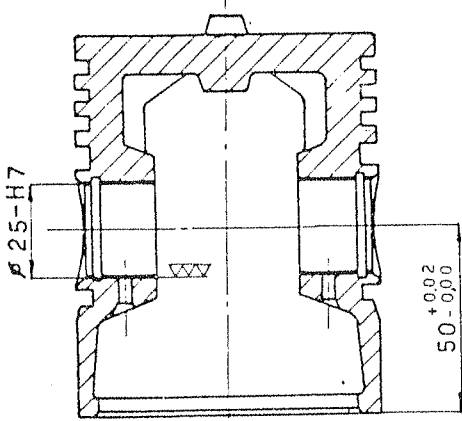
6. OPERASYON
 Ø 3 mm deliğinin delinmesi



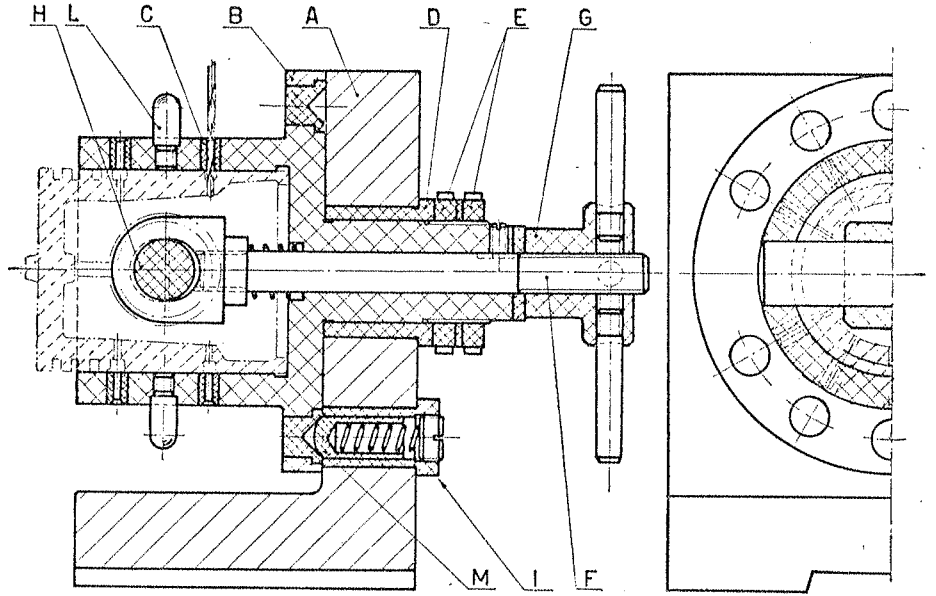


7. OPERASYON
30° Aralıklı deliklerin delinmesi

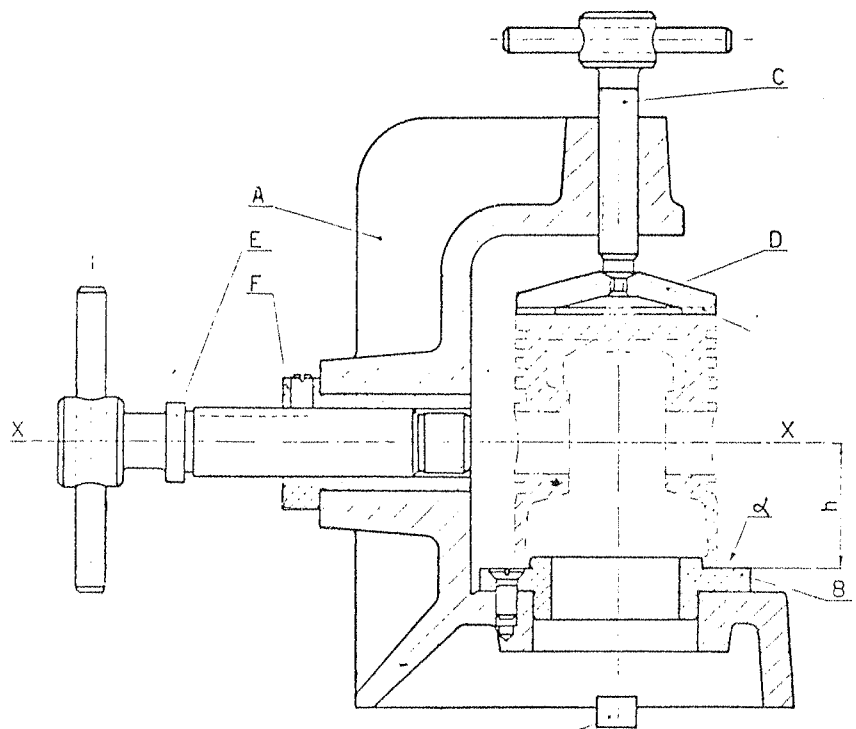
8. OPERASYON
Delik çapakların alınması



9. OPERASYON
Perno deliğinin hassas ölçüsünde işlenmesi

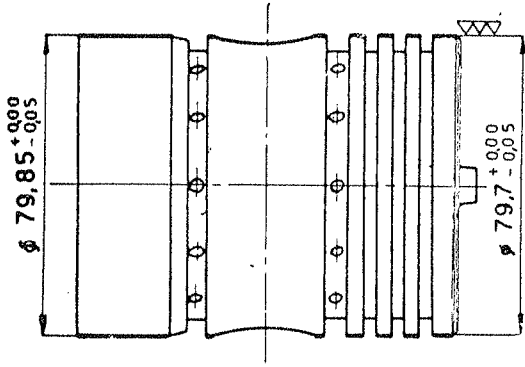


İNDEKS TİPİ DELME APARATI



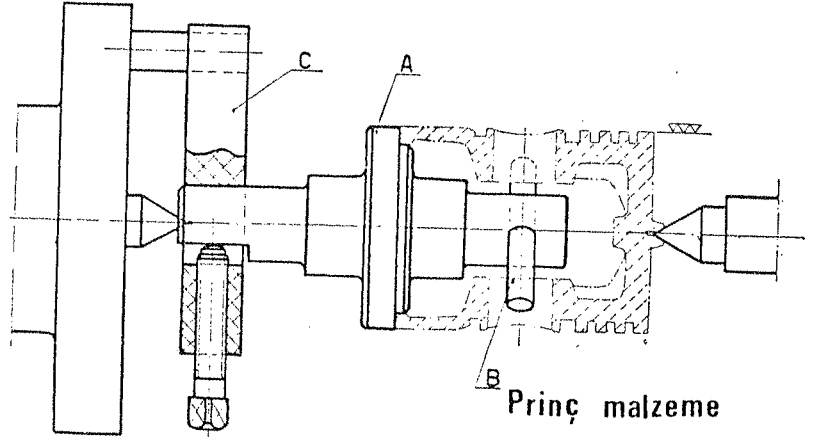
Hizalama kaması

TORNA TEZGAHINA BAĞLANAN DELİK İŞLEME
APARATI

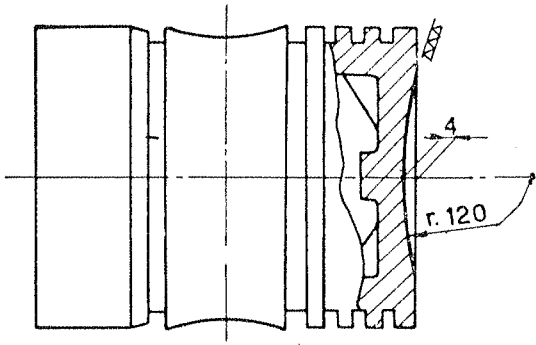


10. OPERASYON

Dış çap ölçüsünün işlenmesi



ÖZEL MANDREN



11. OPERASYON

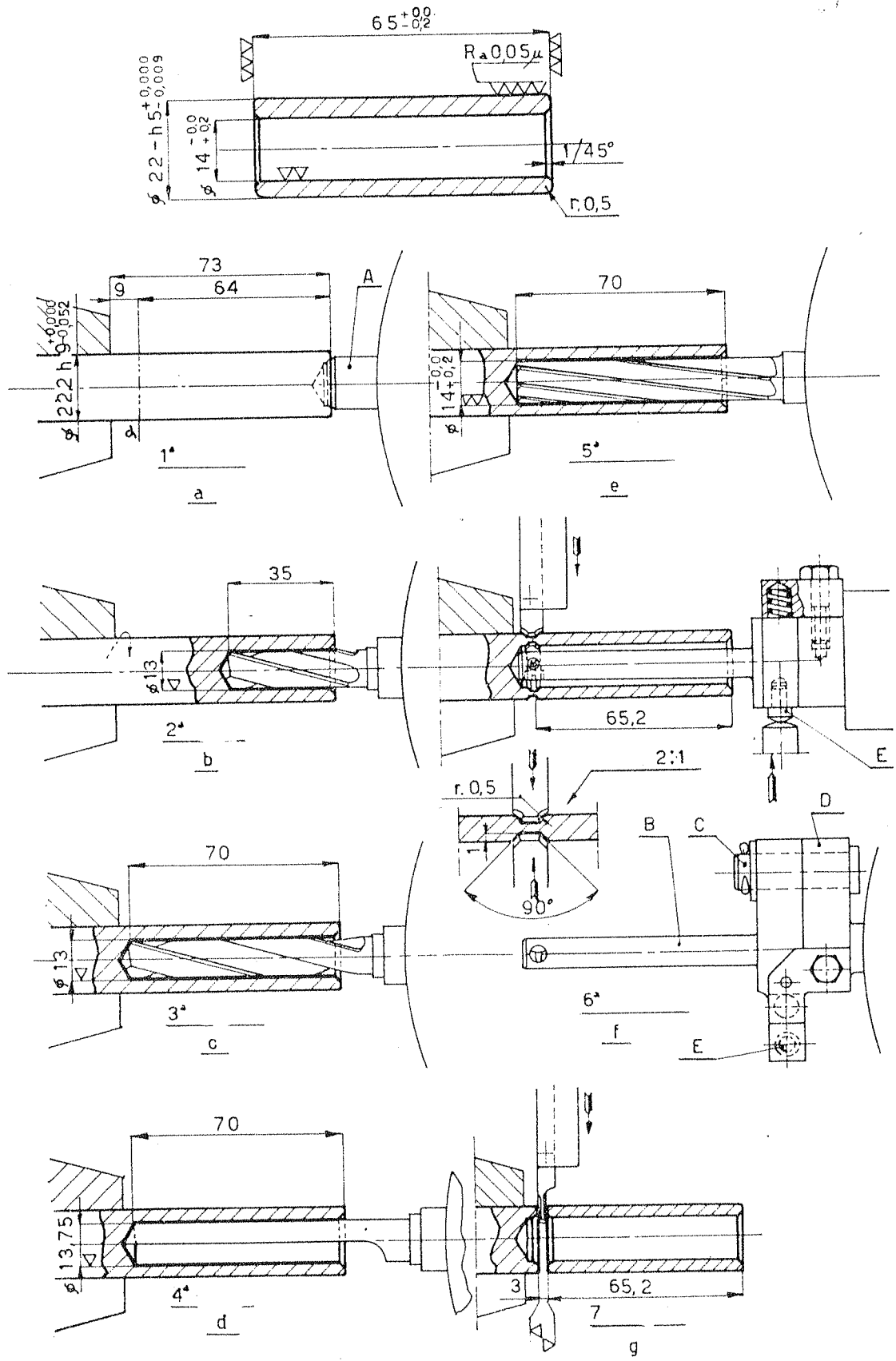
Alın konkav yüzeyinin işlenmesi

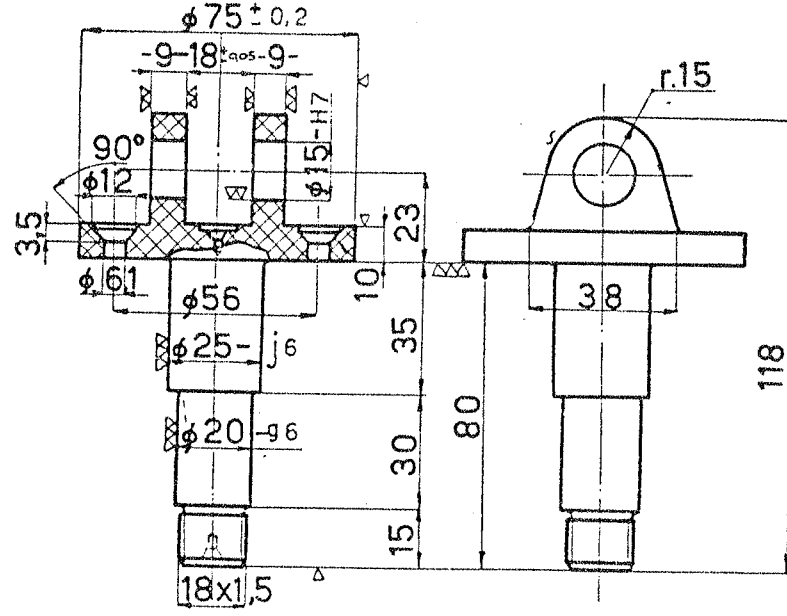
BU İŞLEM İÇİN 4. OPERASYONDA KULLANILAN MANDREN KULLANILACAKTIR.

12. OPERASYON

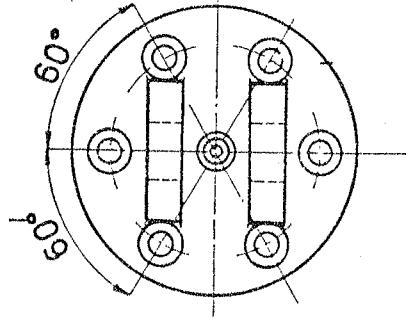
Kalite Kontrol

PİSTON PERNOSUNA AİT OPERASYON SIRASI



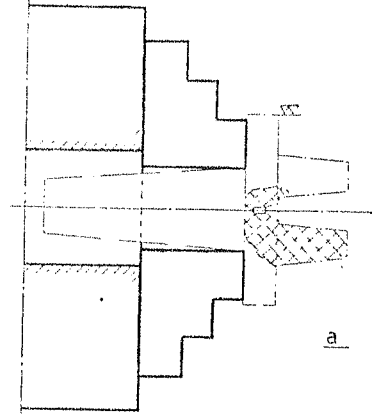
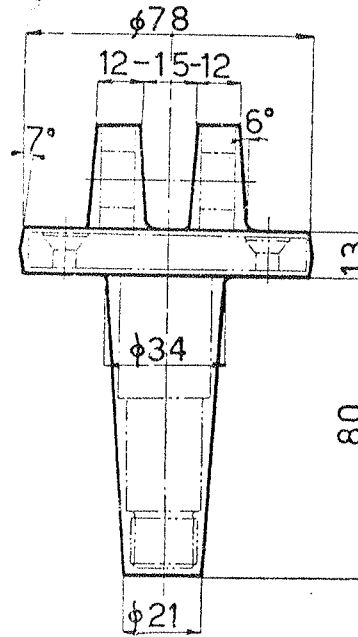
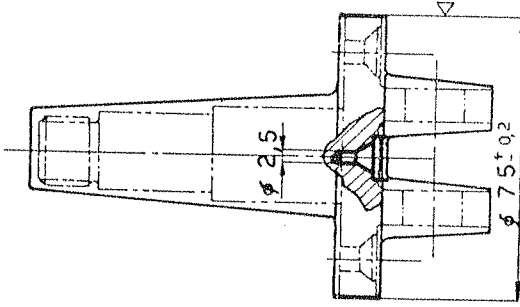


Malzeme: Ç.1020
İmalat sayısı: 10000



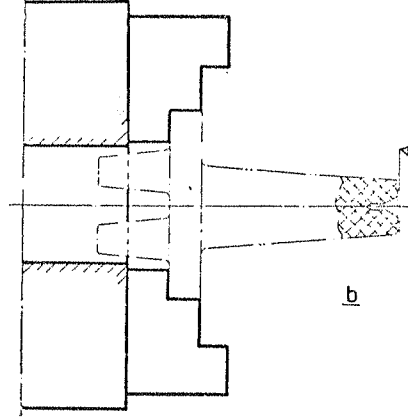
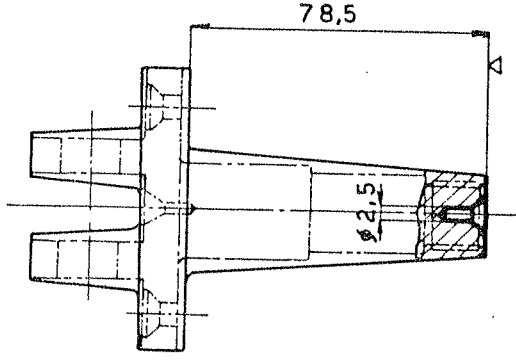
İMALATI İSTENEN PERNOLU ÇATAL

Dövülmüş taslak



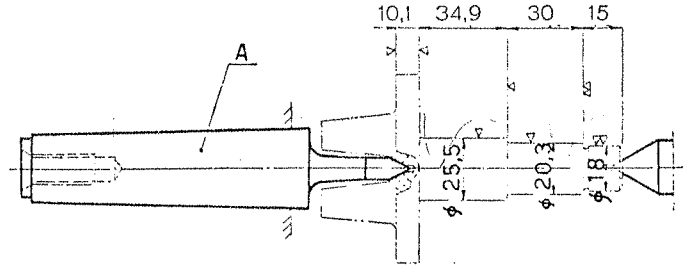
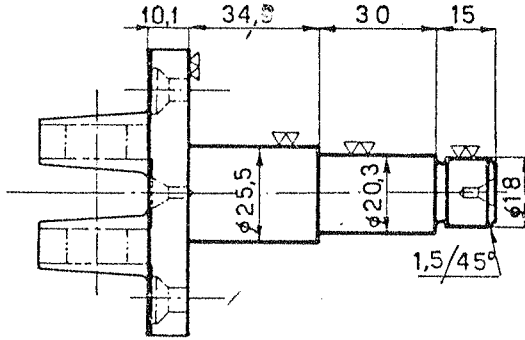
1. OPERASYON

Flanş çapının tornalanması ve punta deliğinin delinmesi.



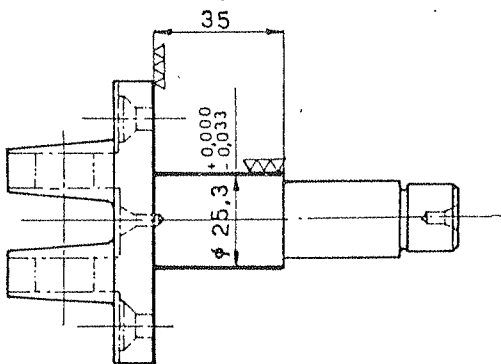
2. OPERASYON

Alın tornalama ve punta deliğinin delinmesi



3. OPERASYON

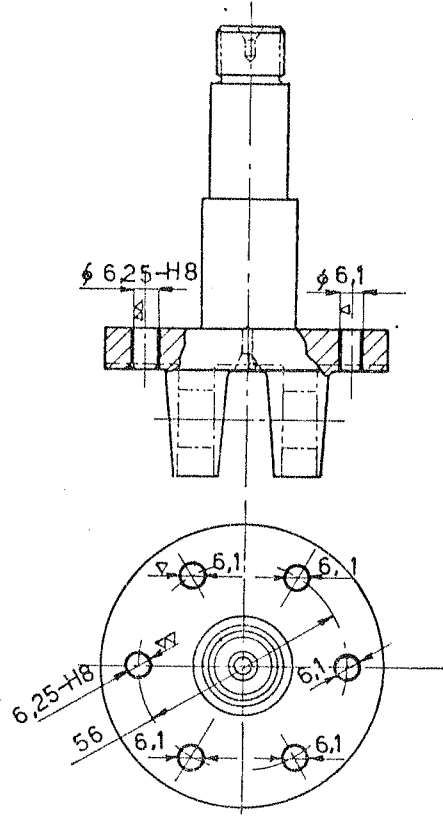
Komple profilin tornalanması



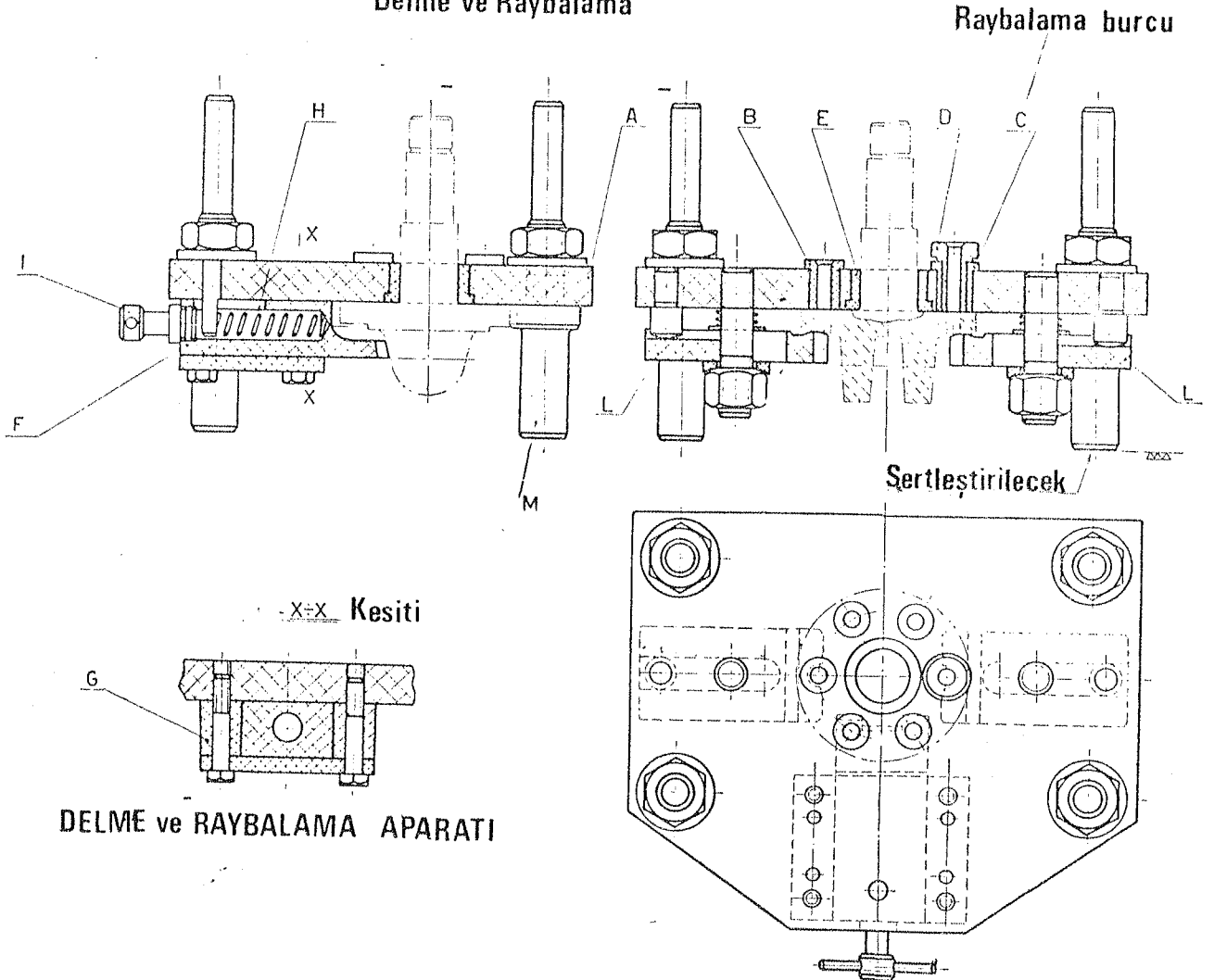
faşlama tezgahında A sabit puntası kullanılacaktır.

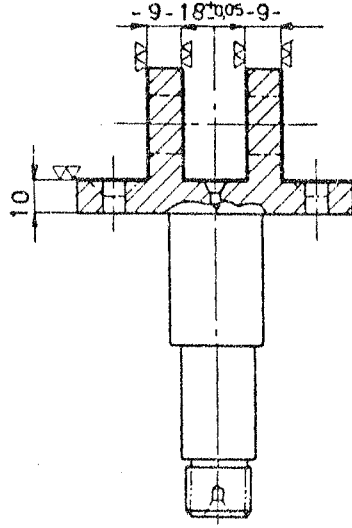
4. OPERASYON

Flanş iç yüzeyi ve büyük çapın taşlanması



5. OPERASYON
Delme ve Raybalama

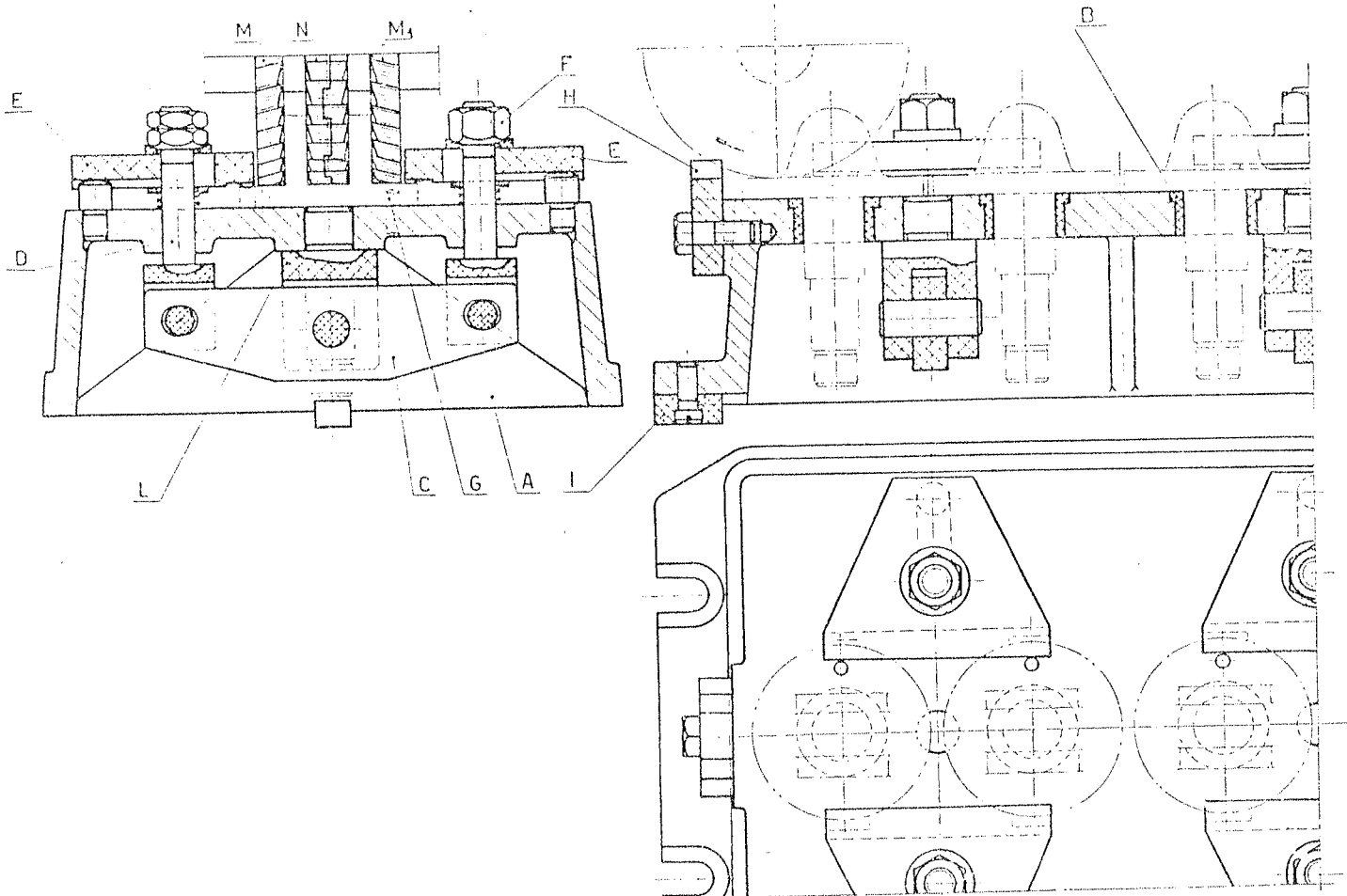


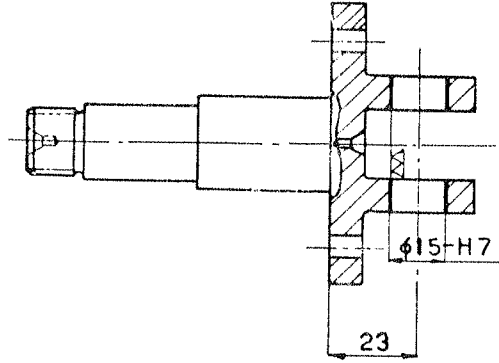


6. OPERASYON

Çatal iç ve yan yüzey yüzeylerinin frezelenmesi

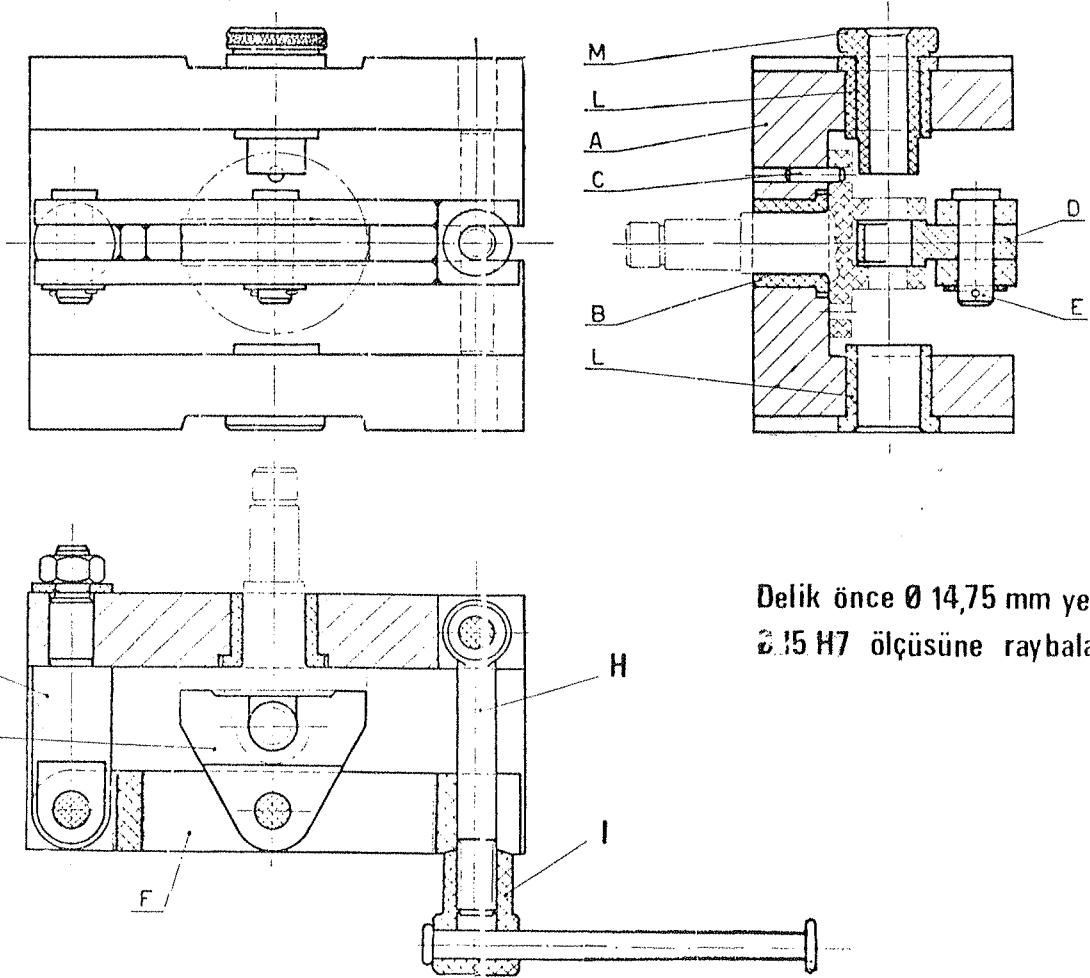
ÇOKLU FREZELEME APARATI





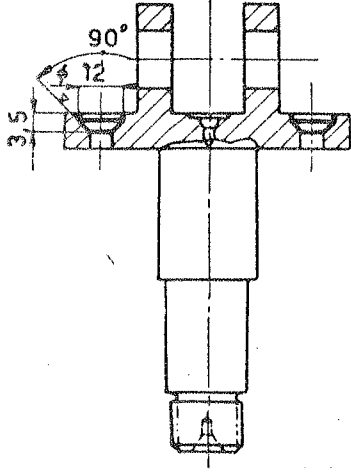
7. OPERASYON

$\phi 15 H7$ Deliginin delinmesi



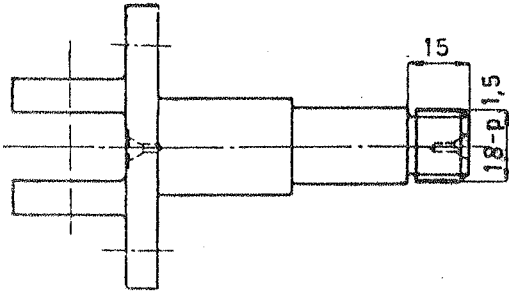
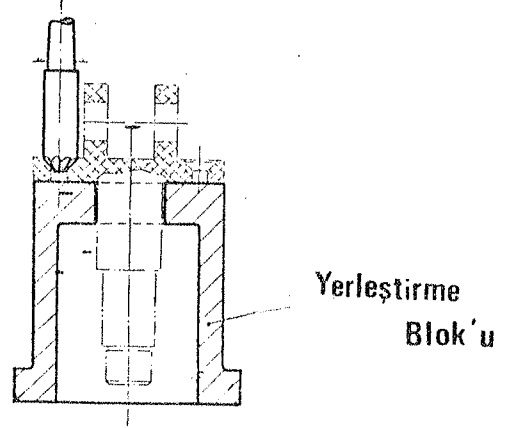
Delik önce $\phi 14,75$ mm ye delinip sonra $\phi 15 H7$ ölçüsüne raybalanır.

DELME ve RAYBALAMA APARATI



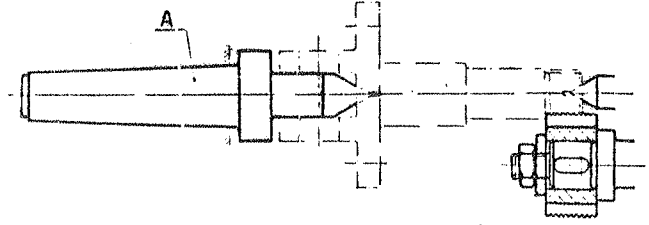
8. OPERASYON

Havşalama

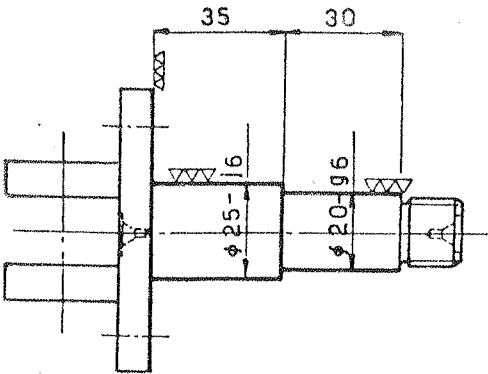


9. OPERASYON

Vida çekme

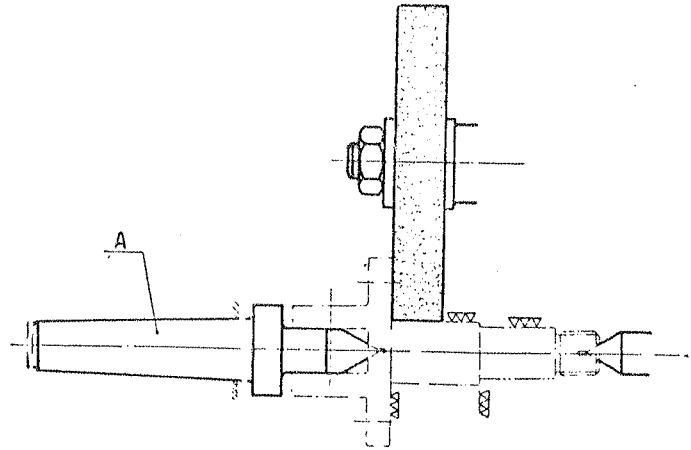


Vida tarağı ile vida çekilmesi

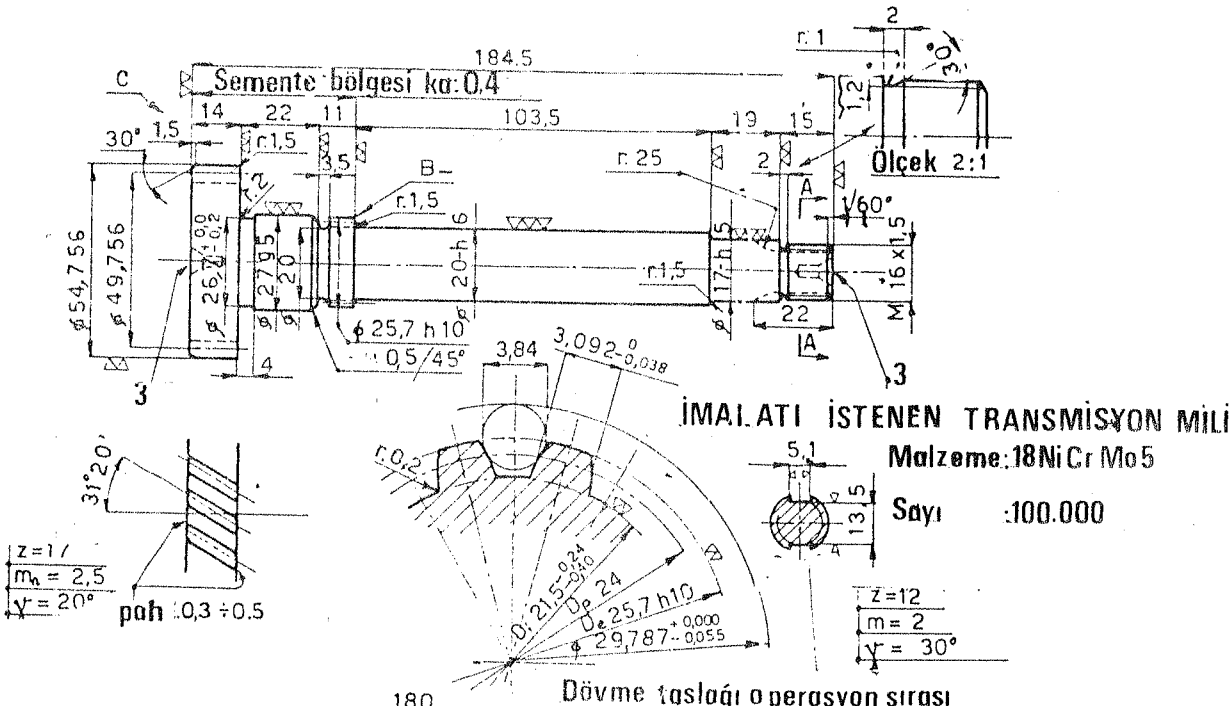


10. OPERASYON

Taşlama



11. OPERASYON: Kalite Kontrol

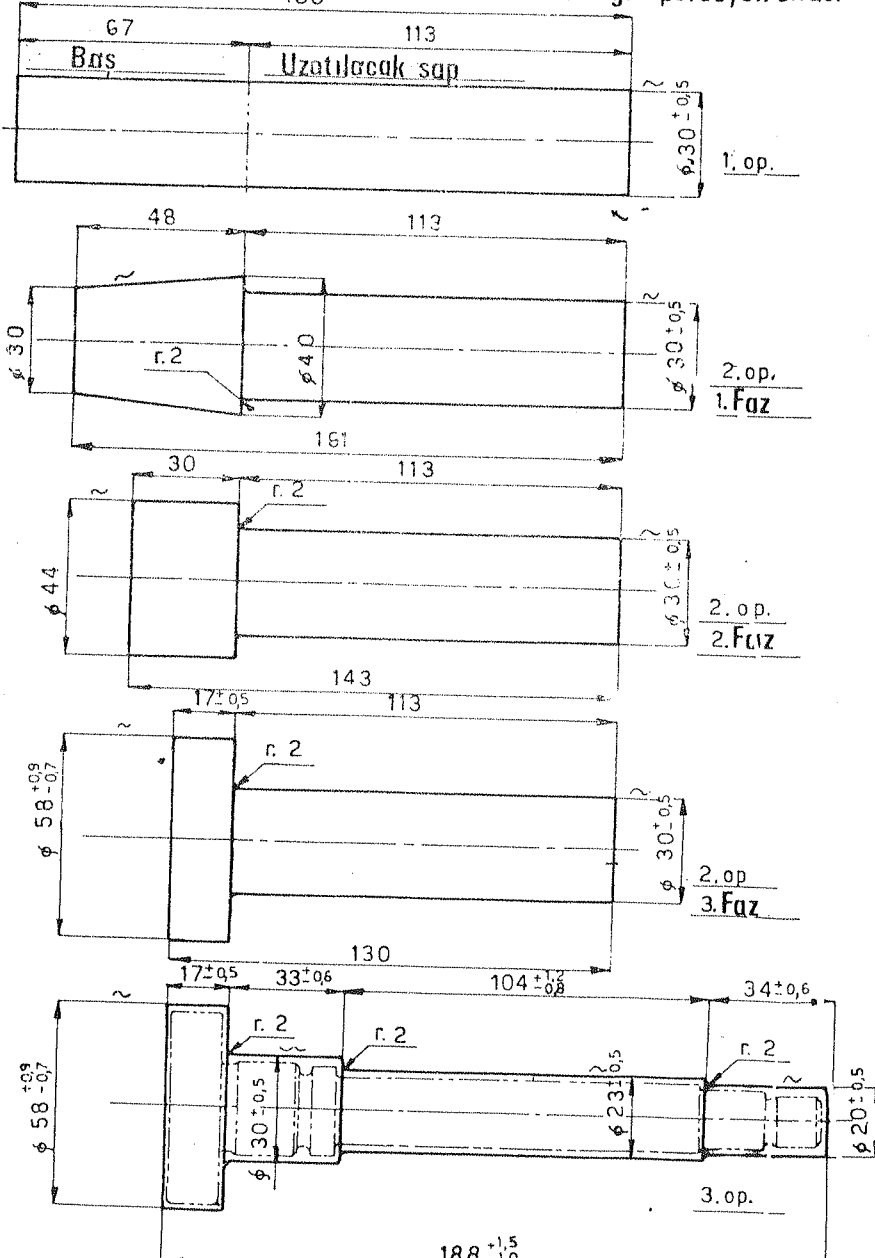


z=1/
m_n=2,5
γ=20°

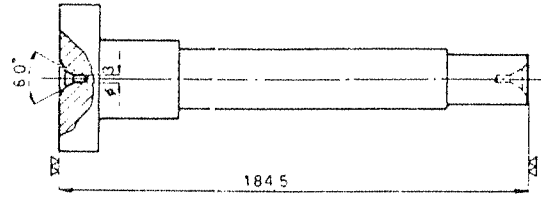
pah .03 ±0.5

z=12
m=2
γ=30°

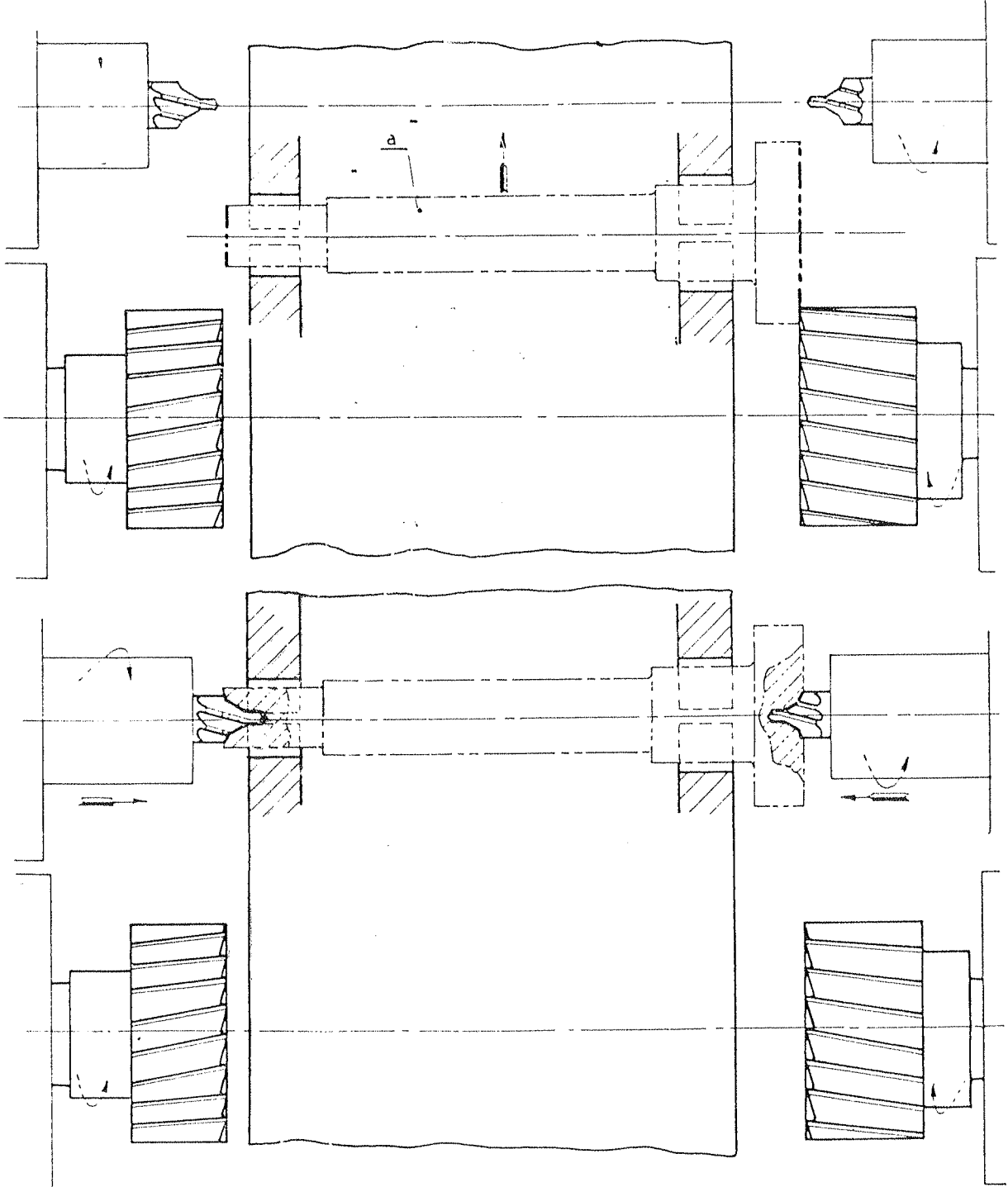
Dövme taslağı o perasyon sırası

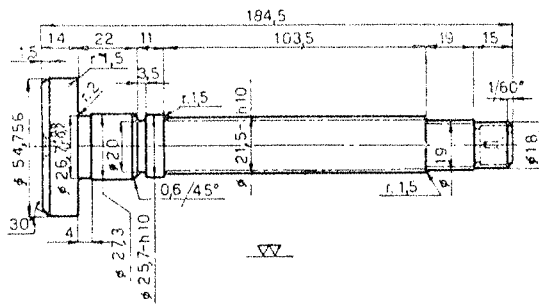


188 ±1,5

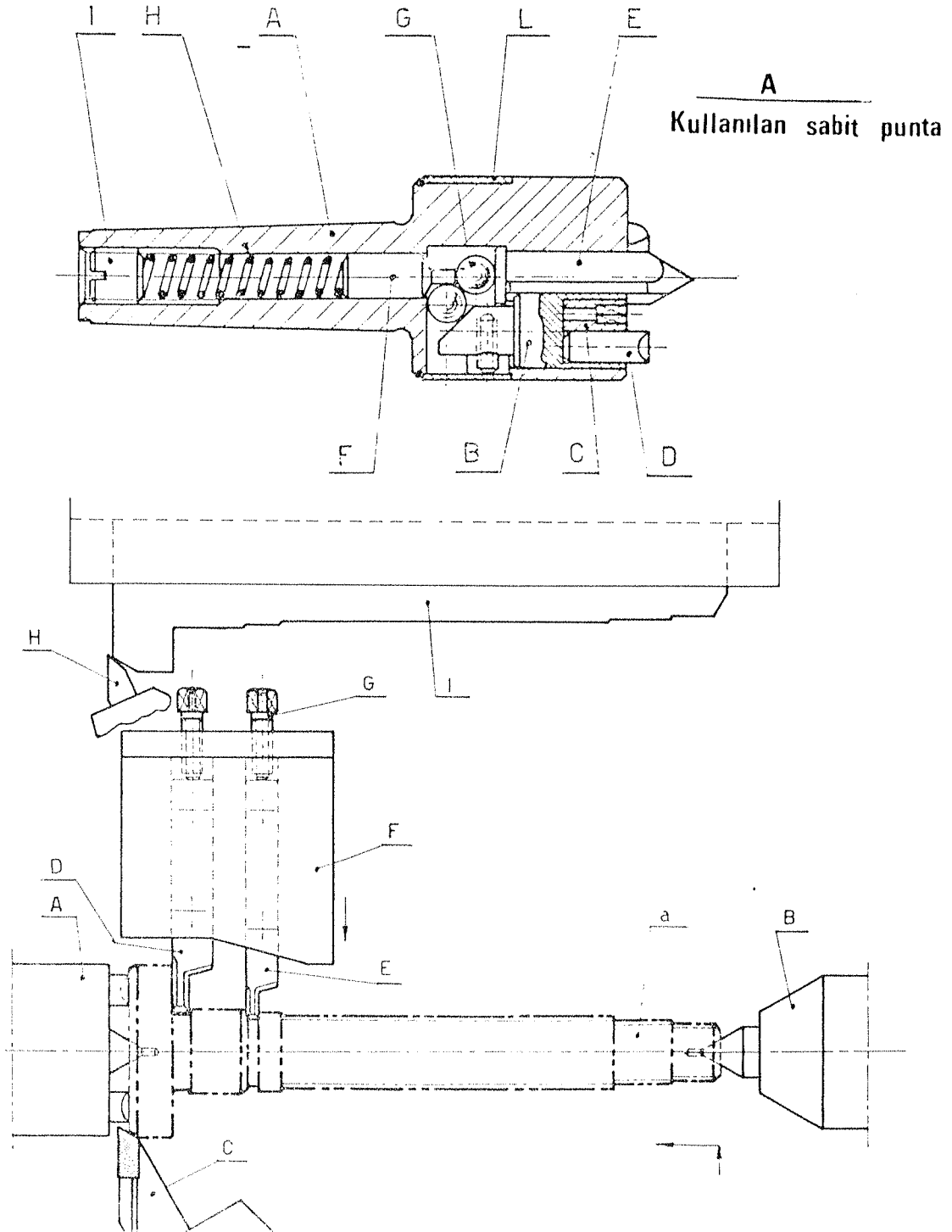


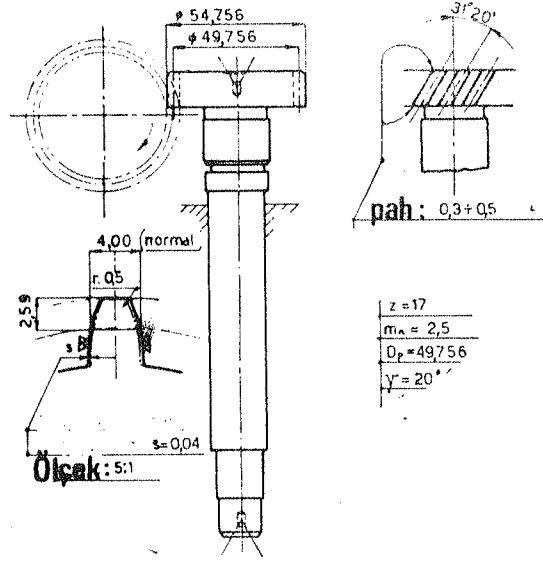
1. OPERASYON
Boy ölçüsüne frezeleme ve punta dalgının delinmesi



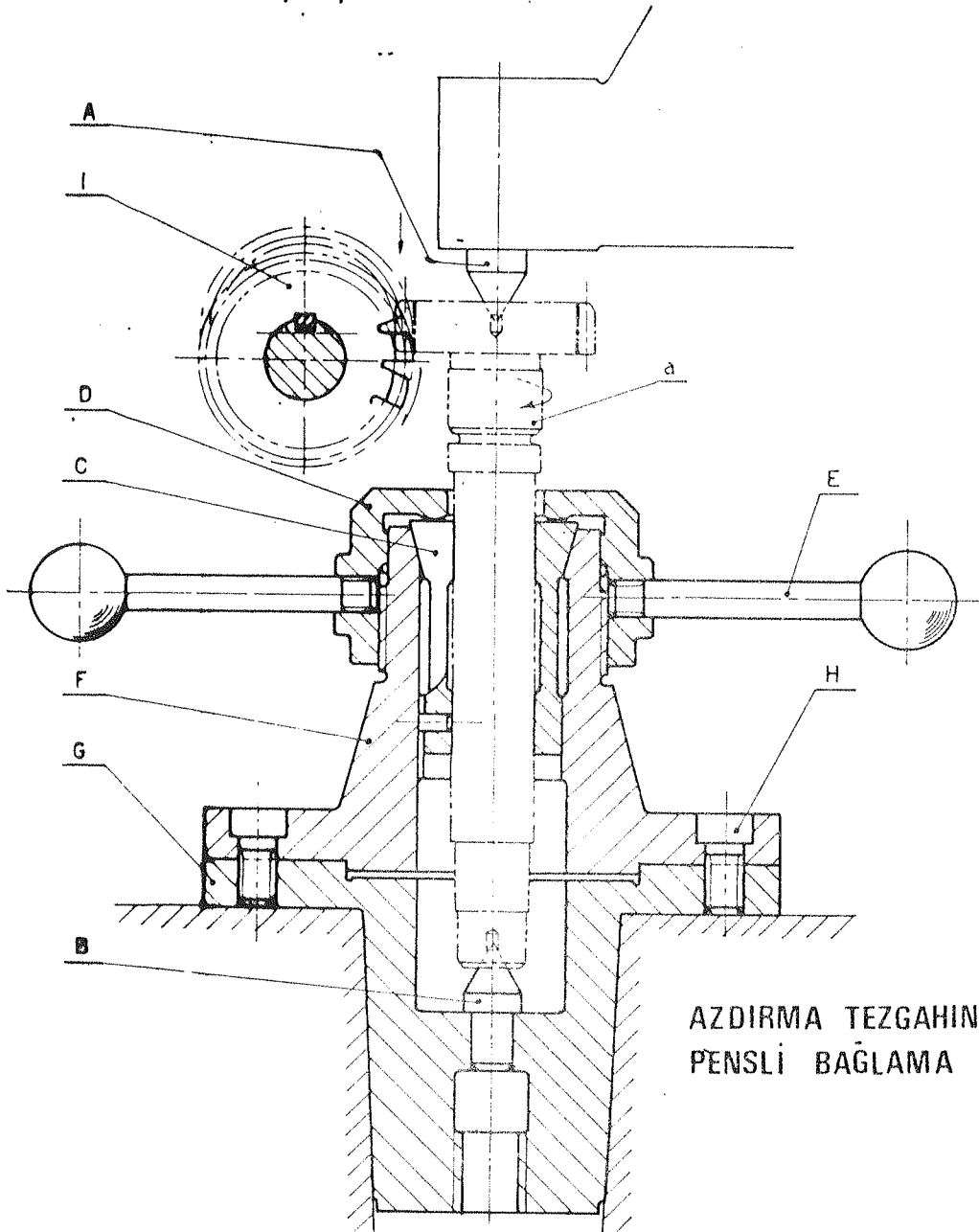


2. OPERASYON PROFIL TORNALAMA

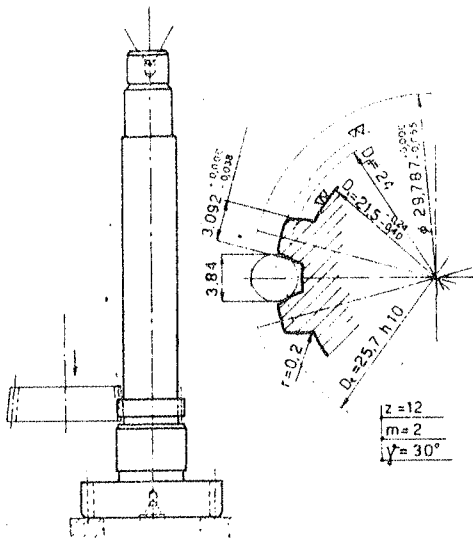




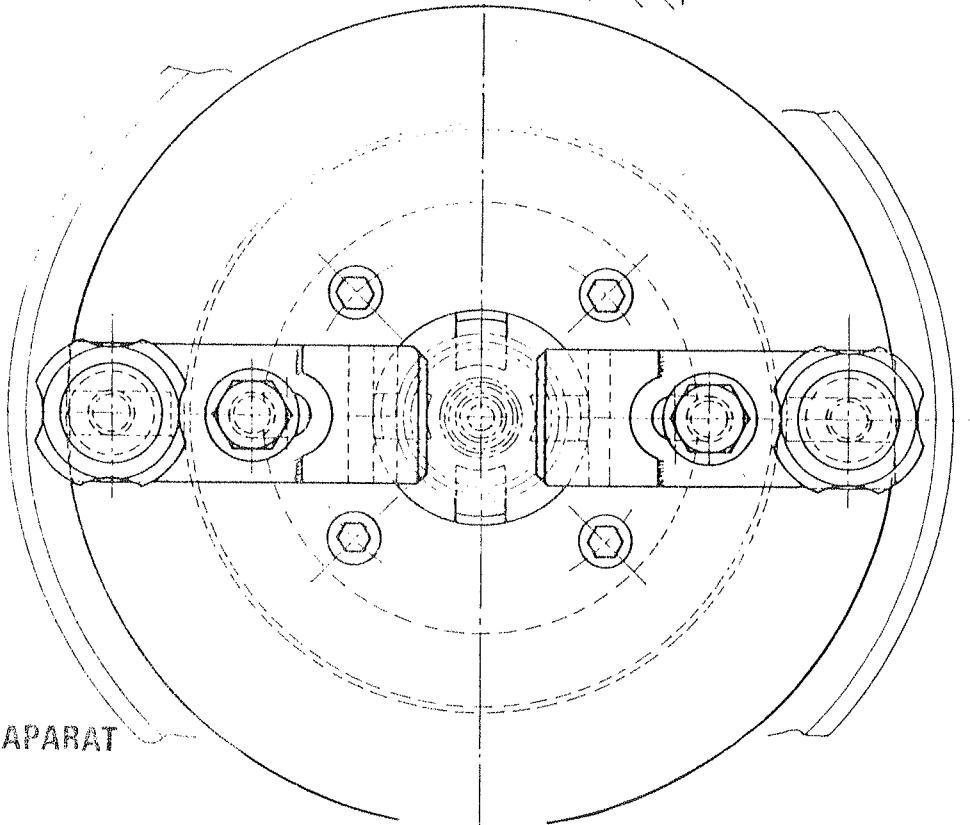
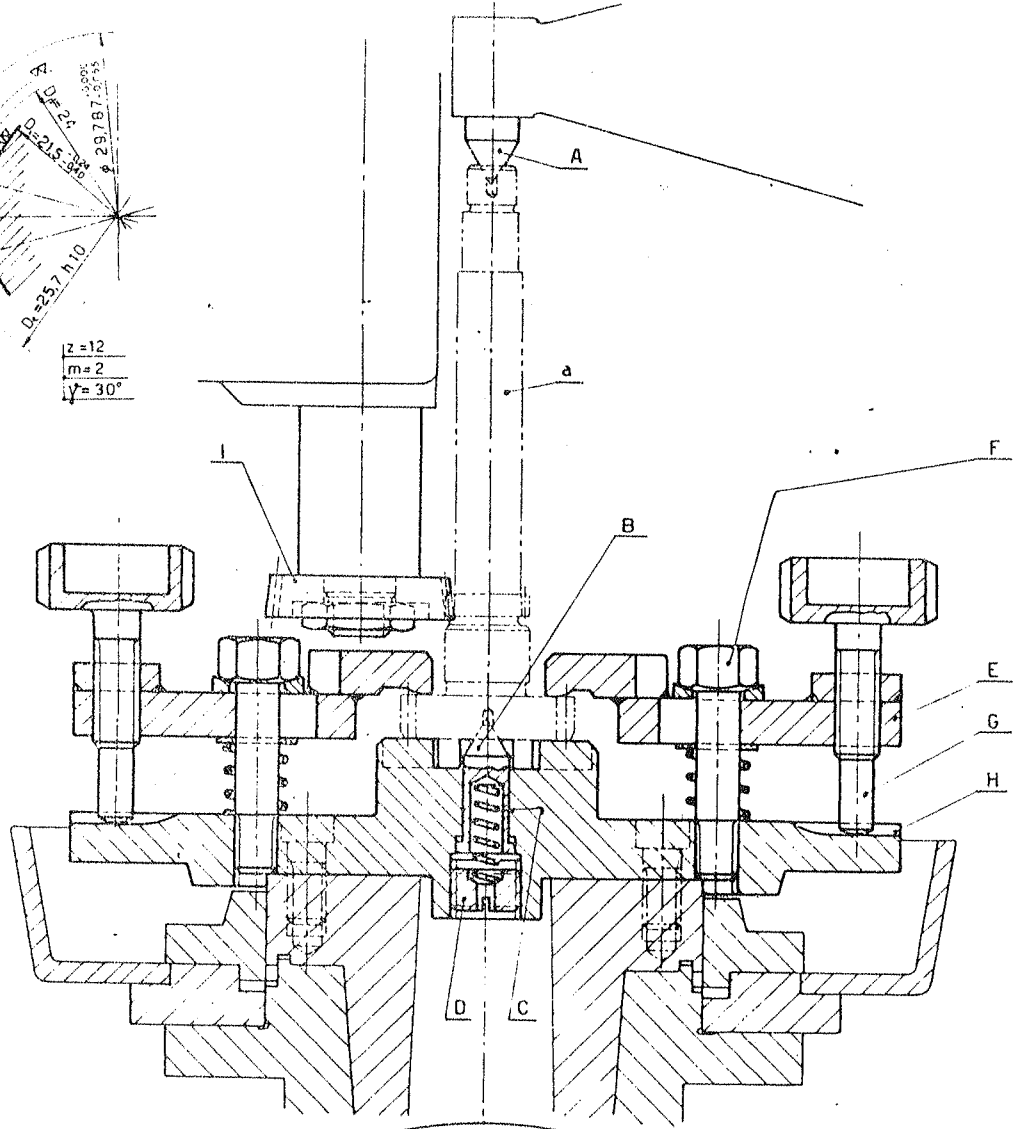
3. OPERASYON Diş açma (HELİSEL)



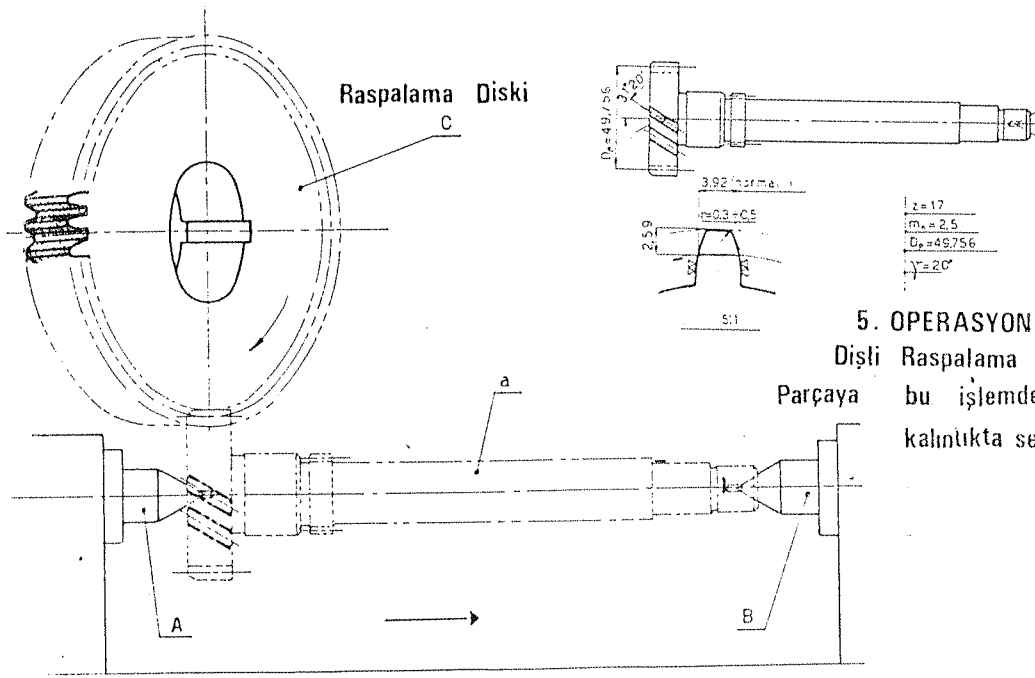
AZDIRMA TEZGAHINDA KULLANILAN
PENSLİ BAĞLAMA APARATI.



4. OPERASYON
Diş Açma



KULLANILAN APARAT

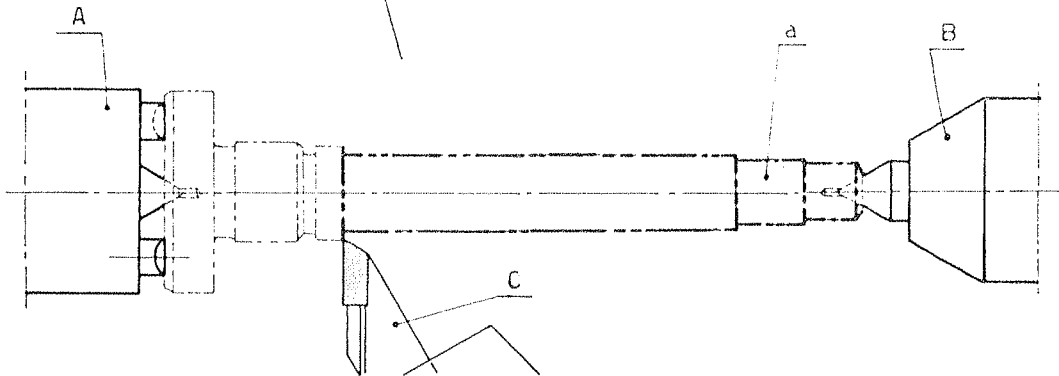
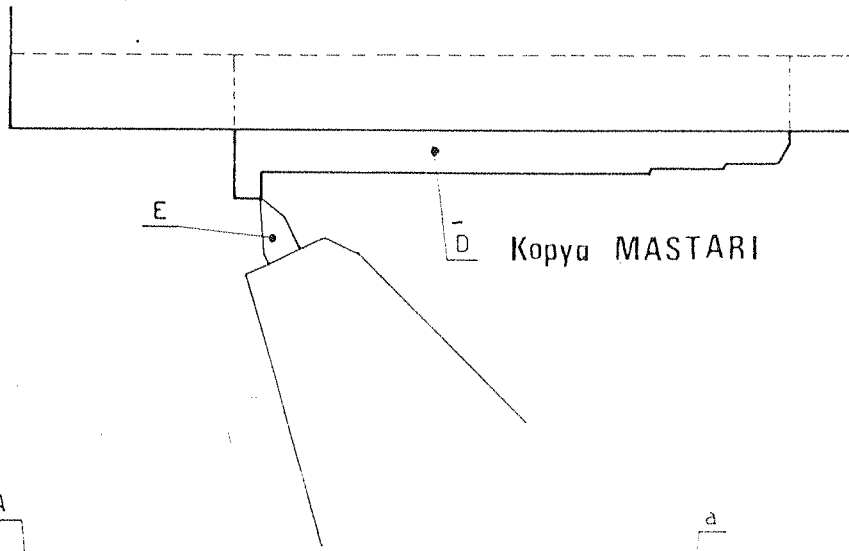
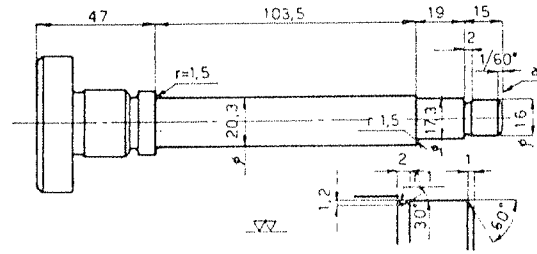


5. OPERASYON

Dişli Raspalama

bu işlemden sonra 0,5mm kalınlıkta semente yapılacaktır.

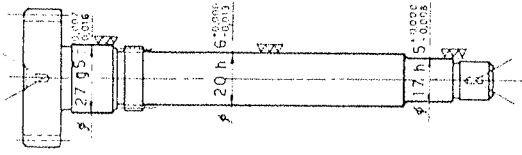
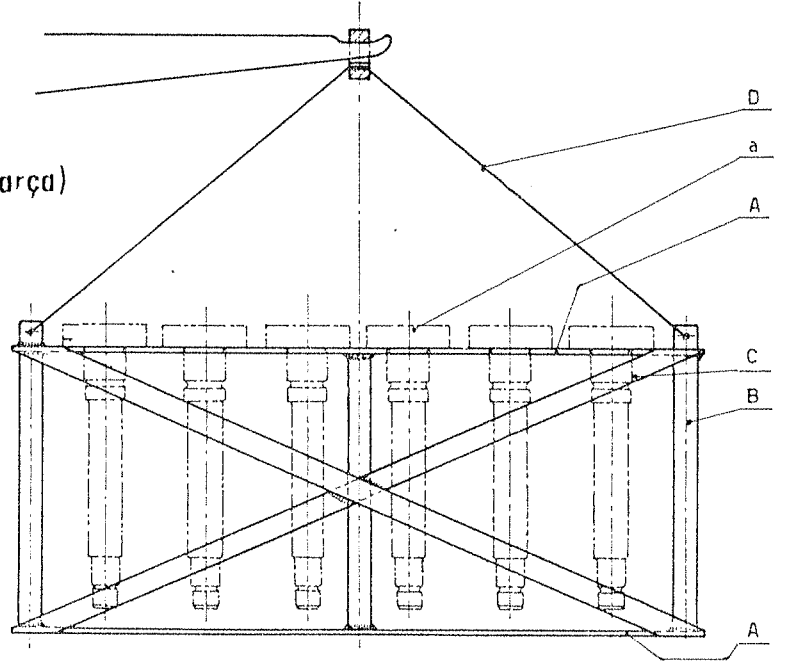
6. OPERASYON
Tornalama



7. OPERASYON

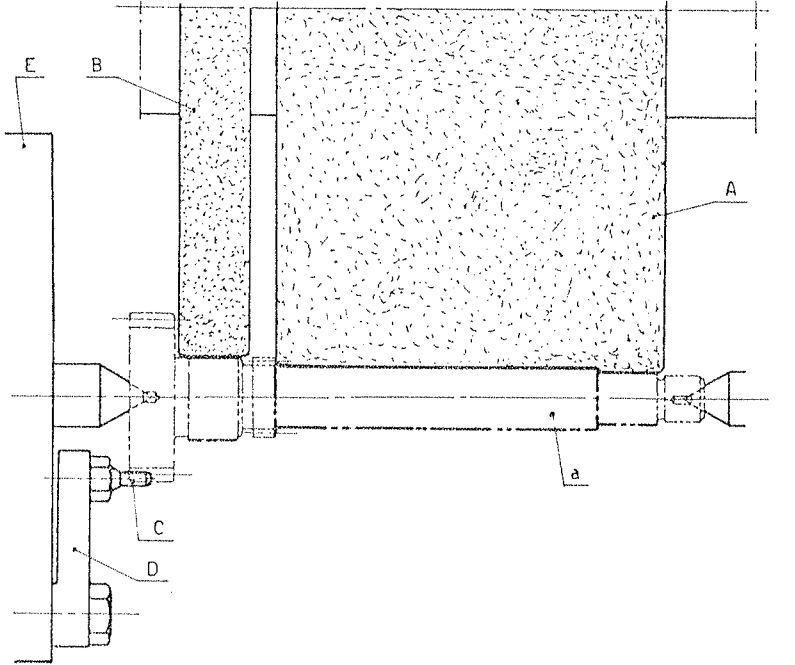
Bu işlemde sırasıyla

- 850° de tavlانیp yağda sulanacak (12 parça)
- 180° menevişlenecek ve HRC si ölçülerek
- Presde doğrultulacaktır.



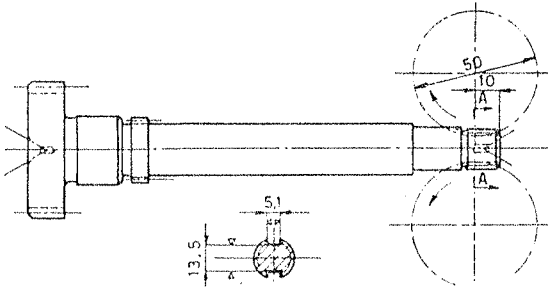
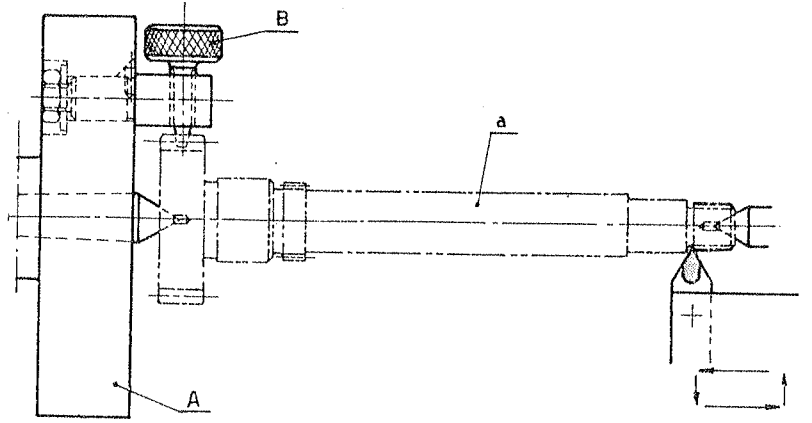
8. OPERASYON

Taşlama



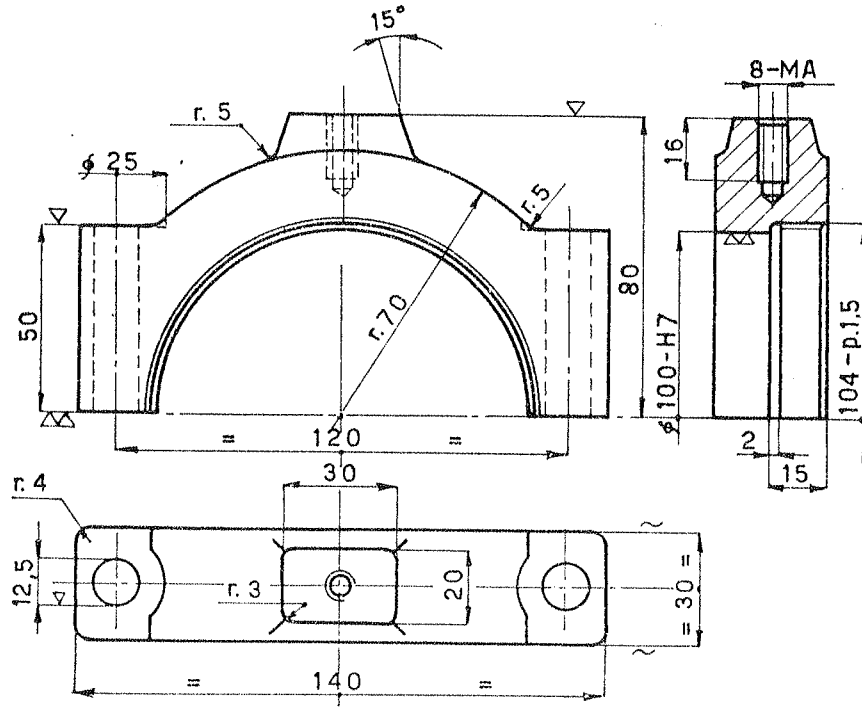


9. OPERASYON
Vida Çekme...

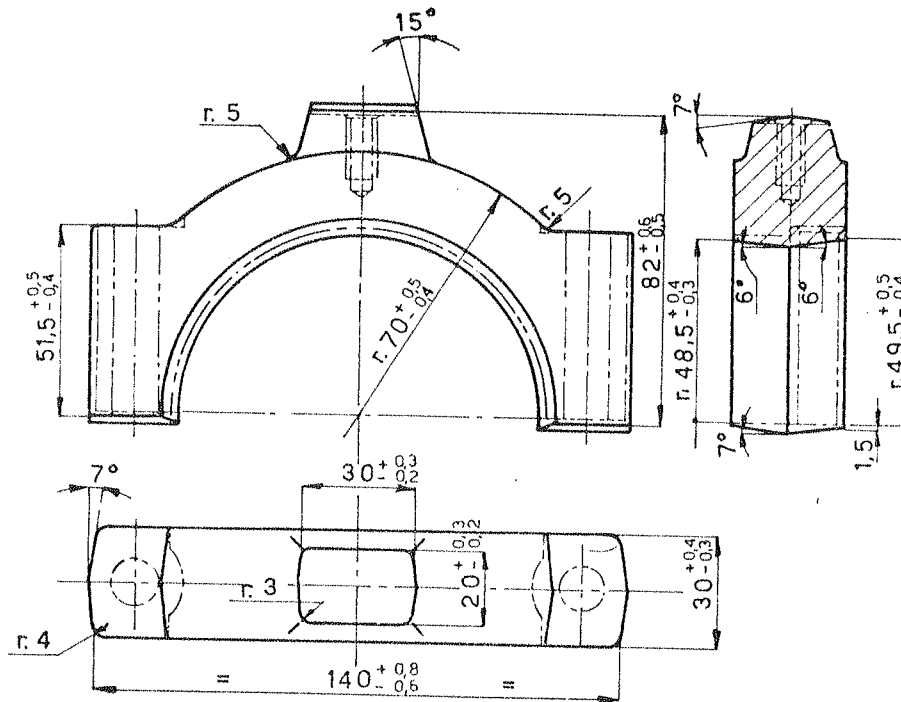


10. OPERASYON
Kanal Açma

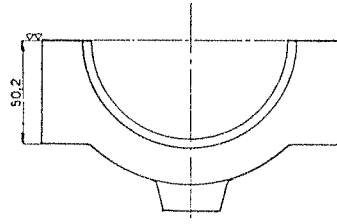
11. OPERASYON
KALİTE KONTROL



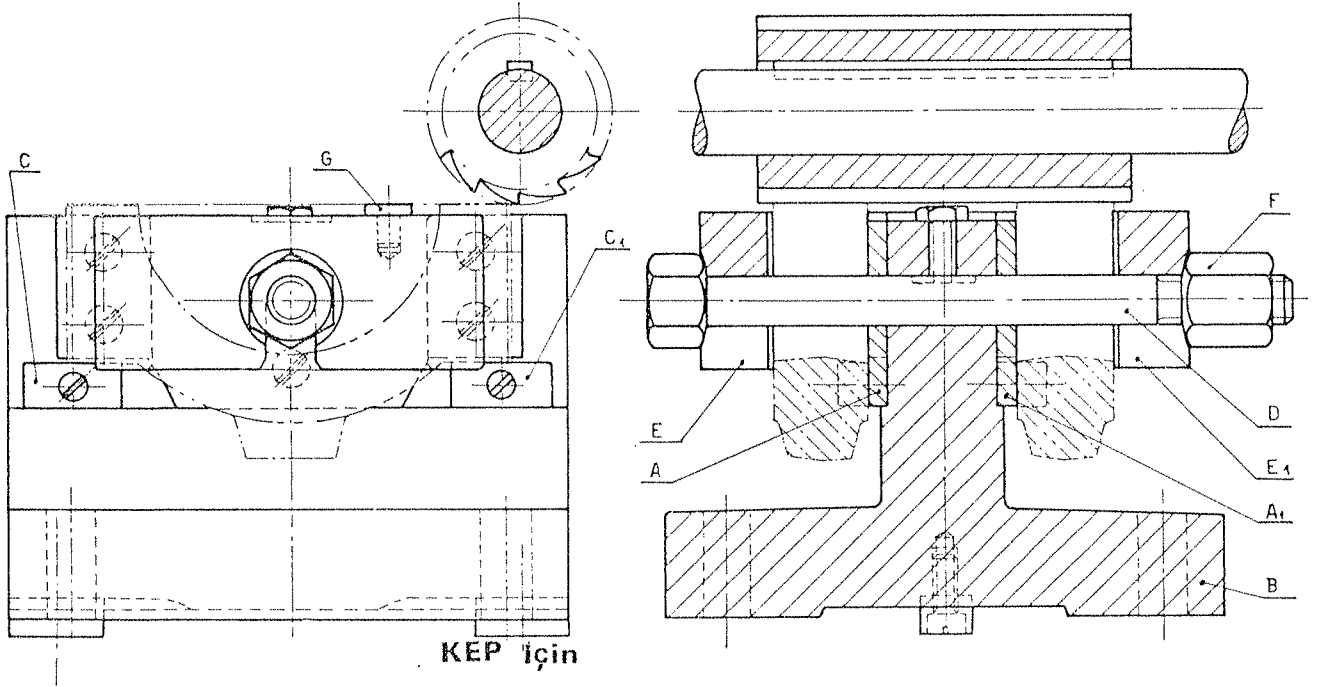
İmali istenen KEP parçası
malzeme : Ç 1040
adet : 1000



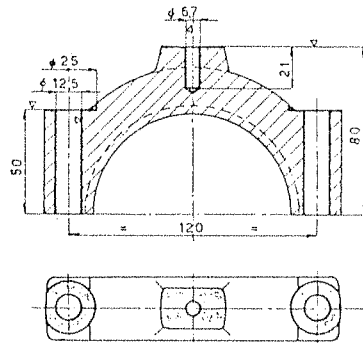
Dövme taslağı



1. Operasyon Frezeleme

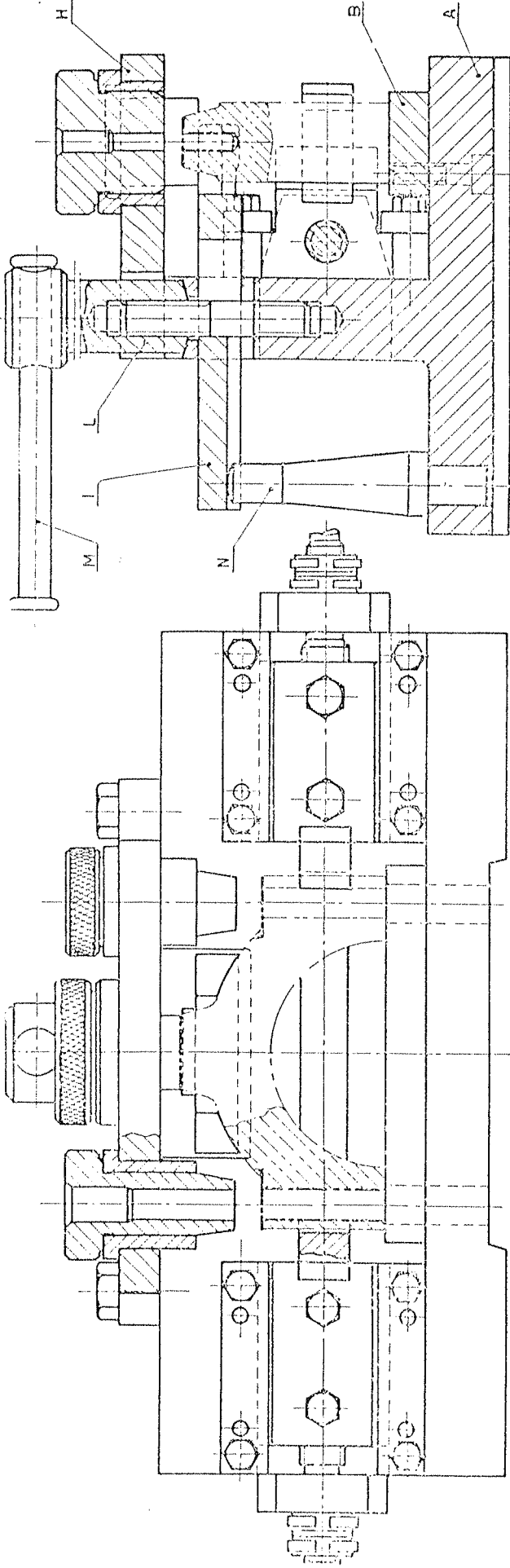


Frezede kullanılan aparat

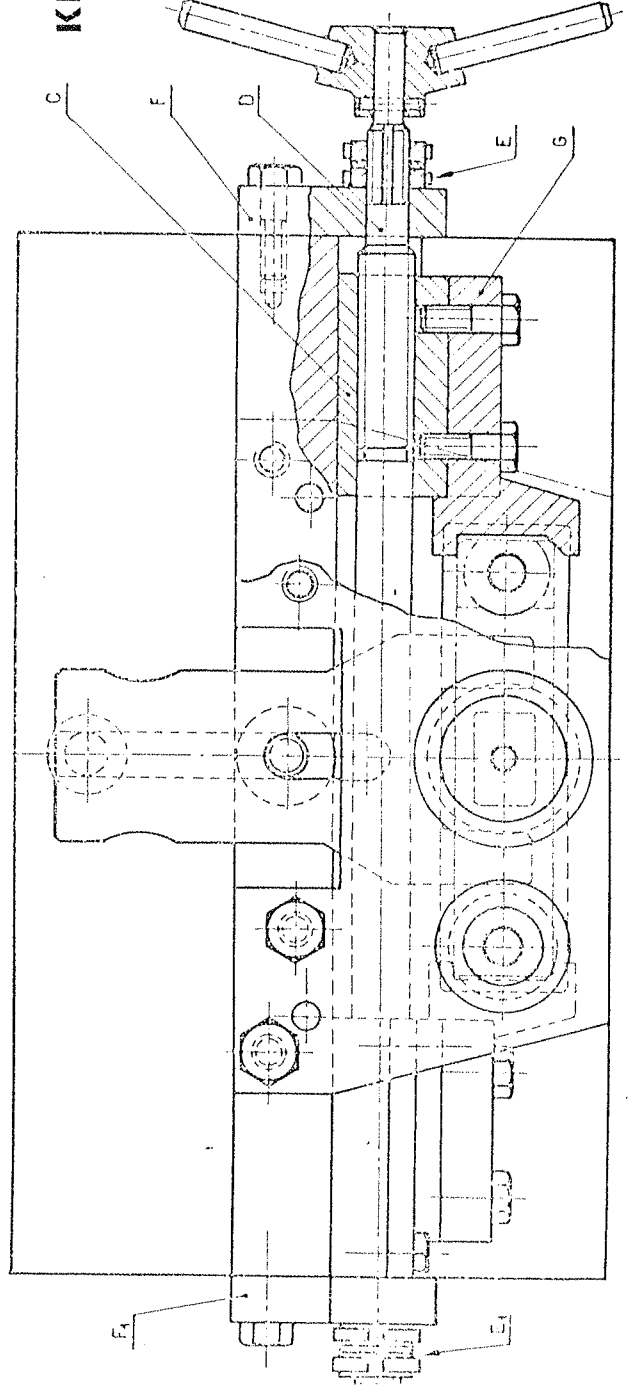


2. Operasyon

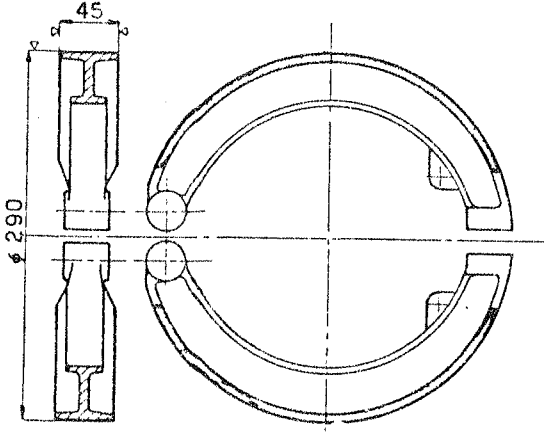
Delik üst yüzey işleme ve delme



KEP Delik üst yüzey işleme ve delme kalıbı

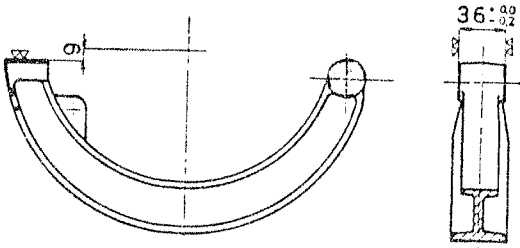


FREN PABUCU NA AİT OPERASYON SIRASI



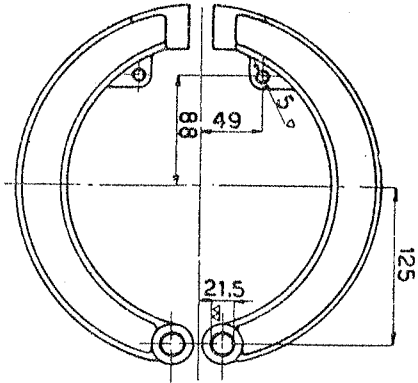
1. Operasyon

Dış ve alın yüzeylerini tornalama



2. Operasyon

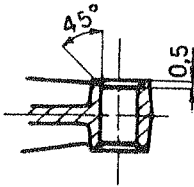
Frezeleme



3. Operasyon

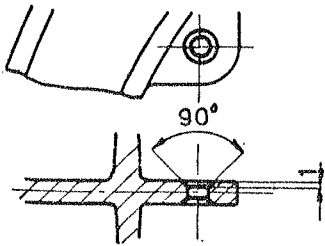
Delme

- Ø21mm.lik matkapla delme(ön delme)
- Ø215mm.ölçüsünde raybalama
- Ø5mm.deliğini delme.



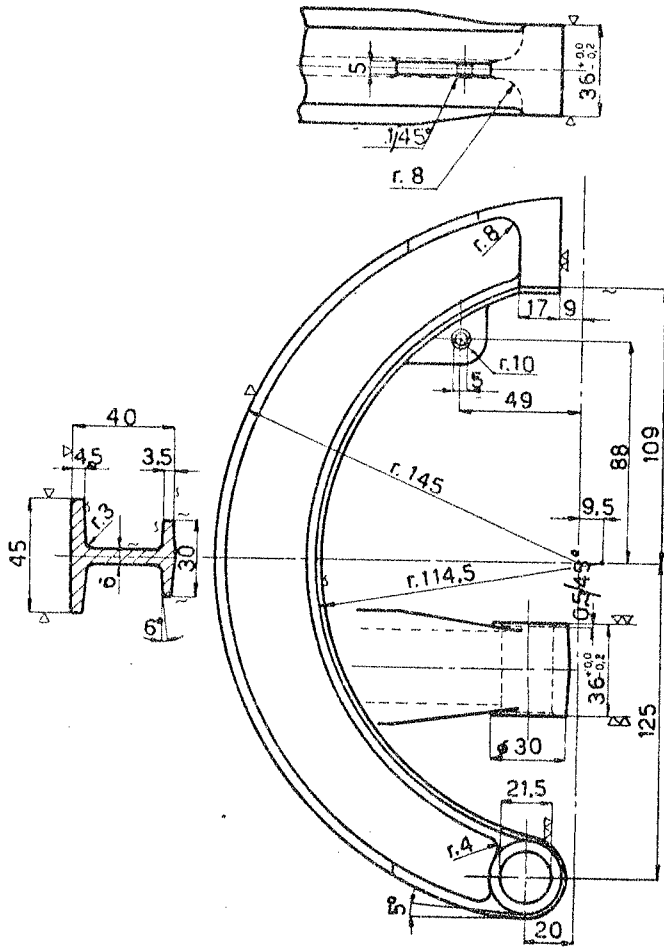
4. Operasyon

Havşalama



5. Operasyon

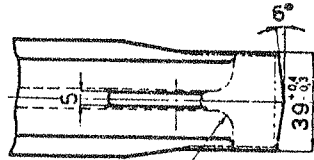
Havşalama



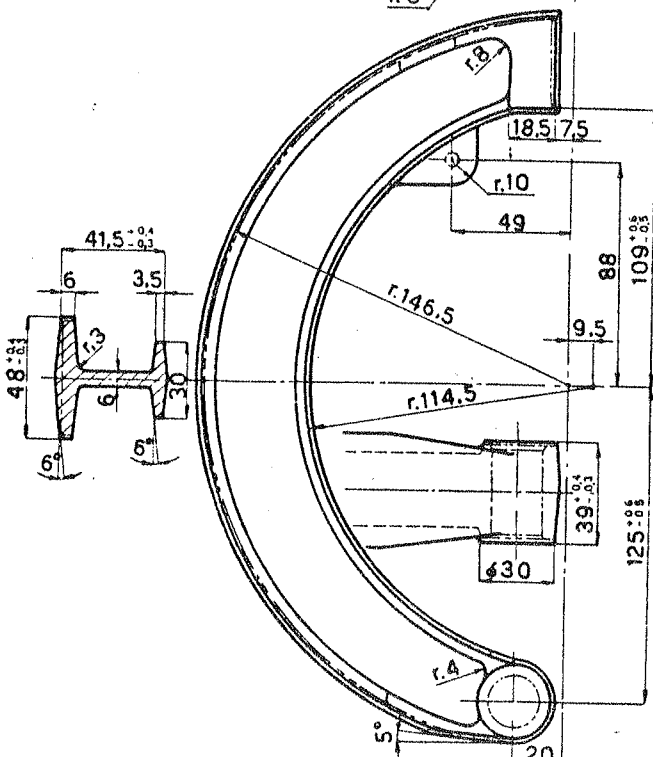
İmali istenen FREN PABUCU

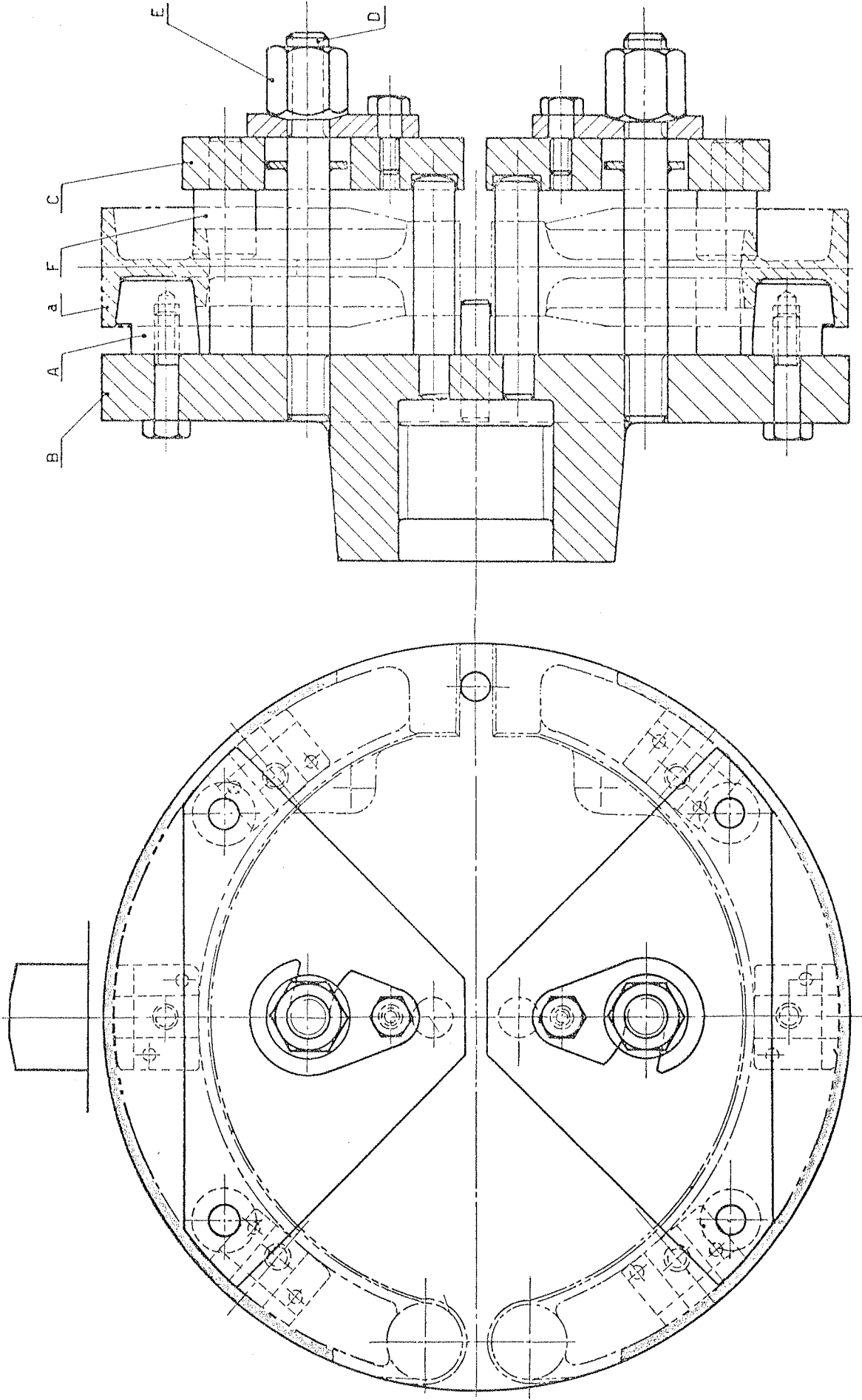
Malzeme : Ç 1040

Sayı : 2000

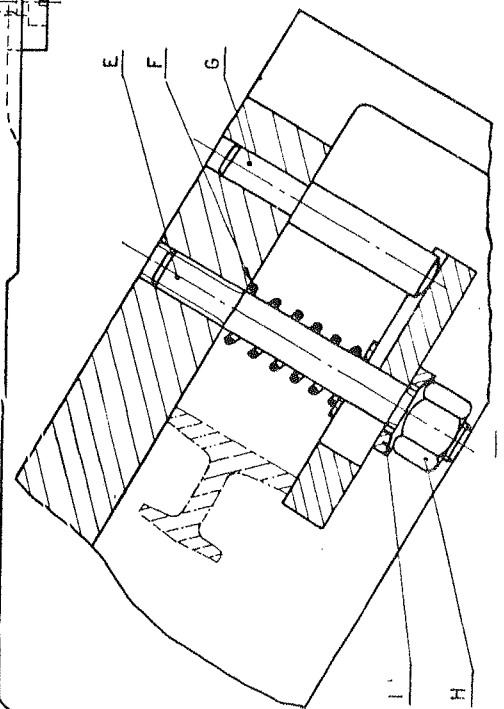
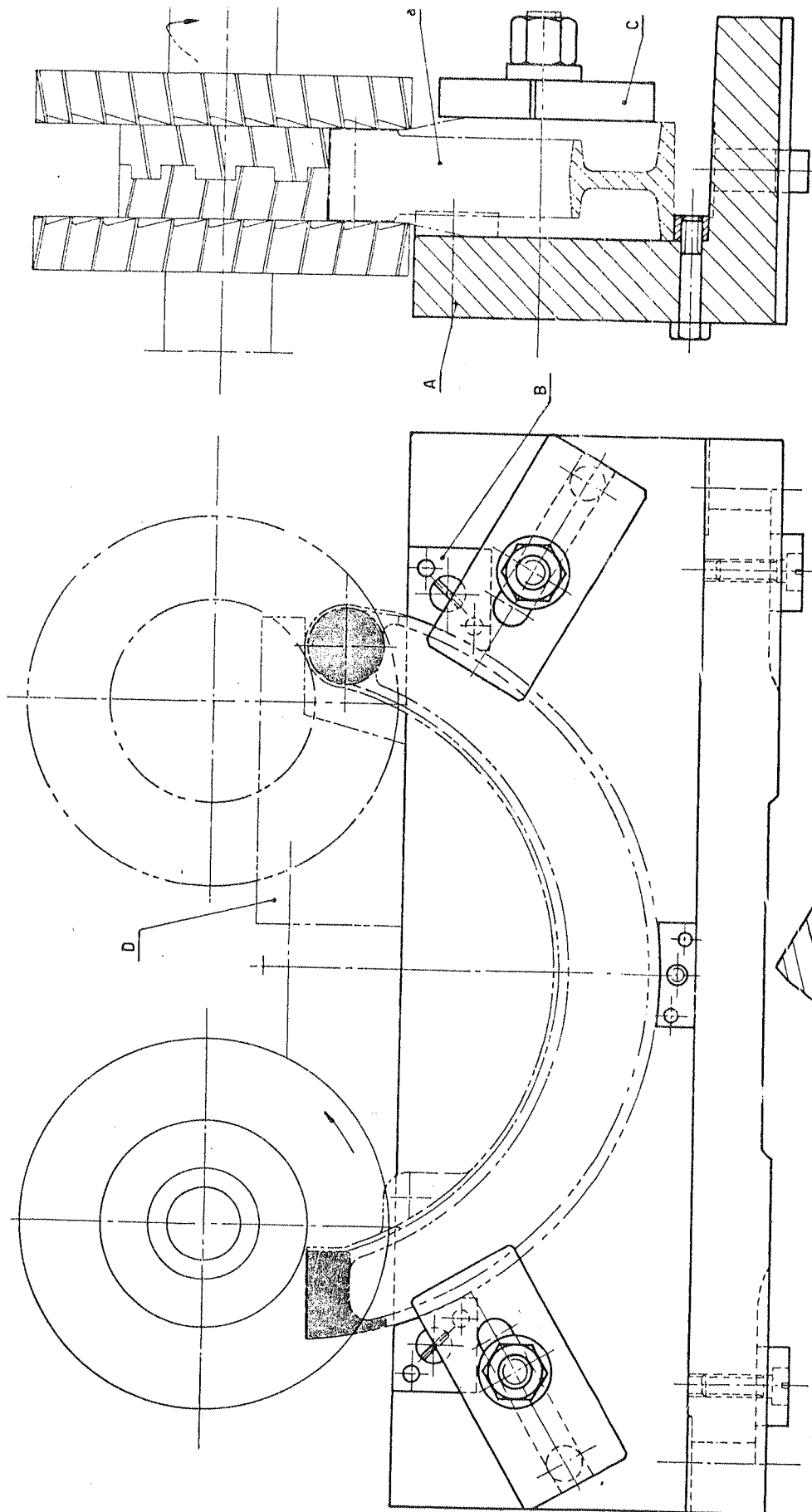


Dövme taşı



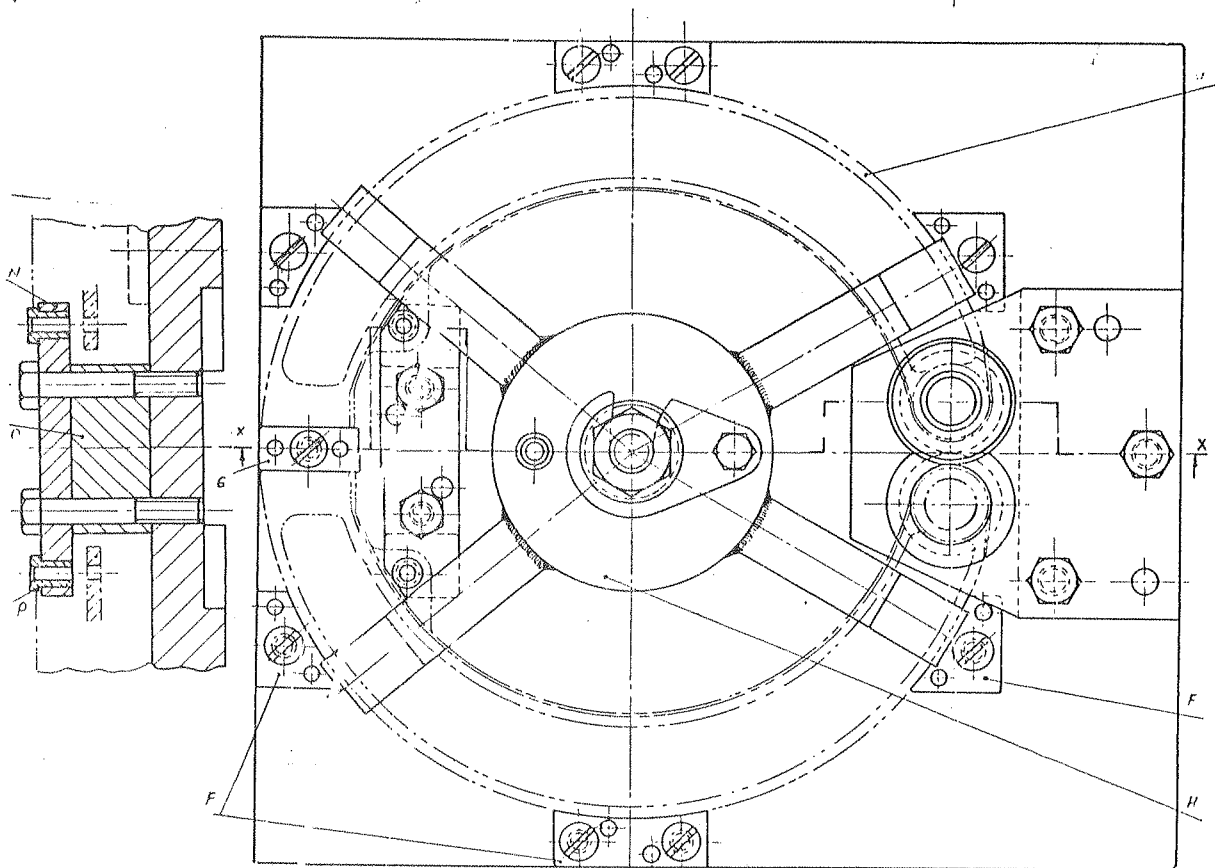
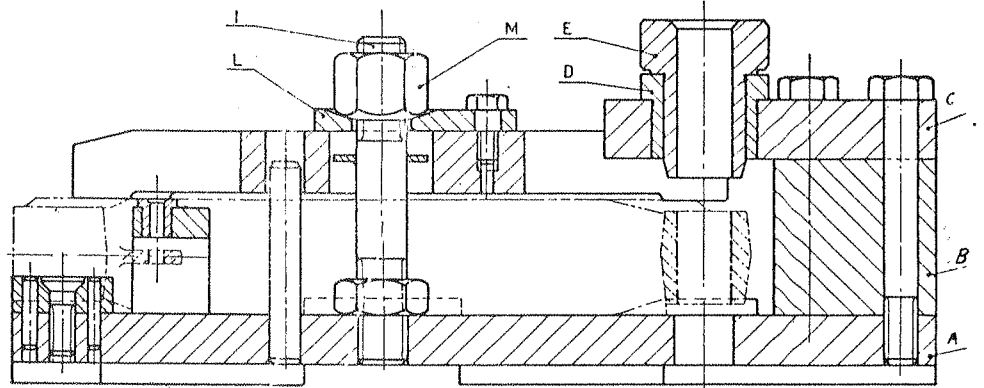


FREN PABUCU Dış ve alın yüzey tornalama aparatı



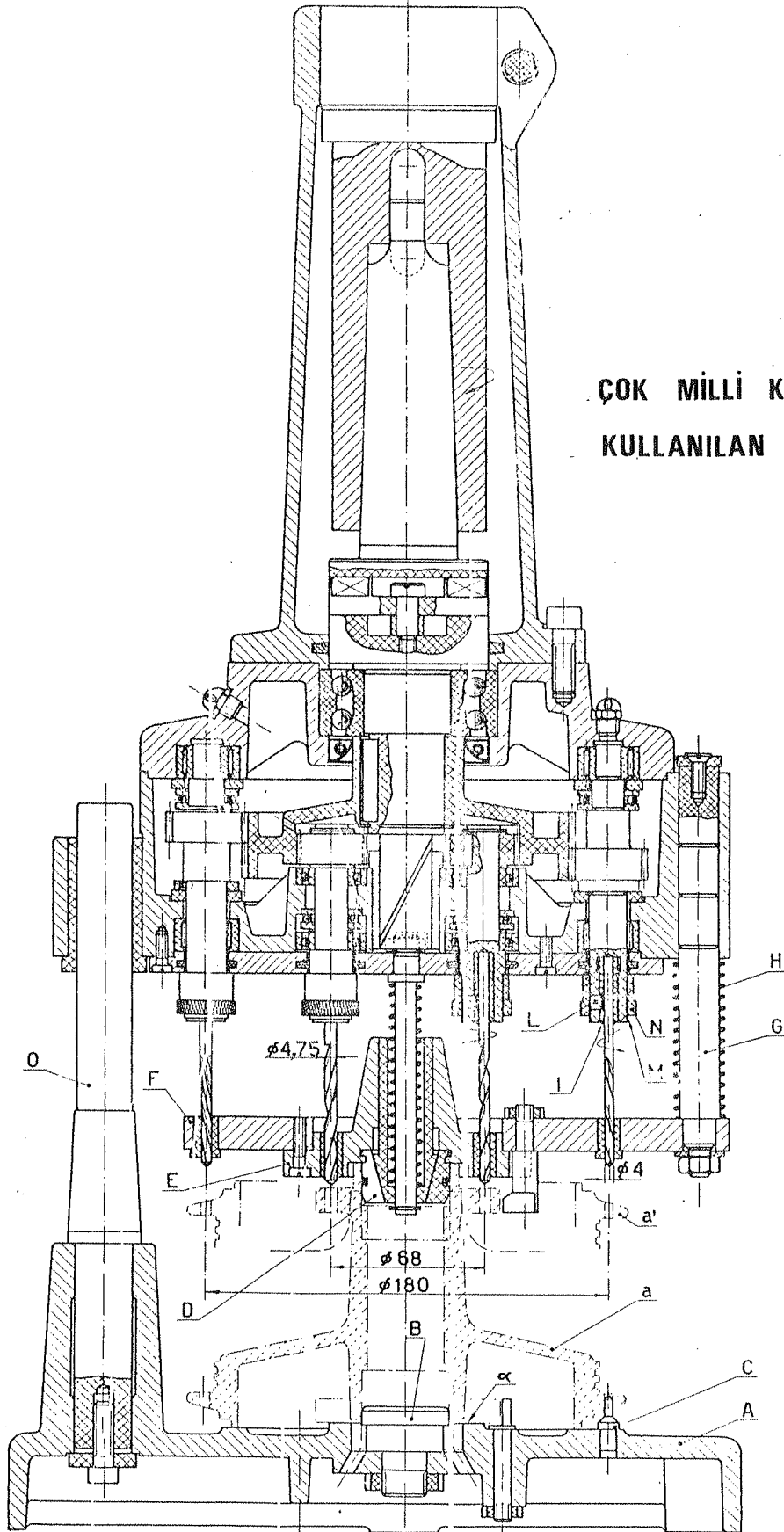
FREN PABUCU Frezeleme aparatı

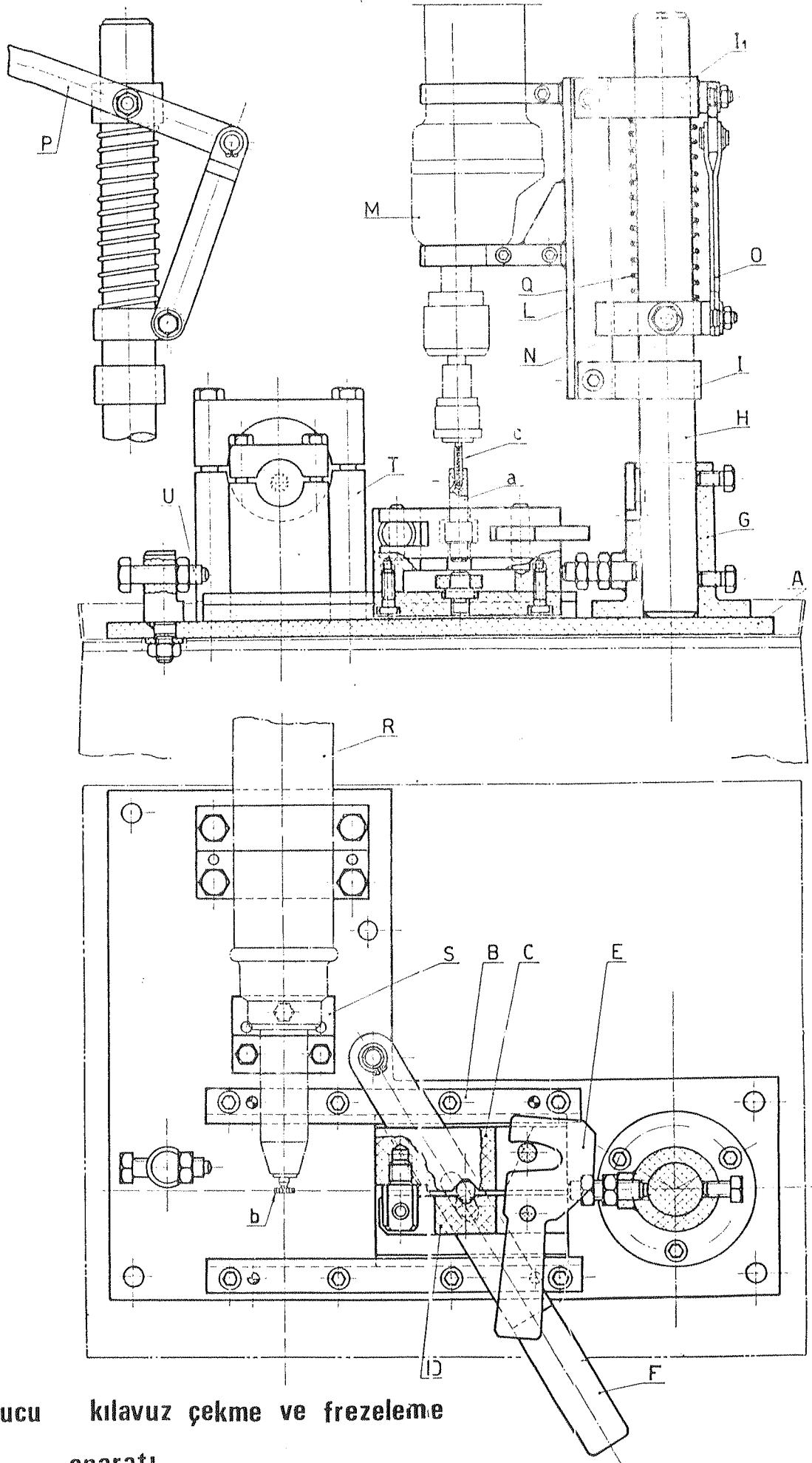
x-x Kesiti



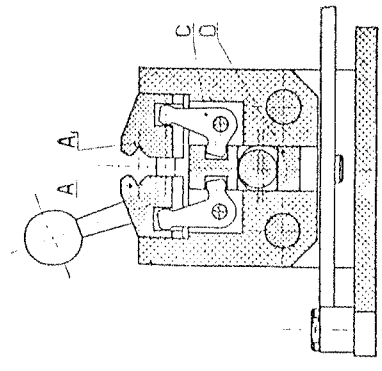
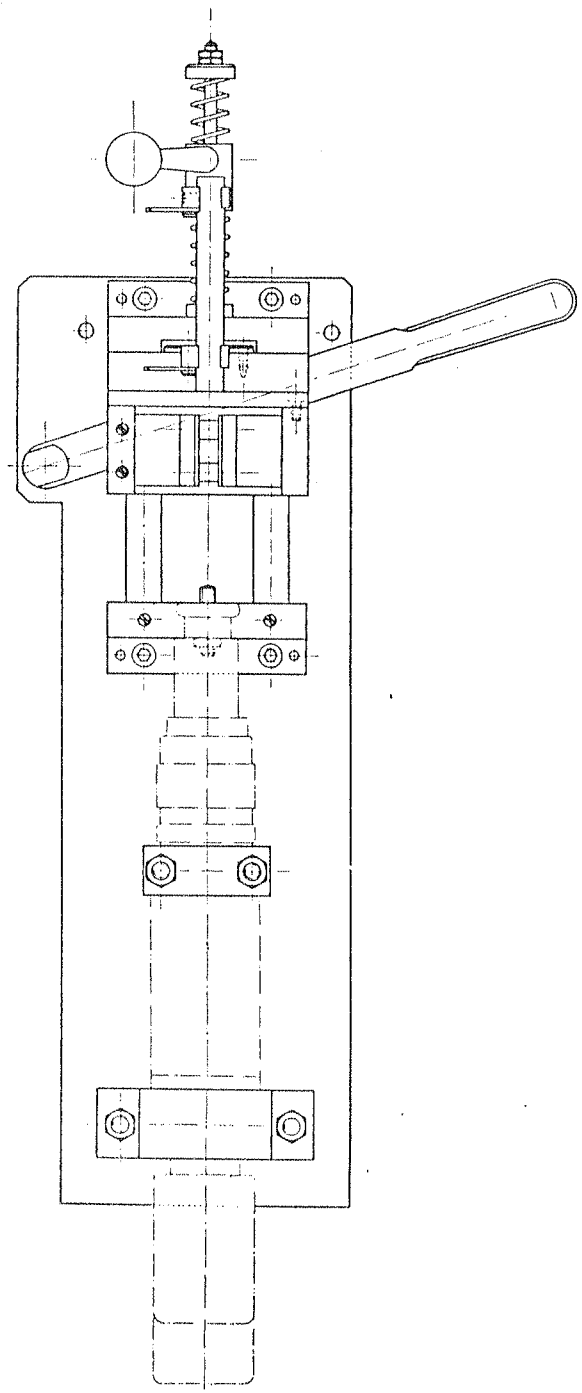
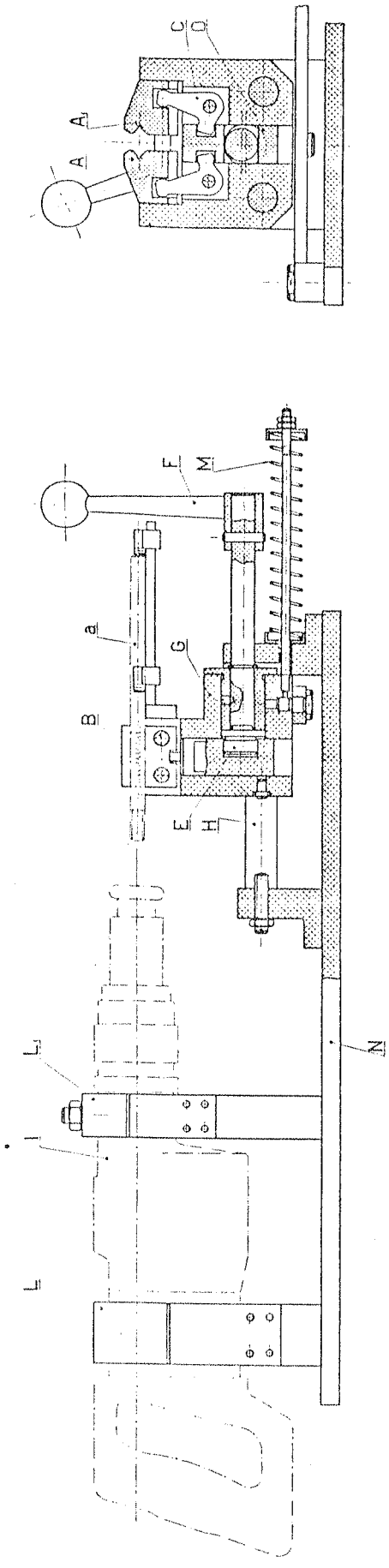
FREN PABUCU Delme kalıbı

ÇOK MILLİ KAFA İLE
KULLANILAN DELME APARATI

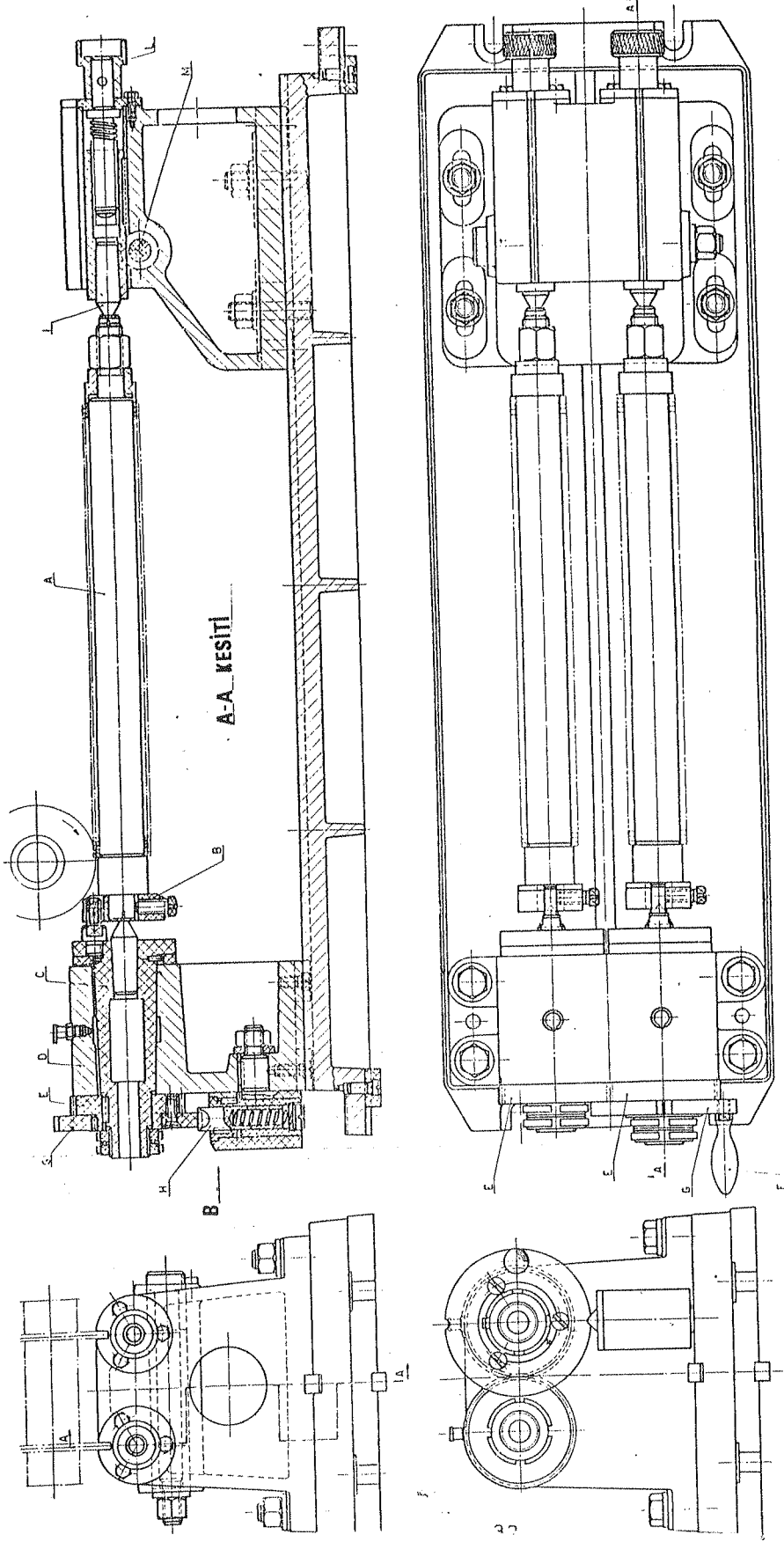




Bir mil ucu kılavuz çekme ve frezeleme
 aparatı



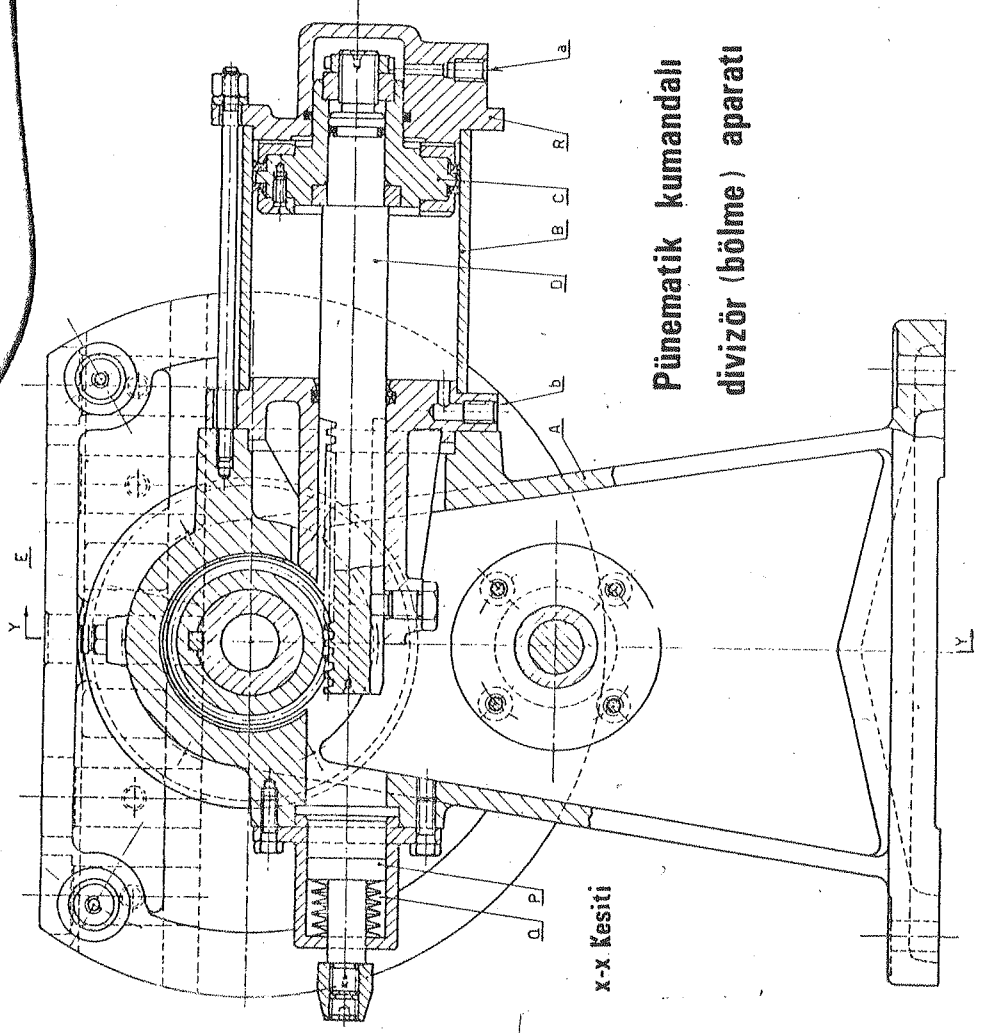
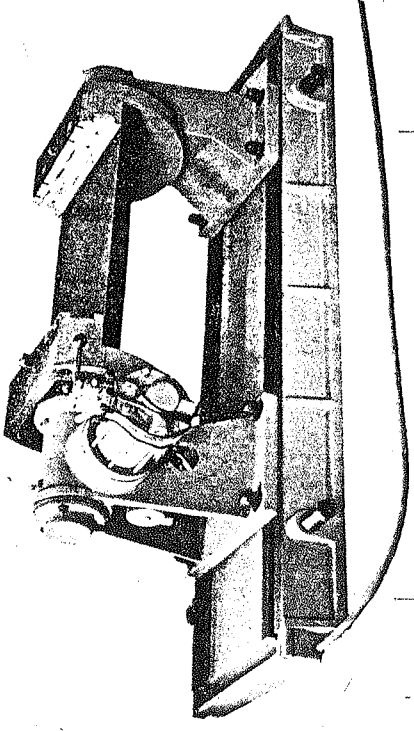
Bir el breyizinden yararlanarak yararlanarak yapılan saplamaya somun takma aparatı



ÇOKLU FREZELEME APARATI

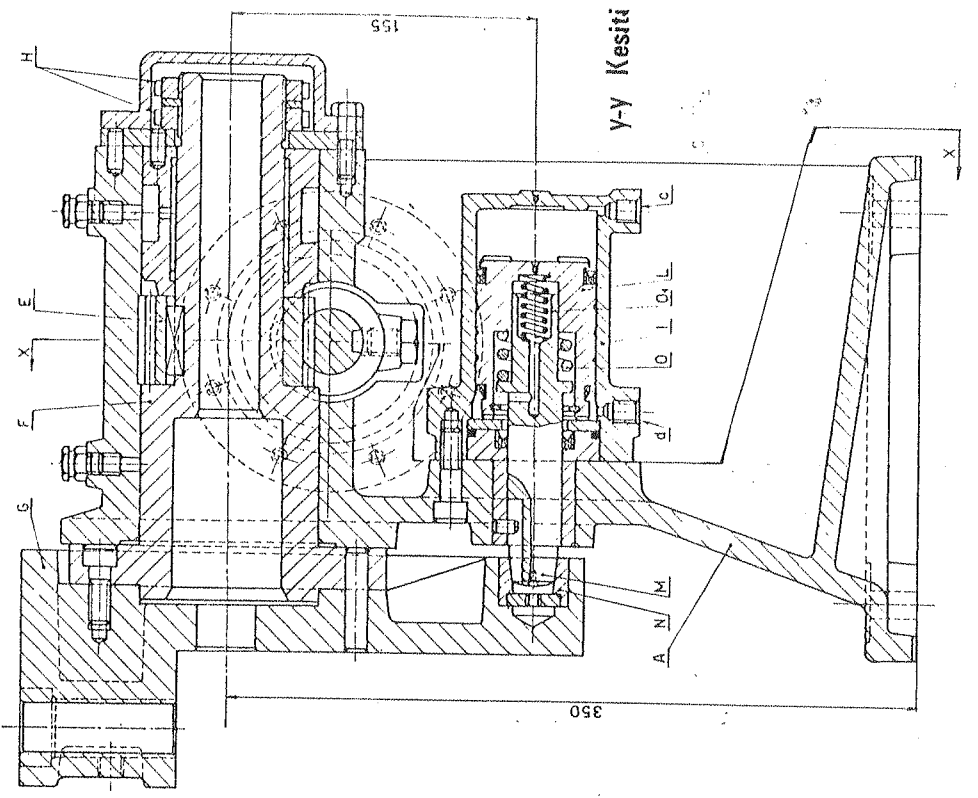
Bir çok vidalı bilezik çevresine eşit aralıklı 4 kanalımlı açılması

B - GÖRÜNÜŞÜ

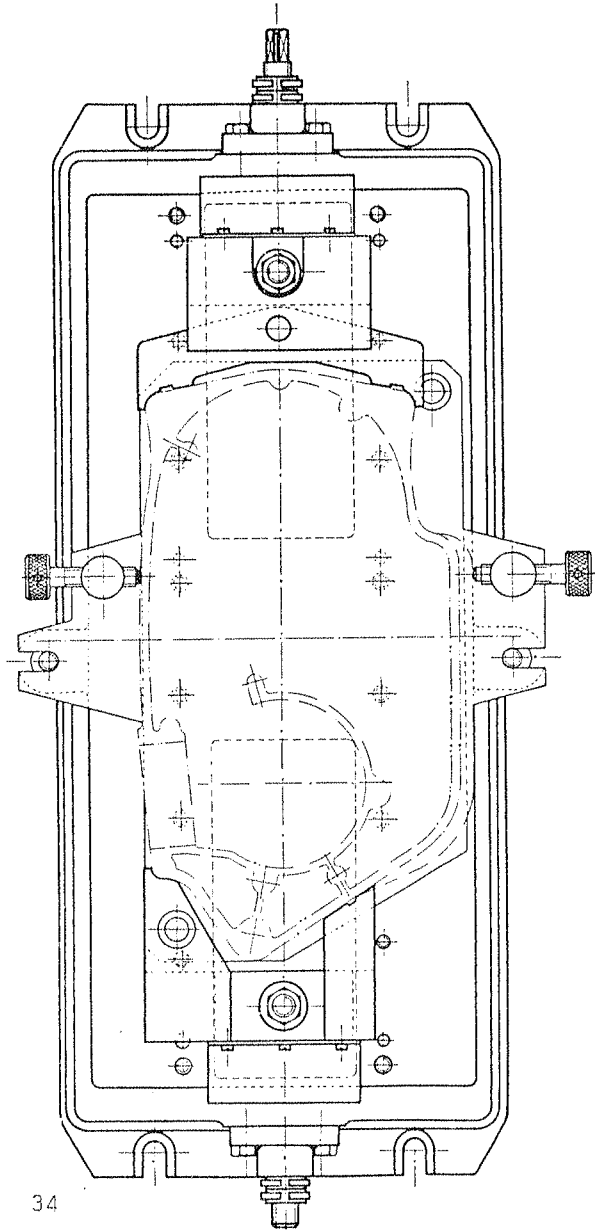
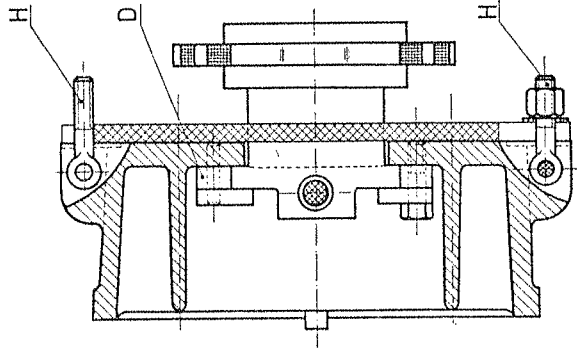
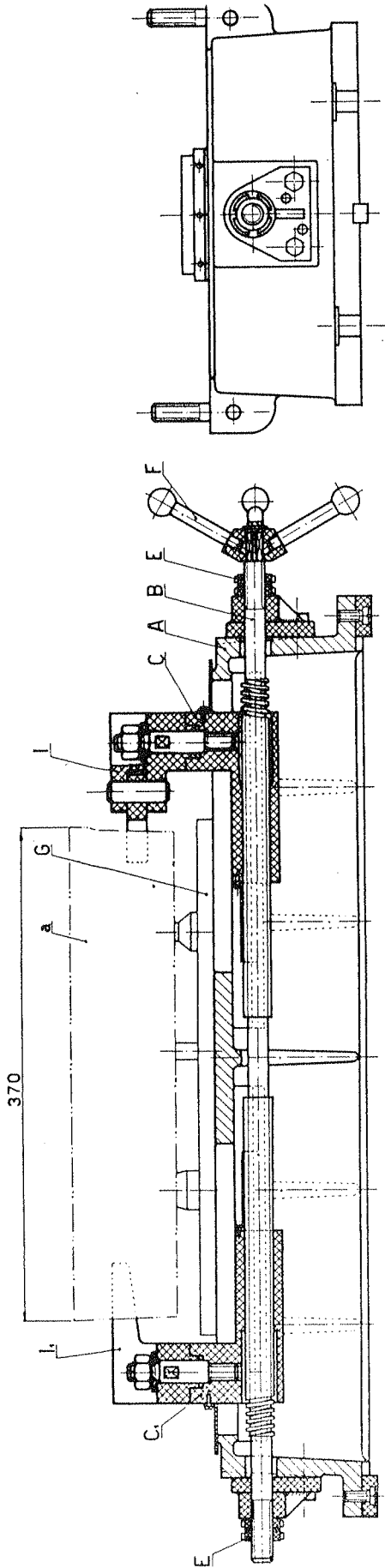


X-X Kesiti

**Pnöematik kumandalı
divizör (bölme) aparatı**

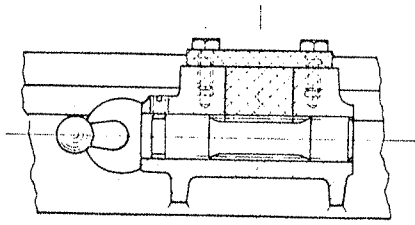


Y-Y Kesiti

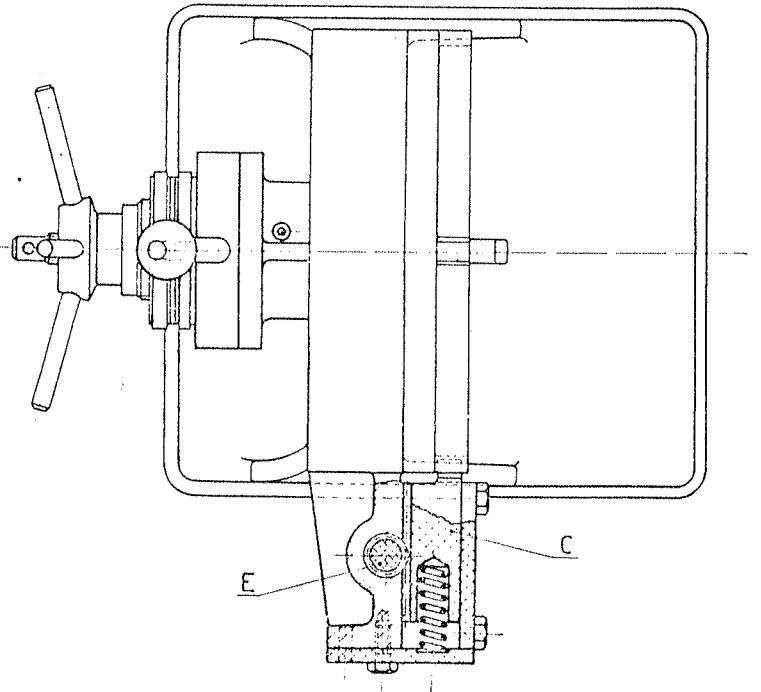
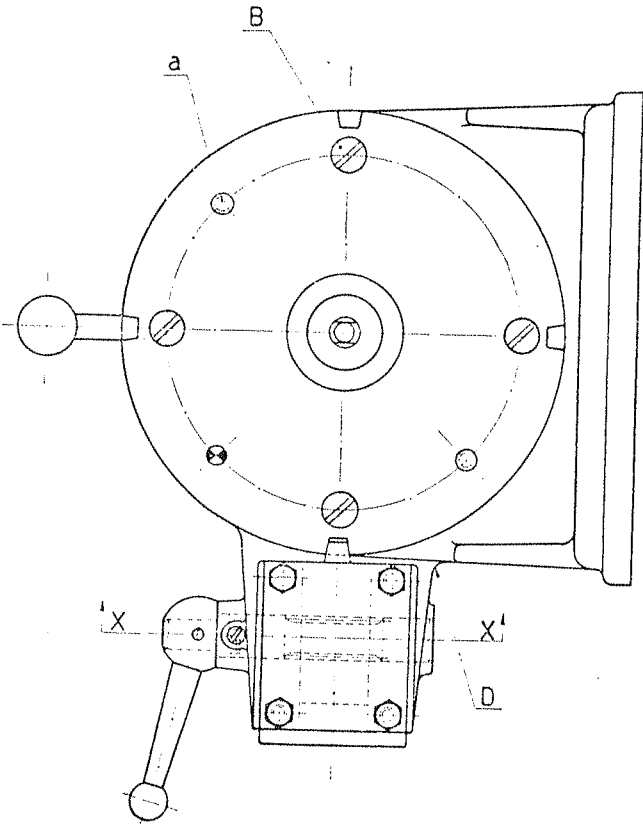
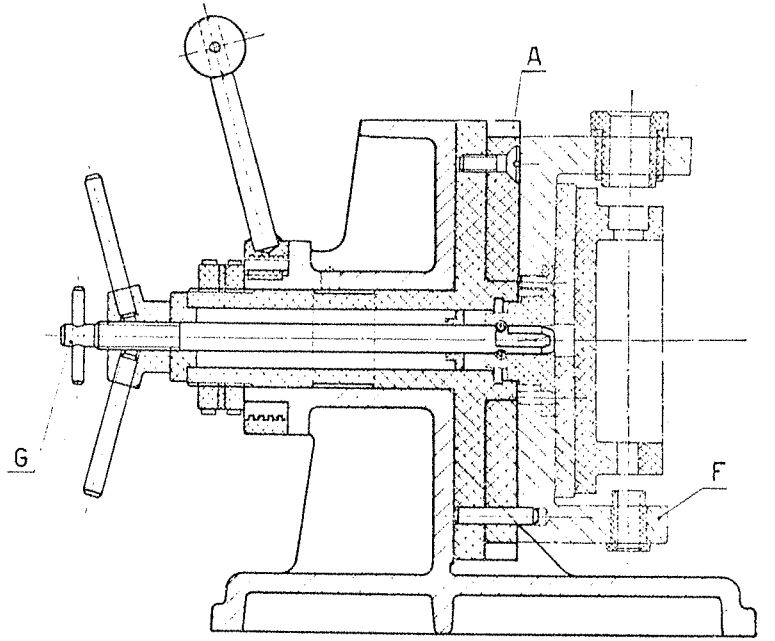


34

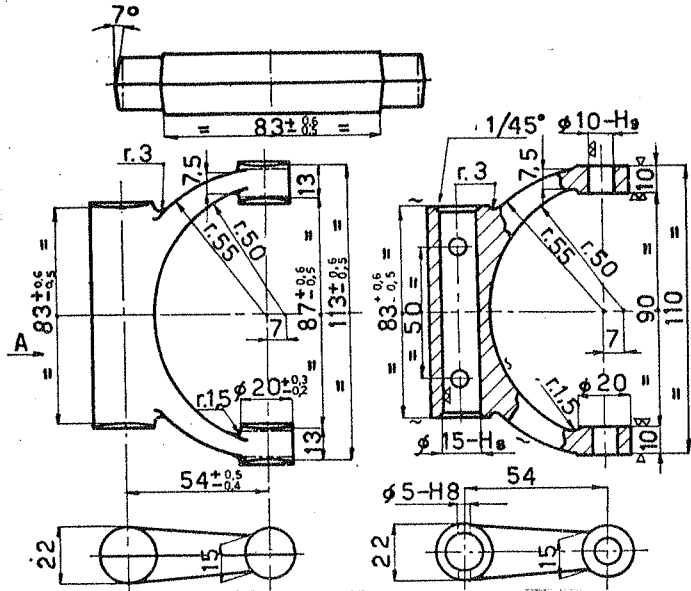
MOTOR KARTERİ YÜZEYİ FREZELEME APARATI



x-x kesiti

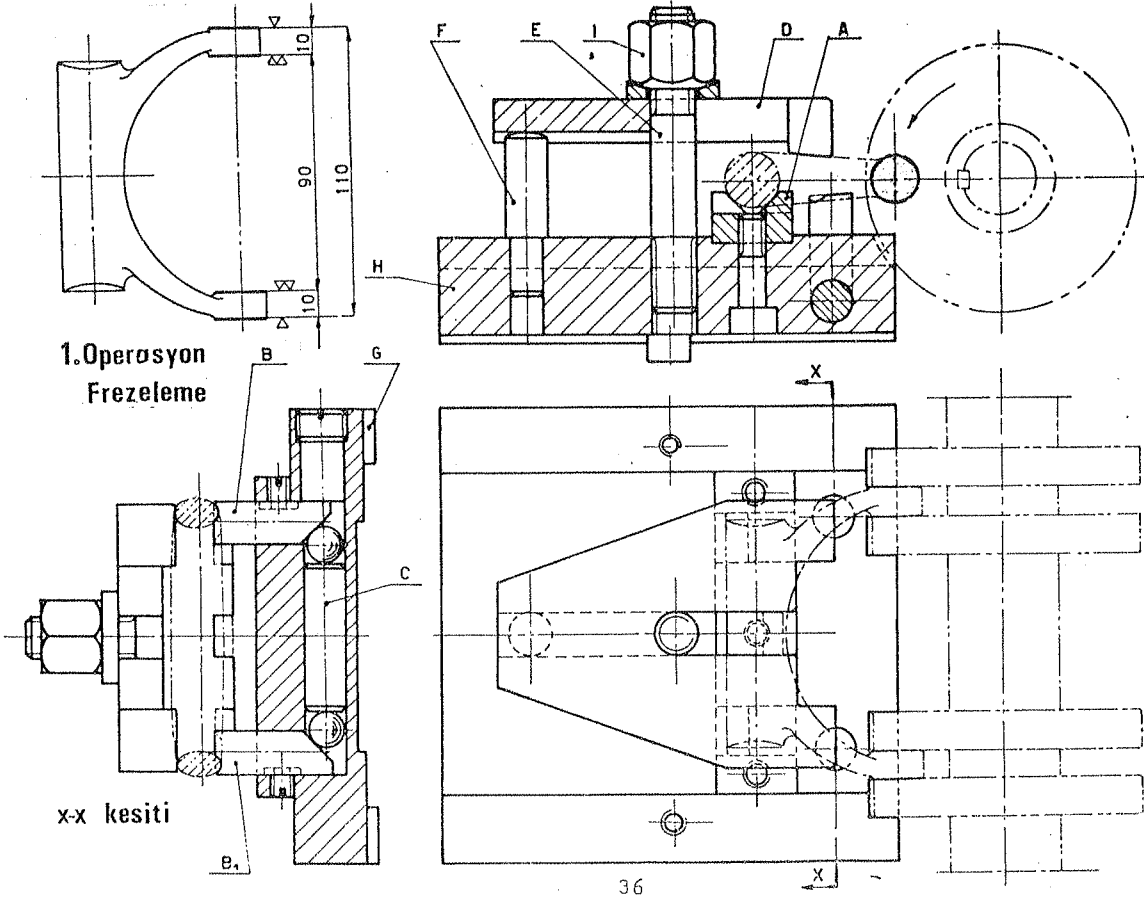


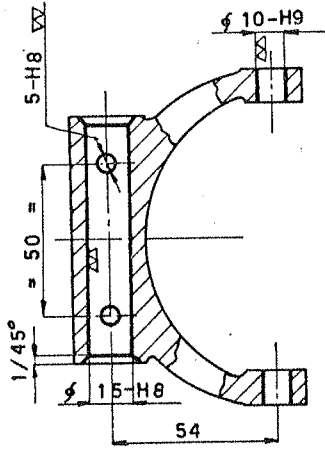
DIVIZÖR TERTİBATLI DELME APARATI



İmalatı İstenen
VİTES ÇATALI
 Malzeme: Ç 1030
 Sayı : 1500

FREZELEME APARATI



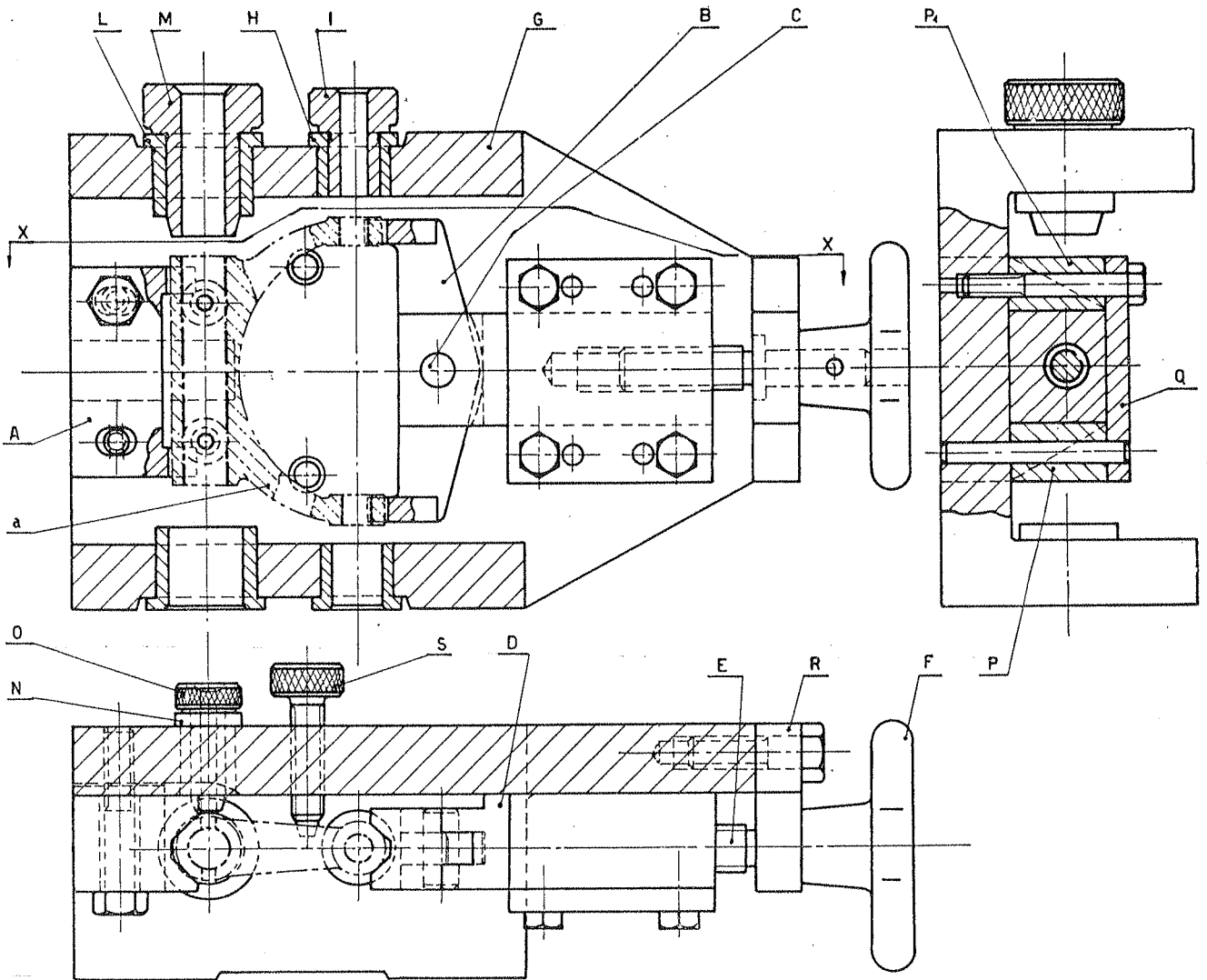


2. OPERASYON

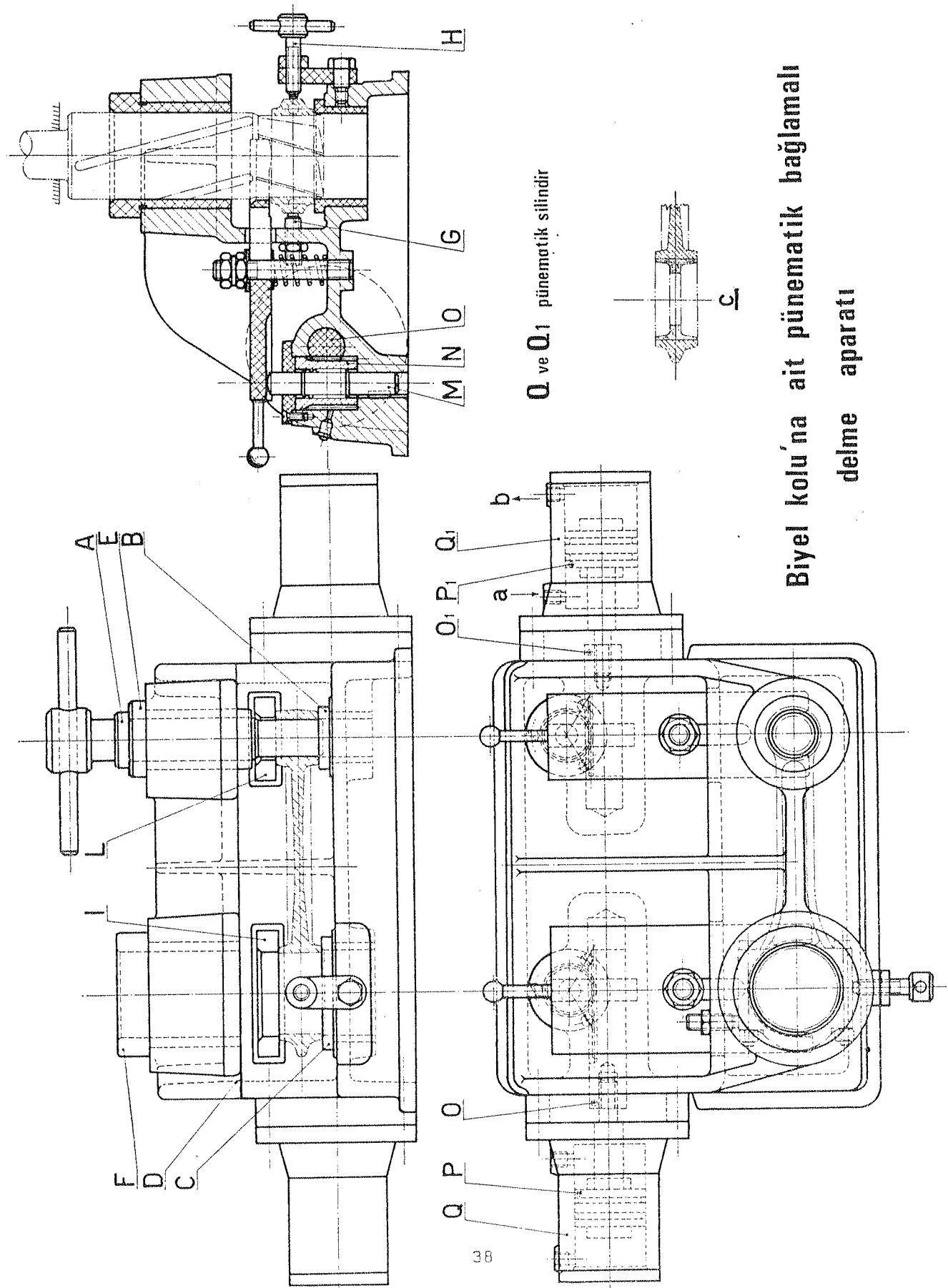
Delme, Raybalama, Havşalama

- a.) $\phi 14$ mm.lik matkapla delme (ön delme)
- b.) $\phi 14,75$ mm.lik matkapla delme (ön delme)
- c.) $\phi 15$ H8 ölçüsünde raybalama
- d.) 45° lik havşa matkabiyle havşalama
- e.) $9,75$ mm matkapla delme (ön delme)
- f.) $\phi 10$ H9 ölçüsünde raybalama
- g.) $\phi 4,75$ mm. matkapla delme (ön delme)
- h.) $\phi 5,015$ ölçüsünde raybalama

VİTES ÇATALI DELME APARATI

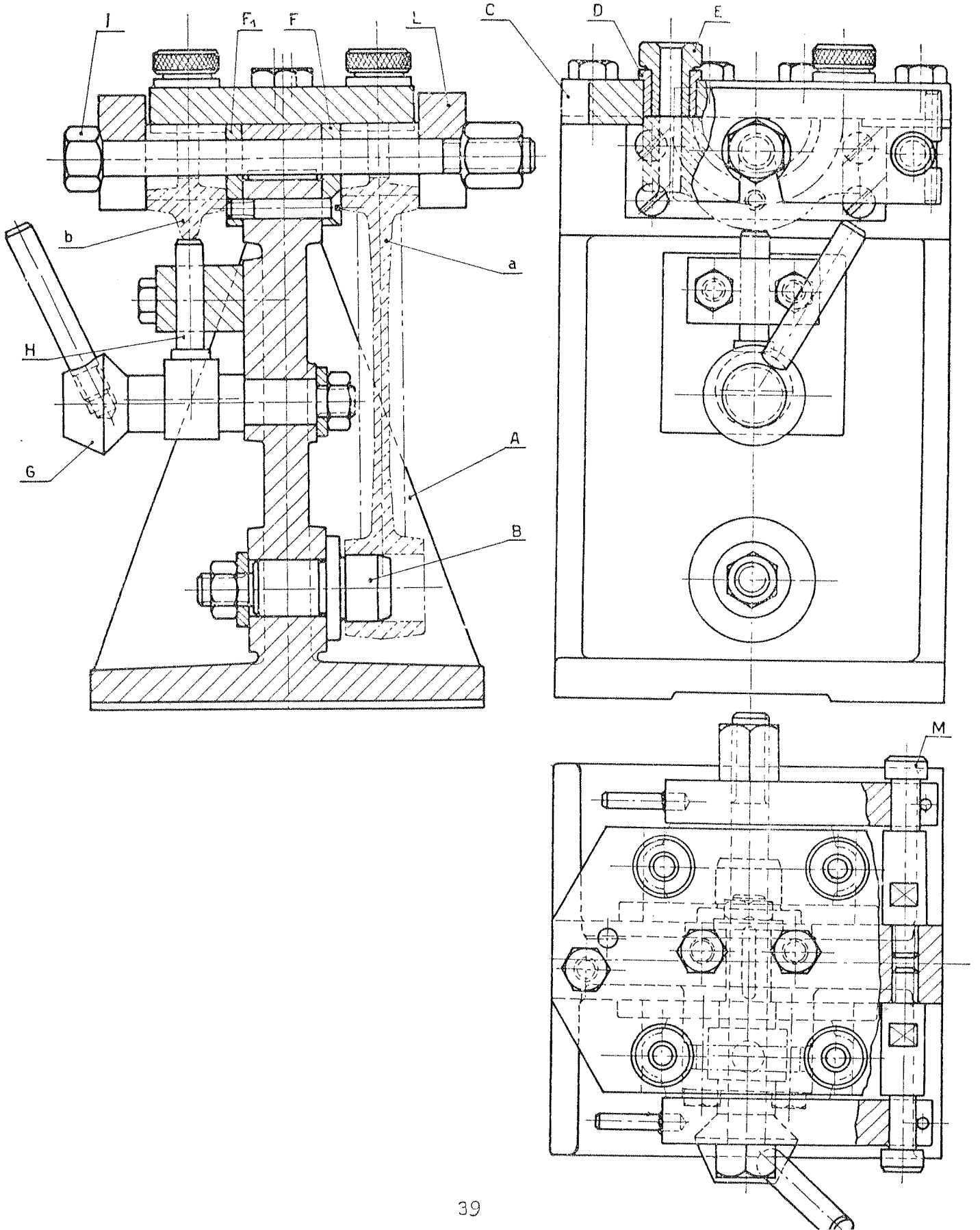


X-X kesiti

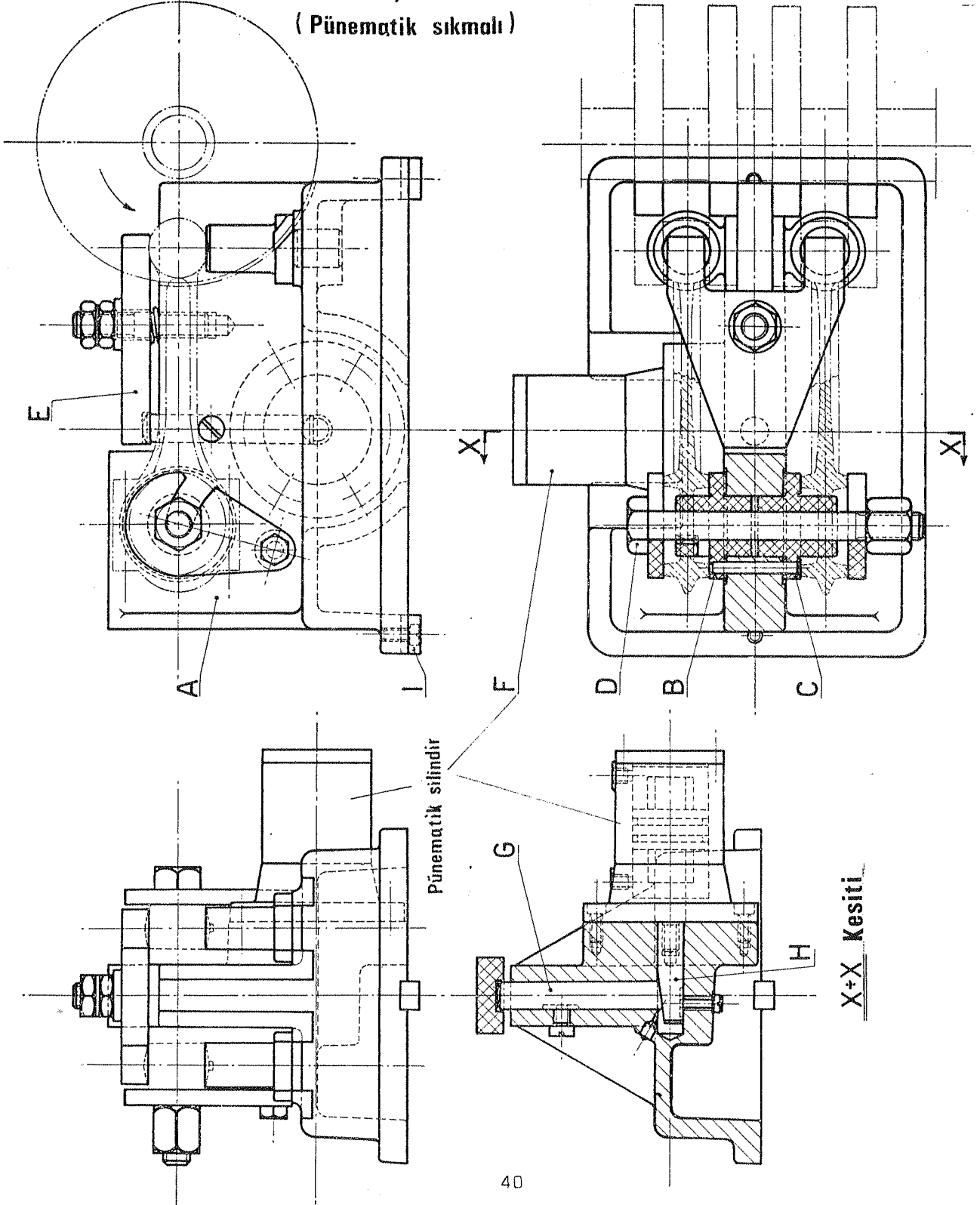


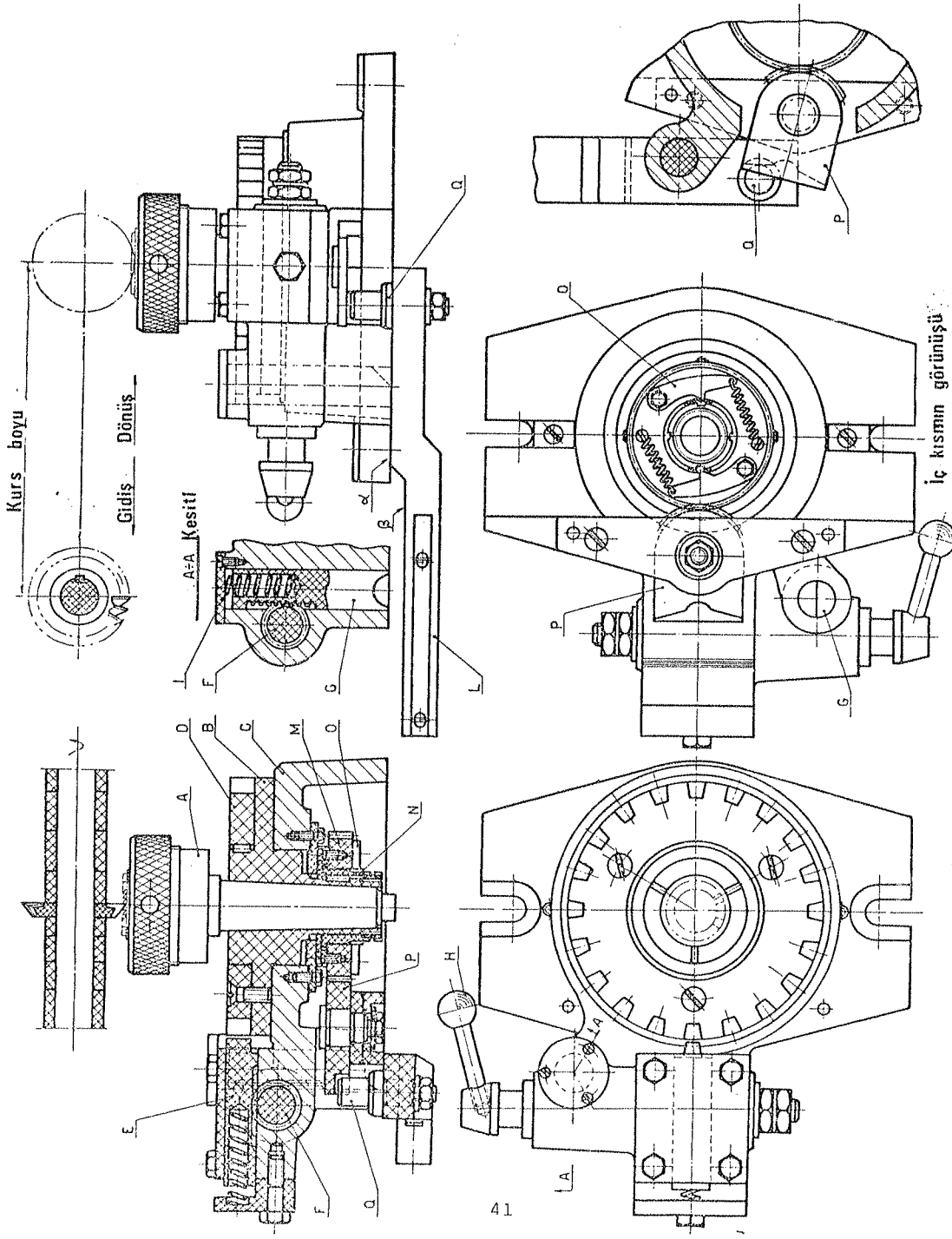
BİYEL KOLU ve KEBİ

Bağlantı deliği delme kalıbı



BİYEL KOLU ÇOKLU FREZELEME APARATI
(Pünematik sıkmalı)





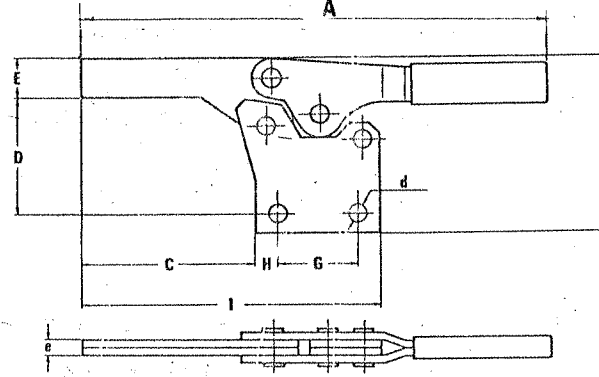
OTAMATİK BÖLÜNTÜLÜ FREZELEME APARATI

İç kısmın görünüşü

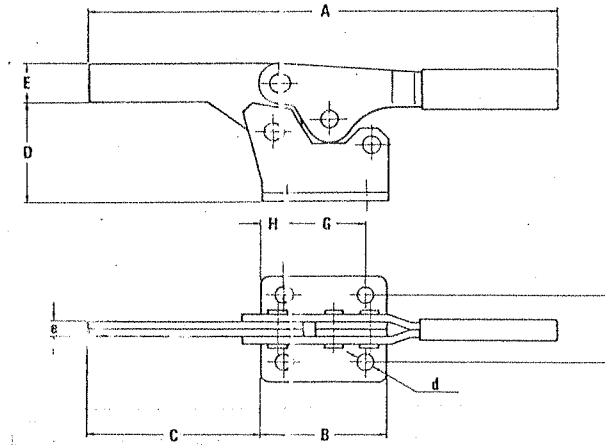
BAĞLAMA

STANDARTLARI

YATAY
TABANSIZ ve TABANLI GERDİRMELİ ÇABUK SIKICILAR

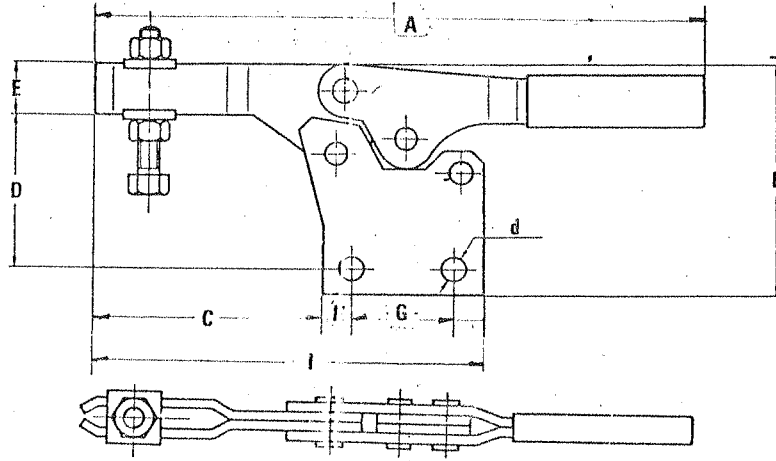


A	B	C	D	E	G	H	I	d	e	gr.	Açılma	Sıkma kg.
133	35	45	36	11	15	10	80	4,5	4	110	90°	50
178	64	68	42	15	23	10	114	5,5	5	220	90°	125
247	85	91	65	20	36	11	149	8,5	7	540	90°	300
330	135	124	71	27	42	14	194	8,5	10	1315	90°	450

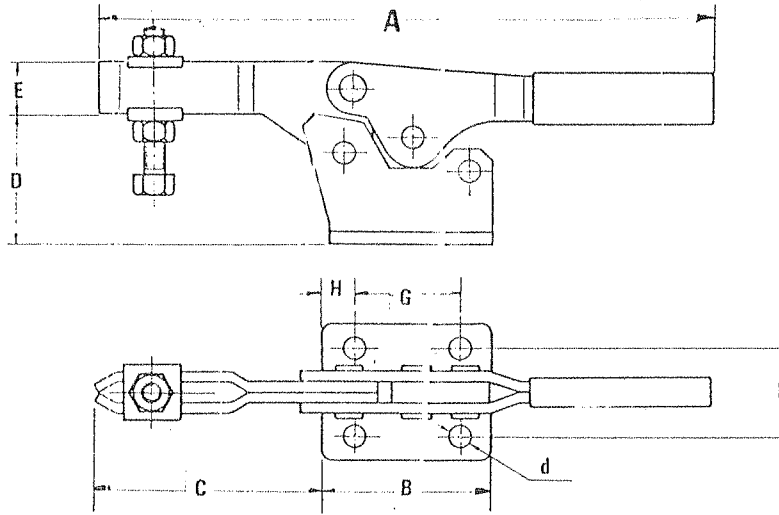


A	B	C	D	E	F	G	H	d	gr.	Açılma	Sıkma kg.
133	35	45	30	11	24	15	10	4,5	110	90°	50
178	47	69	37	15	23	26	10	5,5	220	90°	125
247	58	91	44,5	20	36	36	11	8,5	540	90°	300
330	70	124	61	27	42	42	14	8,5	1315	90°	450

YATAY
TABANSIZ ve TABANLI SIKMA UÇLU GERDİRMELİ BAĞLAYICILAR

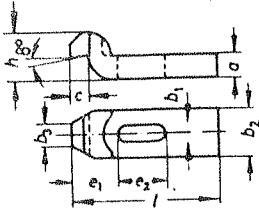


A	B	C	D	E	G	H	I	d	gr.	Açılma	Sıkma kg.
72	35	22	30	8	15	5	47	4	40	90°	25
131	35	43	36	11	15	10	78	4,5	120	90°	50
176	64	66	42	15	26	10	111	5,5	250	90°	125
245	85	89	65	20	36	11	147	8,5	640	90°	300
327	135	121	71	27	42	14	191	8,5	1465	90°	450

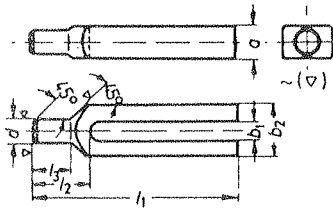


A	B	C	D	E	F	G	H	d	gr.	Açılma	Sıkma kg.
72	25	22	18	8	15	15	5	4	40	90°	25
131	35	43	30	11	24	15	10	4,5	120	90°	50
176	47	66	37	15	23	26	10	5,5	250	90°	125
245	58	89	44,5	20	36	36	11	8,5	640	90°	300
327	70	121	61	27	42	42	14	8,5	1465	90°	450

PABUÇLAR



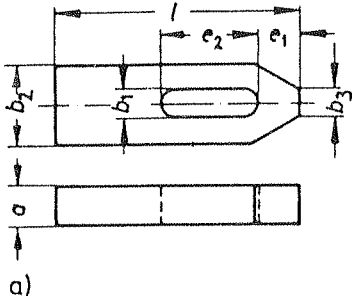
b_1	l	a	b_2	b_3	c	e_1	e_2	h	Vida
7	60	10	20	10	8	20	20	20	M 6
9	80	12	25	12	9	25	25	24	M 8
11	100	15	30	15	12	32	32	30	M 10
14	125	20	40	20	16	40	40	40	M 12, M 14
18	125	25	50	25	20	49	40	50	M 16, M 18
	160						50		
22	160	30	60	30	24	55	55	60	M 20
	200						70		
26	200	35	70	35	28	72	60	70	M 24
	250						80		
35	250	40	80	40	40	91	70	80	M 30
	315	50	100				100	100	



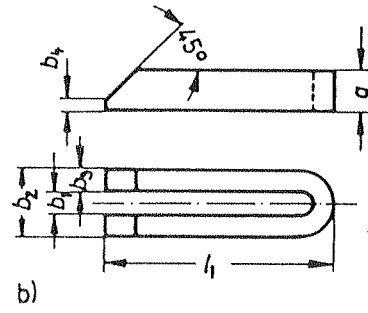
c)

b_1	l_1	a	b_2	c/l	l_2	l_3	Vida
9	100	15	30	12	30	18	M 8
11	125	20	30	16	36	24	M 10
14	160	25	40	20	45	30	M 12 + 14
14	200	25	40	20	45	30	M 12 + 14
18	200	30	50	24	55	36	M 16 + 18
18	250	30	50	24	55	36	M 16 + 18
22	250	40	60	30	65	45	M 20 + 22
22	315	40	60	30	65	45	M 20 + 22
26	250	40	70	38	80	56	M 24
26	315	40	70	38	80	56	M 24
34	315	50	80	45	85	56	M 30
34	400	50	80	45	85	56	M 30

PABUÇLAR

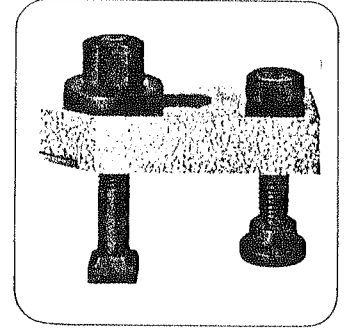
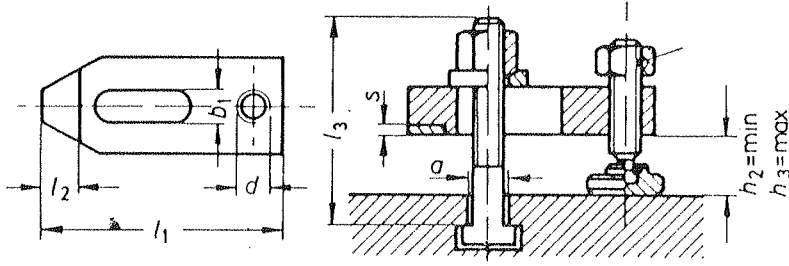


b_1	l	a	b_2	b_3	e_1	e_2	Vida
7	50	10	20	8	10	20	M 6
9	60	12	25	10	13	22	M 8
11	80	15	30	12	15	30	M 10
14	100	20	40	14	21	40	M 12, M 14
	125					50	
18	125	25	50	18	26	45	M 16, M 18
	160					65	
22	160	30	60	22	30	60	M 20, M 22
	200					80	
26	200	30	70	26	35	80	M 24
	250					105	
34	250	40	80	34	45	100	M 30
	315					130	

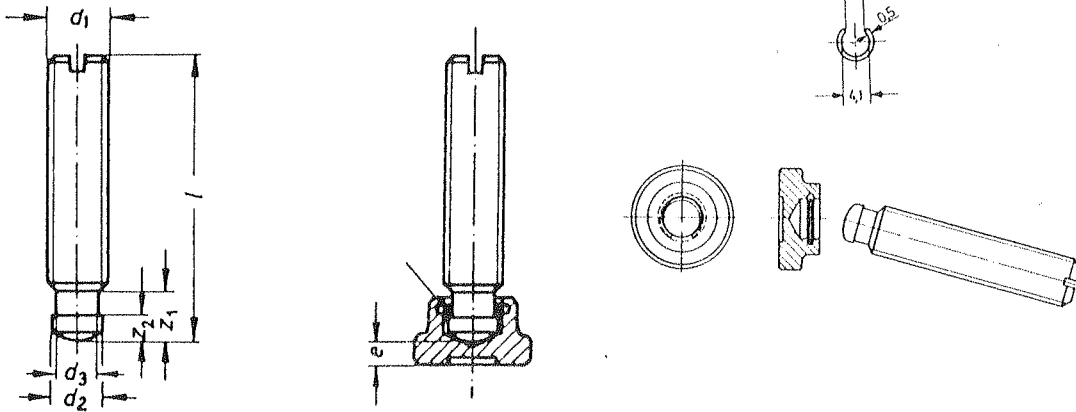


b_1	l_1	a	b_2	b_3	b_4	Vida
7	60	12	19	6	3	M 6
9	80	15	25	8	4	M 8
11	100	20	31	10	5	M 10
14	125	25	38	12	6	M 12, M 14
	160					
	200					
18	160	30	48	15	8	M 16, M 18
	200	30			8	
	250	40			10	
22	200	40	52	15	10	M 20, M 22
	250		62	20		
	315		62	20		
26	200	40	66	20	10	M 24
	250					
	315					
34	250	50	74	20	12	M 30
	315					
	400					
40	400	60	100	30	12	M 36
	600					

PABUÇ (Yüksekliği ayarlanabilir)

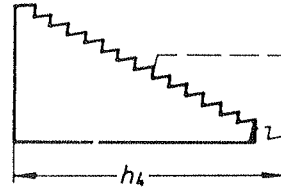
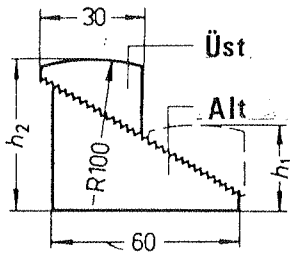
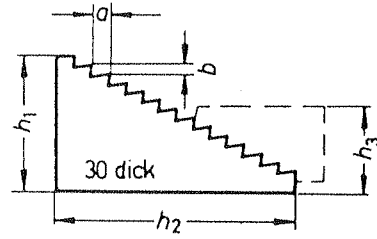
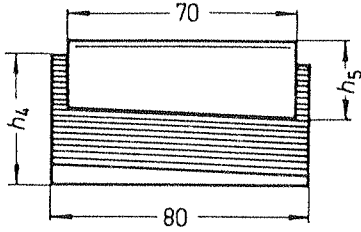


a	l_3	min. h_2	max. h_3	b_1	l_1	d	l_2	s
8	50	8	19	9	60	M 8	10	2
8	80	8	49					
10	65	10	27	11	80	M 10	12	2
10	100	10	62					
12	80	10	32	14	100	M 12	15	3
12	125	10	77					
14	80	10	30					
14	125	10	75					
16	100	12	38	18	125	M 16	20	3
16	160	12	98					
18	100	12	36					
18	160	12	96					



d_1	l					$d_2 h 11$	d_3	$e \approx$	$z_1 \approx$	$z_2 \approx$
M 6	30	35	40	50		4,5	4	2,2	5,4	2,5
M 8	35	40	45	50	60	6	5,4	3	6,8	3
M 10	50	55	60	65	80	8	7,2	4,5	8,2	4,5
M 12	60	65	70	80	100	8	7,2	4,5	8,6	4,5
M 16	65	70	80	100	125	12	11	5,3	10,6	5
M 20	80	90	100	125	150	15,5	14,4	5,6	12,4	5,5

PABUÇ DESTEKLERİ



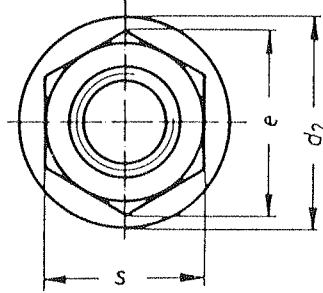
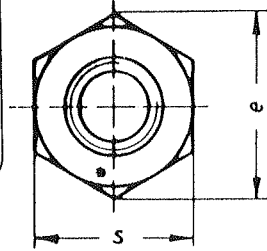
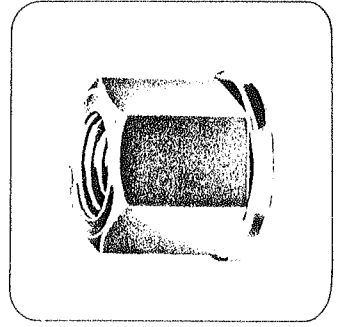
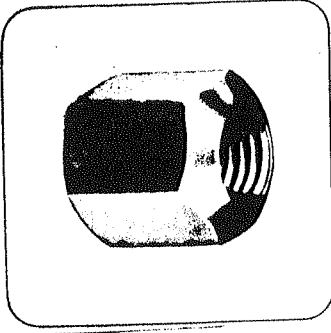
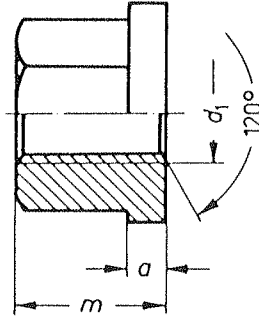
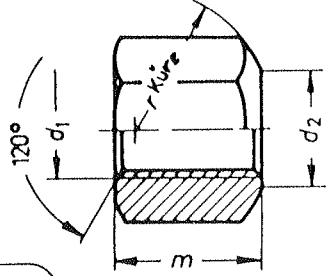
	h_4	h_5	min. max.	
			h_1	h_2
Alt				
A	42			
B	82			
C	122			
Üst				
K		24		
G		44		
A K			24	45
A G			45	65
A K G			25	65
B K			65	85
B G			85	105
B K G			65	105
C K			105	125
C G			125	145
C K G			105	145

	h_1	h_2	a	b	min. max.	
					h_3	h_4
1	20	32	4,65	2,3		
2	35	64	4,65	2,3		
3	68	128	4,65	2,3		

BAĞLAMA SOMUNLARI

Tabansız

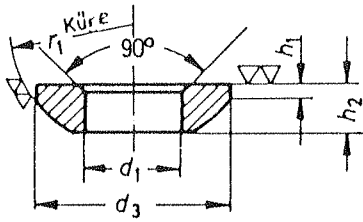
Tabanlı



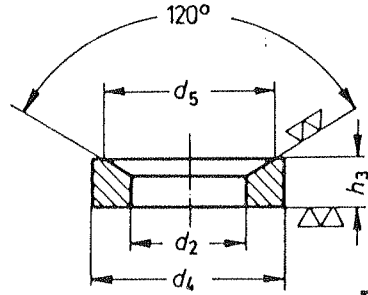
d_1	d_2	e	m	r	s
M 6	7	11,5	9	9	10
M 8	9	15	12	11	13
M 10	11,5	19,6	15	15	17
M 12	14	21,9	18	17	19
M 14	16	25,4	21	20	22
M 16	18	27,7	24	22	24
M 18	20	31,2	27	24,5	27
M 20	22	34,6	30	27	30
M 22	22	36,9	33	29	32
M 24	26	41,6	36	32	36
M 30	32	53,1	45	41	46
M 36	38	63,5	54	50	55

d_1	a	d_2	e	m	s
M 8	3,5	18	15	12	13
M 10	4	22	19,6	15	17
M 12	4	25	21,9	18	19
M 14	4	28	25,4	21	22
M 16	5	31	27,7	24	24
M 18	5	34	31,2	27	27
M 20	6	37	34,6	30	30
M 22	6	40	36,9	33	32
M 24	6	45	41,6	36	36
M 30	8	58	58,1	45	46
M 36	10	68	63,5	54	55

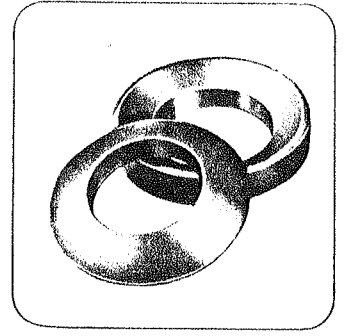
RONDELA' LAR



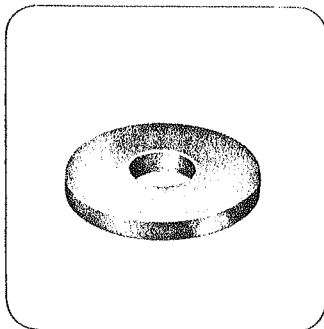
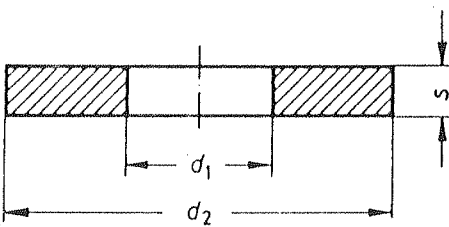
Form C



Form D-G

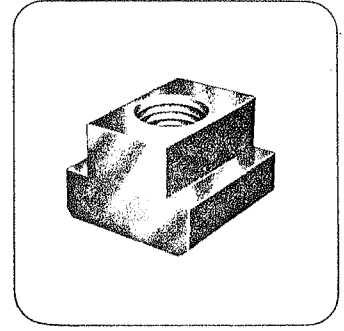
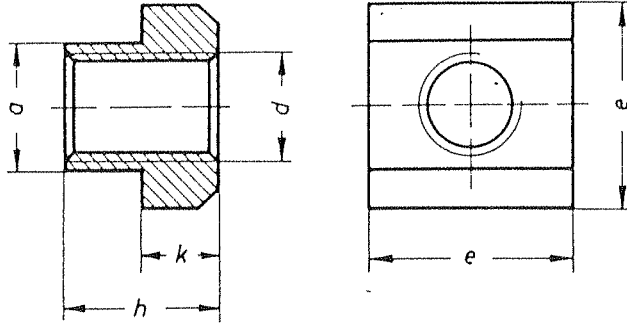


d_1 H 12	d_2 H 12	d_3	d_4		d_5	h_1	h_2	h_3		r_1
			Form D	G				Form D	G	
6,4	7,1	12	12	17	11	0,7	2,3	2,8	4	9
8,4	9,6	17	17	24	14,5	0,6	3,2	3,6	5	12
10,5	12	21	21	30	18,5	0,8	4	4,2	5	15
13	14,2	24	24	36	20	1,1	4,6	5	6	17
15	16,5	28	28	—	24,8	1,2	5	5,6	—	22
17	19	30	30	44	26	1,3	5,3	6,2	7	22
21	23,2	36	36	50	31	2	6,3	7,5	8	27
25	28	44	44	60	37	2,4	8,2	9,5	10	32
31	35	56	56	68	49	3,6	11,2	12	12	41
37	42	68	68	—	60	4,6	14	15	—	50
43	49	78	78	—	70	6,5	17	18	—	58
50	56	92	92	—	82	8	21	22	—	67



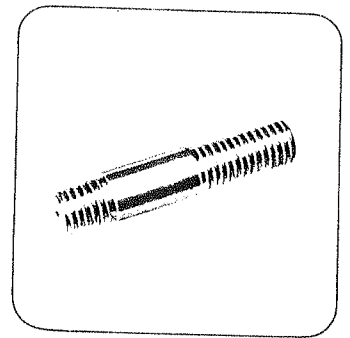
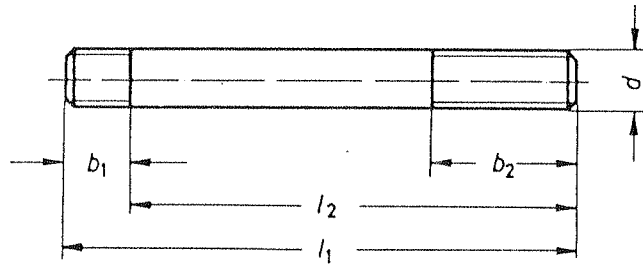
d_1	d_2	s	Vidq
6,4	17	3	M 8
8,4	23	4	M 8
10,5	28	4	M 10
13	35	5	M 12
15	40	5	M 14
17	45	6	M 16
19	45	6	M 18
21	50	6	M 20
23	50	8	M 22
25	60	8	M 24
31	68	10	M 30
38	80	12	M 36

T SOMUNU



T Kanal ölçüsü	d	a	e	h	k
6	M 5	5,6	10	8	4
8	M 6	7,6	13	10	6
10	M 8	9,6	15	12	6
12	M 10 (M 8*)	11,5	18	14	7
14	M 12 (M 10*)	13,5	22	16	8
16	M 14 (M 12*)	15,6	25	18	9
18	M 16 (M 14*)	17,5	28	20	10
20	M 18 (M 16*)	19,6	32	24	12
22	M 20 (M 18*)	21,6	35	28	14
24	M 22 (M 20*)	23,6	40	32	16
28	M 24	27,6	44	36	18
32	M 27	31,5	50	40	20
36	M 30	35,5	54	44	22
42	M 36	41,5	65	52	26
48	M 42	47,5	75	60	30
54	M 48	53,4	85	70	34

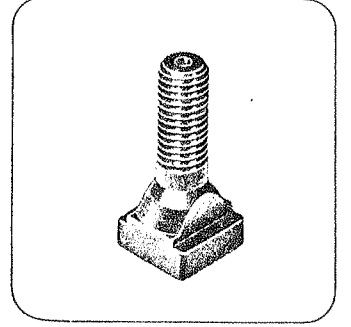
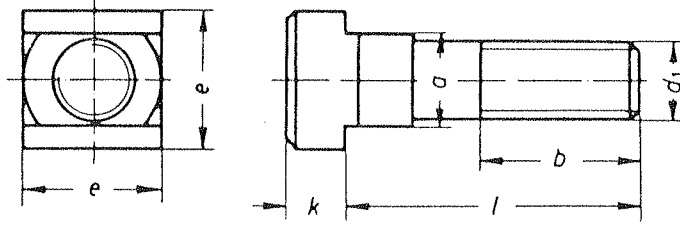
SAPLAMA



d	l_1	b_1	b_2	l_2
M 6	32	9	16	23
	50		30	41
	80		50	71
M 8	40	11	20	29
	63		40	52
	100		63	89
	160		100	149
M 10	50	13	25	37
	80		50	67
	125		75	112
	200		125	187
M 12	50	15	25	35
	63		32	48
	80		50	65
	100		63	85
	125		75	110
M 14	200		125	185
	63	17	32	46
	100		63	83
	160		100	143
M 16	250		160	233
	63	19	32	44
	80		50	61
	100		63	81

d	l_1	b_1	b_2	l_2
M 16	125	19	75	106
	160		100	141
	250		160	231
M 20	80	27	32	53
	125		70	98
	200		125	173
	250		160	223
M 24	315		180	288
	500		315	473
	100	35	45	65
	160		100	125
M 30	250		160	215
	400		250	365
	630		315	595
	125	43	56	92
M 36	200		125	157
	315		200	272
	500		315	457
	700		400	657
M 36	160	51	80	109
	250		160	199
	400		250	349
	700		400	649

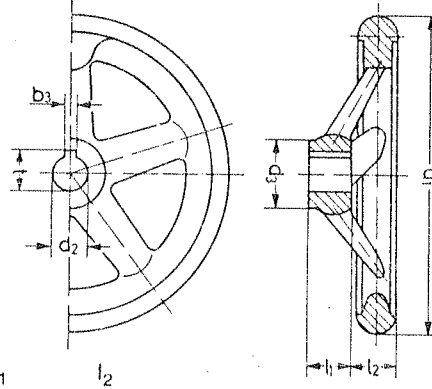
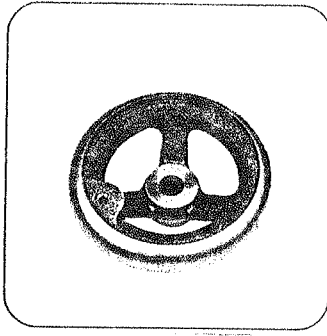
T KANAL VİDASI



Kanal Genişliği	d_1	l	a	b	e	k
6	M 6	25	5,6	15	10	4
		40		28		
		65		40		
8	M 8	32	7,6	22	13	6
		50		35		
		80		50		
10	M 10	40	9,6	30	15	6
		65		45		
		100		60		
12	M 12	50	11,6	35	18	7
		80		55		
		125		74		
		200		120		
14	M 12	50	13,6	35	22	8
		80		55		
		125		75		
		200		120		
16	M 16	65	15,6	45	24	9
		100		65		
		160		100		
		250		150		

Kanal Genişliği	d_1	l	a	b	e	k
18	M 16	65	17,6	45	28	10
		100		65		
		160		100		
		250		150		
22	M 20	80	21,6	55	35	14
		125		85		
		200		125		
28	M 24	100	27,6	70	44	18
		160		110		
		250		150		
36	M 30	125	35,5	80	54	22
		200		135		
		320		200		
		500		300		
42	M 36	160	41,5	100	65	26
		250		175		
		400		250		
		600		340		

EL ÇARKI (Kollu)

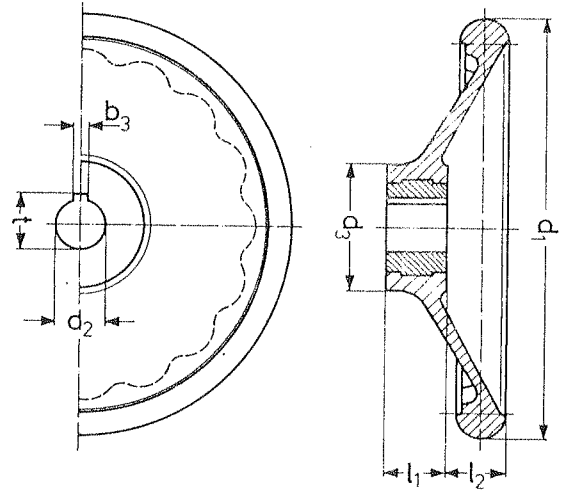
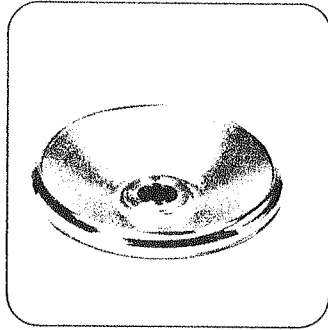


d_1	d_2 H7		d_3	l_1	l_2	kol adedi
	küçük	büyük				
80	10	12	24	16	13	3
100	10	12	26	17	16	3
125	12	14	28	18	18	3
140	14	16	30	19	20	3
160	14	16	32	20	20	3
200	18	22	38	24	21	3
250	22	26	45	28	22	5
315	26	30	53	33	23	5
400	30	34	65	38	25	5
500	34	40	78	45	27	5
630	40	50	95	56	32	7
800	50	—	116	68	37	7

Kama ölçüleri

d_2	10	12	14	16	18	22	26	30	34	40	50
b_3	3	4	5	5	6	6	8	8	10	12	14
t	11,4	13,8	16,3	18,3	20,8	24,8	29,3	33,3	37,3	43,3	53,8

EL ÇARKI (DÜZ)

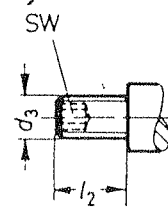
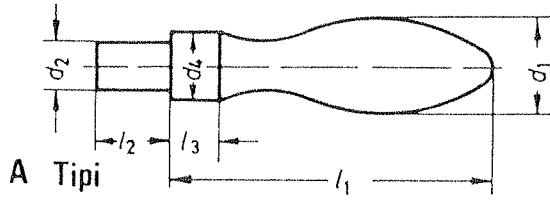


d_1	d_2 H7		d_3	l_1	l_2
	küçük	büyük			
100*	10	12	26	17	16
125	12	14	35	18	18
160	14	16	40	20	20
200	18	22	45	24	21
250	22	26	52	28	22

kama ölçüleri

d_2	10	12	14	16	18	22	26
b_3	3	4	5	5	6	6	8
t	11,4	13,8	16,3	18,3	20,8	24,8	29,3

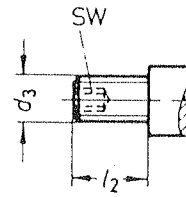
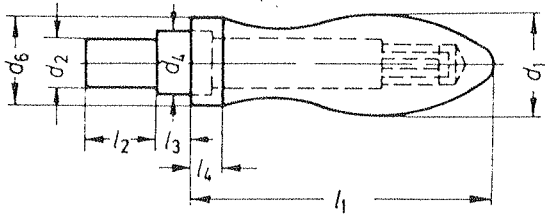
SABİT ÇEVİRME SAPI



B Tipi

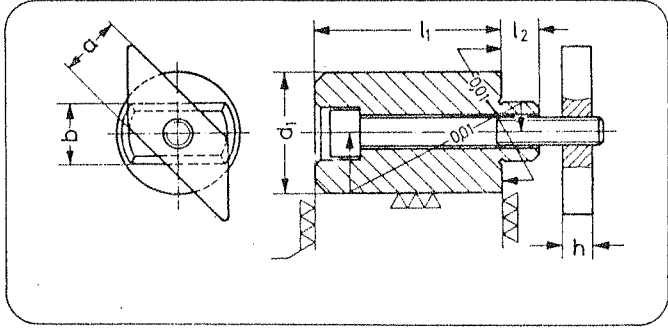
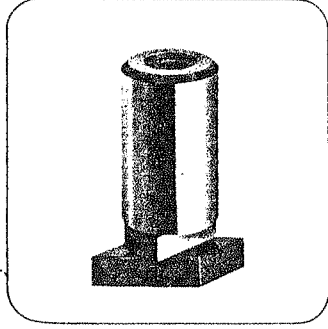
	TİP		d_4 h 13	l_1 ≈	l_2	l_3	SW
	A	B					
d_1	d_2 h 8	d_3					
10	4	M 4	7	32	7	4	—
13	5	M 5	8	40	9	5	—
16	7	M 6	10	50	11	7	3
20	8	M 8	13	64	13	8	4
25	10	M 10	16	80	14	10	5
32	13	M 12	20	100	21	13	6
36	16	M 16	22	112	26	14	8

DÖNER ÇEVİRME SAPI

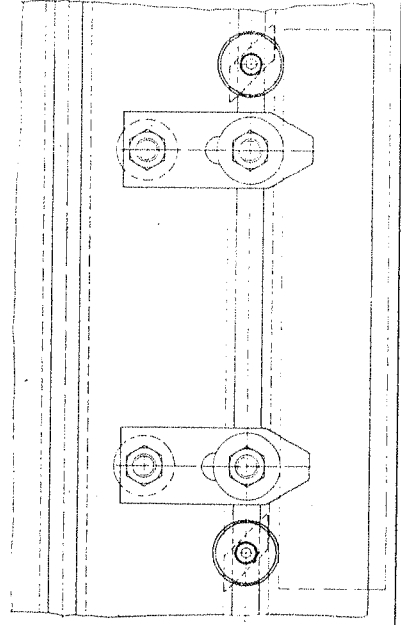
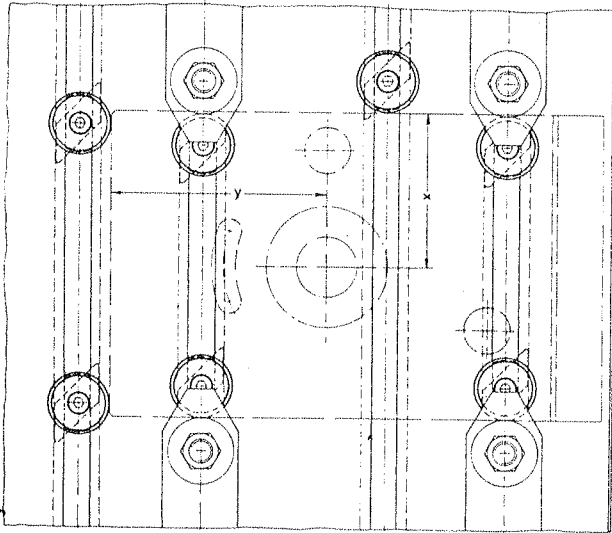
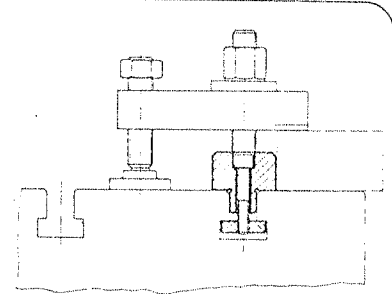
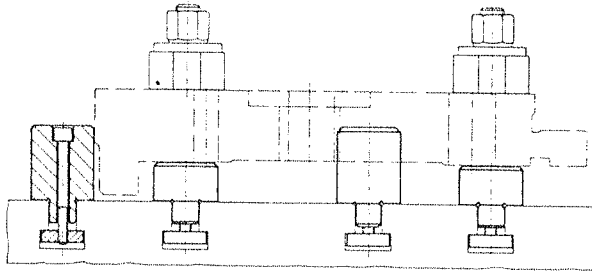


d_1	d_2 h 8	d_3	d_4 h 13	d_6	l_1 ≈	l_2	l_3	l_4	SW
16	7	M 6	10	14	49	11	5,5	5	3
20	8	M 8	13	18	61	13	6	6	4
25	10	M 10	16	21	75	14	8	6,5	5
32	13	M 12	20	26	95	21	10,5	8	6
36	16	M 16	22	29	106	26	11	9	8

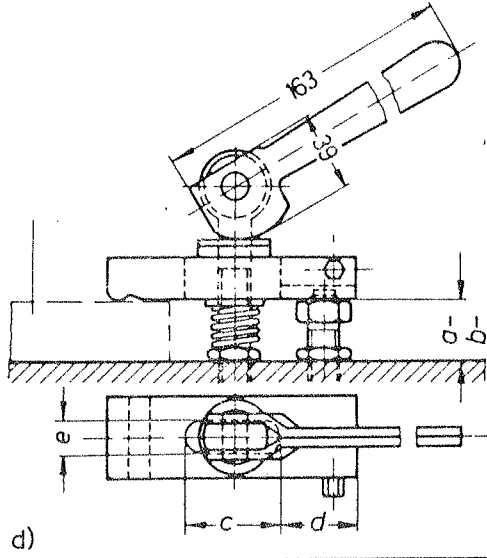
SİLİNDİRİK DAYAMA



b	l ₁	uzun	a	d ₁	h	l ₂	vida
h 6	kısa	uzun	- 0,6	± 0,01			
	± 0,01	± 0,2					
10	15	-	10	20	6	8	M 6×25
10	-	25	10	20	6	8	M 6×35
12	15	-	12	20	6	8	M 6×25
12	-	25	12	20	6	8	M 6×35
14	25	-	14	32	8	9	M 8×35
14	-	50	14	32	8	9	M 8×60
16	25	-	16	32	8	10	M 8×45
16	-	50	16	32	8	10	M 8×70
18	25	-	18	40	10	15	M 10×50
18	-	50	18	40	10	15	M 10×75
22	25	-	20	40	14	15	M 10×55
22	-	50	20	40	14	15	M 10×80
28	25	-	22	46	16	20	M 12×60
28	-	50	22	46	16	20	M 12×90



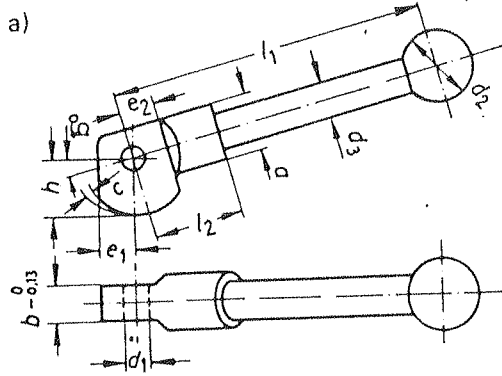
KAMLI ÇABUK SIKICILAR



a	b	c	d	e	maksimum kam yüksekliği	Pabuç ölçüleri	Vida
30	45	39	31	14	4	100 x 30 x 20	M 12
35	50	48	38,5	18	5	125 x 40 x 20	M 16
36	50	48	51	18	6	150 x 40 x 20	M 16

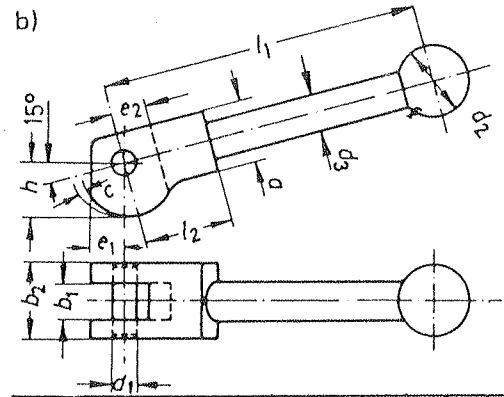
SIKMA KOLLARI

KAM ORTADAN



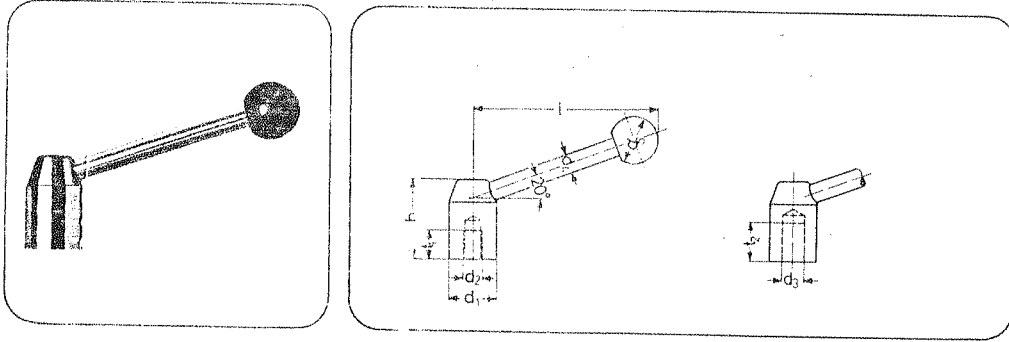
b	a	c	d ₁	d ₂	d ₃	e ₁	e ₂	h	l ₁	l ₂
6	17	2	5	22	10	13	10	16	90	32
8	18	2	6	25	10	13	11	16	85	30
10	24	2	8	25	12	14	14	19	125	40
12	25	2	10	38	14	16	19	25	150	42
16	25	2	10	38	14	16	19	25	185	42
20	32	2,5	12	38	16	28	22	38	220	50
25	38	3	16	38	20	32	25	50	320	64

KAM ÇİFT YÜZLÜ



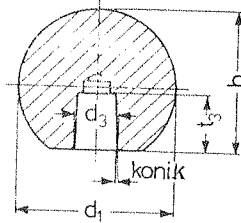
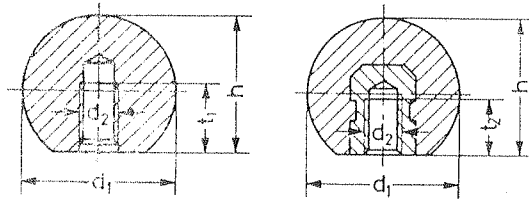
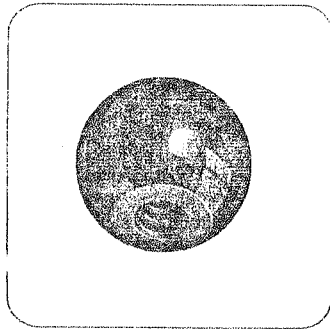
b ₁	a	b ₂	c	d ₁	d ₂	d ₃	e ₁	e ₂	h	l ₁	l ₂
6,5	18	16	2	5	22	10	13	8	16	95	30
8,5	18	19	2	6	22	10	13	10	16	95	30
10,5	22	22	2	8	25	12	14	12	19	125	38
12,5	18	25	2	10	25	10	13	12	16	100	30
	25	32	2	10	38	14	16	14	25	150	42
14,5	24	32	2	12	32	12	15	16	19	135	40
16,5	32	45	2,5	12	38	16	28	18	38	220	50
20,5	38	50	3	16	38	20	32	22	50	320	63

SIKMA KOLU



d_1	d_2	d_3 H 7	d_4	d_5	h	l \approx	t_1	t_2
20	M 8	10	8	20	33	72	12	16
22	M 10	10	8	20	37	85	15	18
28	M 12	12	12	30	47	115	18	22
36	M 16	16	14	35	58	145	24	26
45	M 20	20	16	40	71	180	30	30
		24						

KÜRESEL TOPUZ



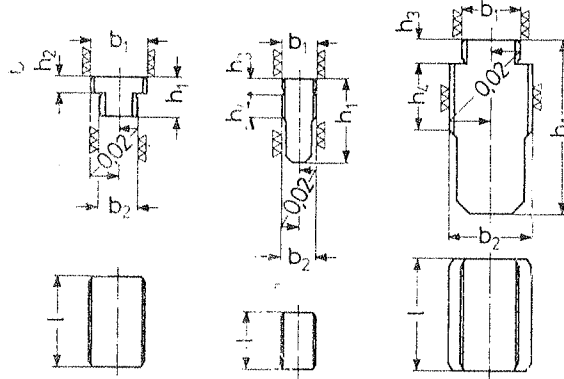
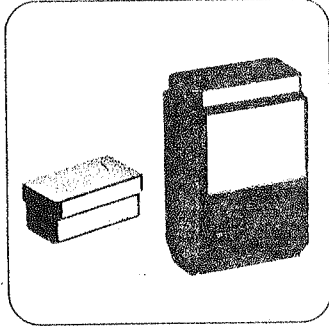
d_1	d_2	d_3	h	t_1 \geq	t_2 \geq	t_3 \geq
16	M 4	4	15	7,2	6	9
20	M 5	5	18	9,1	7,5	12
25	M 6	6	22,5	11	9	15
32	M 8	8	29	14,5	12	15
40	M 10	10	37	18	15	20
50	M 12	12	46	21	18	22

TEZGAH T KANALLARINA YERLEŞTİRİLEN PRİZMATİK PARÇA DAYAMALARI

$b_1 > b_2$

$b_1 = b_2$

$b_1 < b_2$



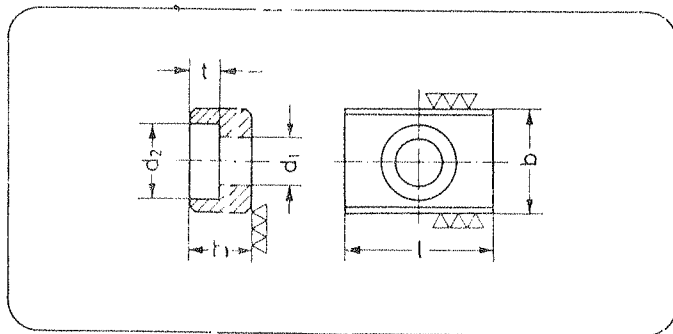
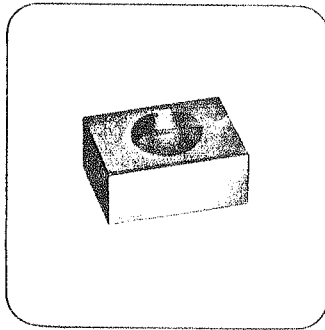
Form 1

2

3

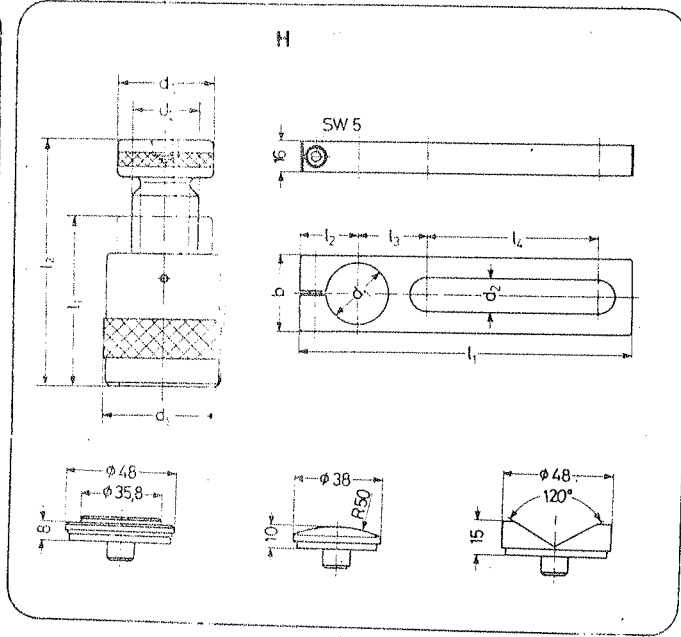
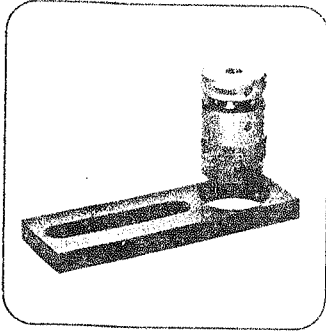
Form

b_1 h 6	b_2 h 6	h_1	h_2	h_3	h_4	l	Form
12	10	12	3,6	-	-	20	1
12	12	28,6	-	5,5	9	20	2
20	12	14	5,5	-	-	32	1
20	14	14	5,5	-	-	32	1
20	16	14	5,5	-	-	32	1
20	18	14	5,5	-	-	32	1
20	20	45,5	-	7	16	32	2
20	22	50,5	-	7	18	40	3
20	28	61,5	-	7	24	40	3
20	36	76,5	-	7	30	50	3



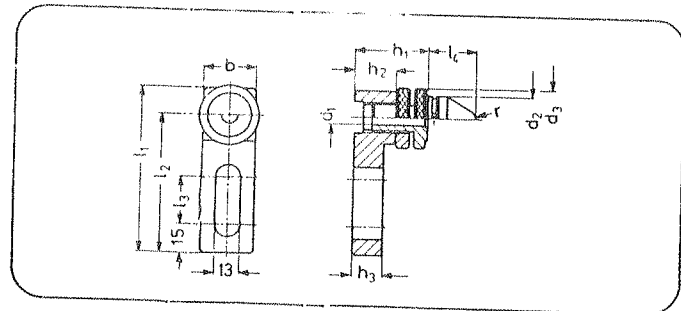
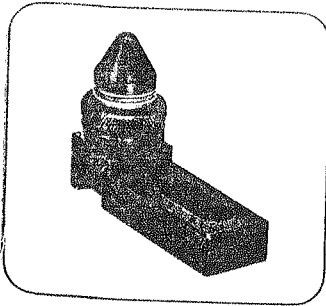
b h 6	h	l	d_1	d_2	t	Vida
10	8	20	4,3	7,4	4,3	M 4 × 10
12	8	20	5,3	9,4	5,3	M 5 × 12
14	10	22	6,4	10,4	6,3	M 6 × 16
16	10	22	6,4	10,4	6,3	M 6 × 16
18	10	22	6,4	10,4	6,3	M 6 × 16
20	10	22	6,4	10,4	6,3	M 6 × 16
22	12	32	6,4	10,4	6,3	M 6 × 16

AYARLANABİLEN VİDALI DESTEK



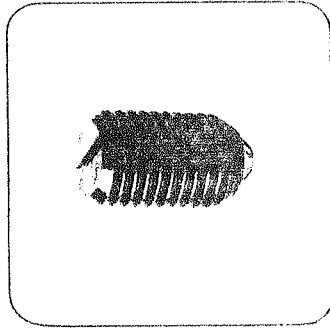
max. l_2	min. l_1	d_1	d_2	d_3	taşıdığı yük kg
50*	38	31	32	20	1500
52	42	50	50	30	6000
70	50	50	50	30	6000
100	70	50	50	30	6000
140	100	68	65	40	10000
210	140	80	70	50	17000
300	190	100	80	65	35000

d_1	b	d_2	l_1	l_2	l_3	l_4
32	40	18,5	175	30	37	90
50	60	20,5	190	38	44	90
70	80	24,5	210	43	54	90

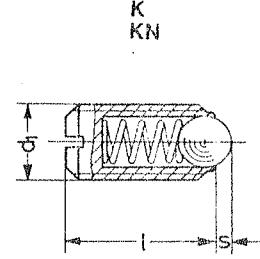
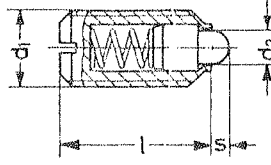


b	d_1	d_2	d_3	l_1	l_2	l_3	l_4	h_1 min.	h_1 max.	h_2	h_3	r
28	10	24	32	88	74	25	24	36	45	22	16	5
38	18	30	42	108	89	40	27	44	54	26	20	8
48	24,8	45	55	108	84	25	27	54	68	32	26	8
58	35	52	68	128	99	40	27	68	132	40	38	16

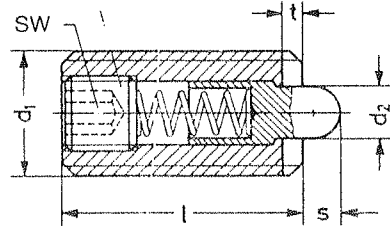
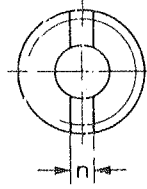
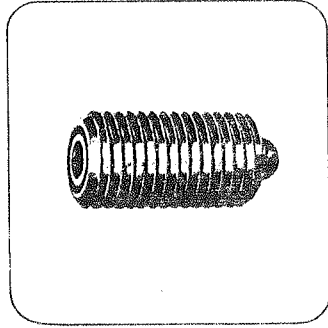
YAY BASKILI DAYAMALAR



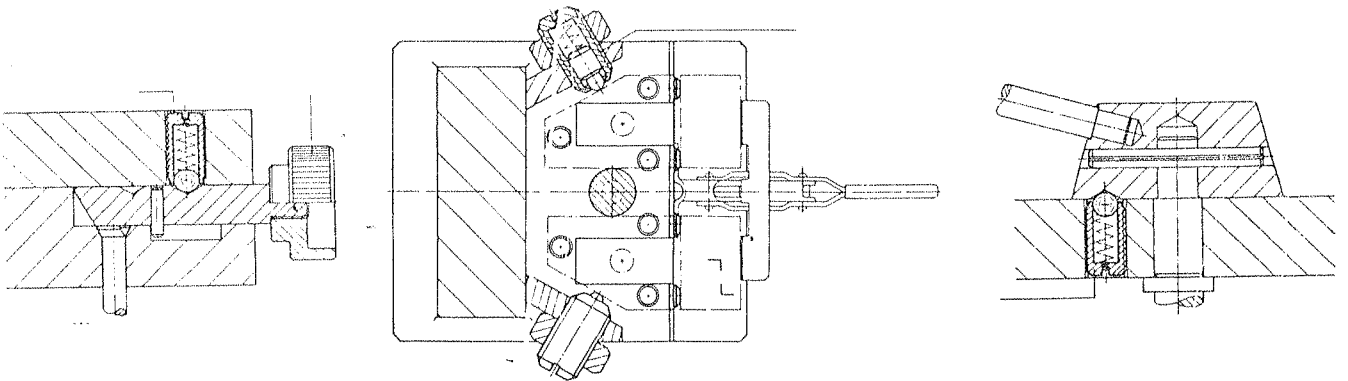
B
M 10 M 16



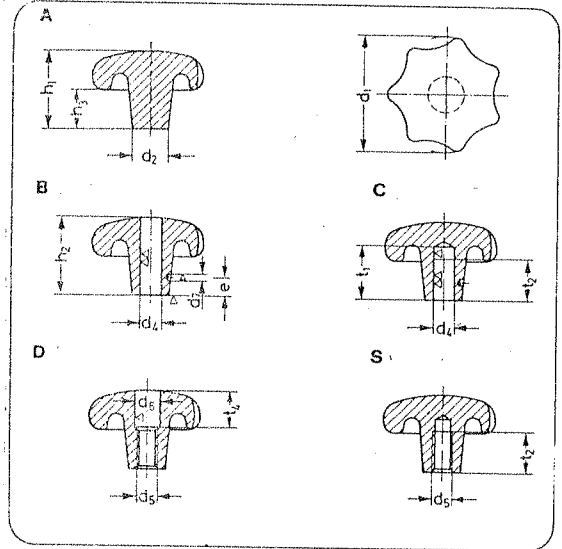
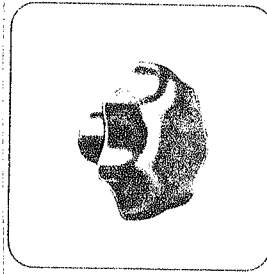
Form B yay baskısı						Form K KN yay baskısı			
d_1	l	d_2	s	uçdn kg	sonda kg	ϕ	s	kg	kg
M 4	9	-	-	-	-	2,5	0,8	0,4	1
M 5	12	-	-	-	-	3	0,9	0,6	1,1
M 6	14	-	-	-	-	3,5	1	0,9	1,5
M 8	16	-	-	-	-	5	1,5	1,8	3
M 10	19	4,5	2,5	2	4	6	2	2	4
M 12	22	-	-	-	-	8	2,5	3	5,5
M 16	24	8,5	4,5	6	10	10	3,5	6,5	12



d_1	d_2	l	n	s	t	SW	kg	kg
							\approx	\approx
M 4	1,5	15	0,6	1,5	0,6	1,3	0,5	1,6
M 5	2,4	18	1,2	2,3	0,8	1,5	0,6	2
M 6	2,7	20	1,3	2,5	0,9	2	0,7	2
M 8	3,5	22	1,5	3	1,4	2,5	0,9	3,5
M 10	4	22	1,5	3	1,4	3	0,9	3,5
M 12	6	28	2,7	4	2	4	1	5,5
M 16	7,5	32	3,2	5	2,5	5	4,5	10

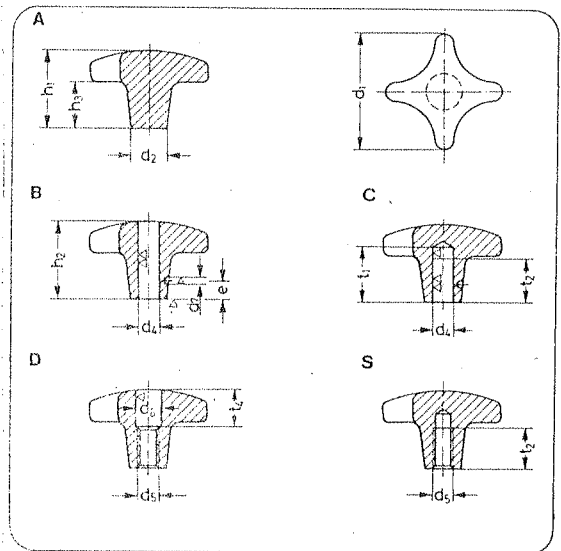
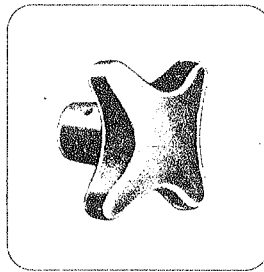


YILDIZ TİPİ TUTAMAK (Ebonit ve Hafif metal)



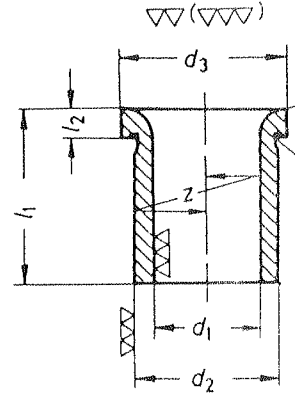
d ₁	d ₂	d ₄ H7	d ₅	d ₆	d ₇	e	h ₁	h ₂	h ₃	t ₁	t ₂	t ₃
32	12	6	M 6	6,4	2,3	6	21	20	10	15	12	10
40	14	8	M 8	8,4	2,8	7	26	25	13	18	15	12
50	18	10	M 10	10,5	2,8	8	34	32	17	21	18	16
63	20	12	M 12	13,0	3,8	10	42	40	21	25	22	20
80	25	16	M 16	17,0	3,8	12	52	50	25	32	28	30

ÇAPRAZ TİPİ TUTAMAK (Ebonit ve Hafif metal)



d ₁	d ₂	d ₄ H7	d ₅	d ₆	d ₇	e	h ₁	h ₂	h ₃	t ₁	t ₂	t ₃
20	8	4	M 4	4,9	1,4	4	14	13	6	10	7	6
25	10	5	M 5	5,3	1,8	5	17	16	8	12	9	8
32	12	6	M 6	6,4	2,3	6	21	20	10	15	12	10
40	14	8	M 8	8,4	2,8	7	26	25	13	18	15	12
50	18	10	M 10	10,5	2,8	8	34	32	17	21	18	16
63	20	12	M 12	13,0	3,8	10	42	40	21	25	22	20
80	25	16	M 16	17,0	3,8	12	52	50	25	32	28	30
100	32	20	M 20	21,0	4,8	14	66	63	33	40	36	38

SABİT DELME BURCU (BAŞLI)



Malzeme
Sementasyon çeliği
TS. 2850

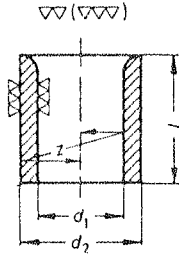
Takım çeliği
TS. 3921

Sertlik
40 HRC

60±3 HRC

d ₁ F7	d ₂ n6	d ₃	Kısa		Uzun		z
			l ₁	l ₂	l ₁	l ₂	
0,4 - 0,6	3	6	6	4	-	-	0,005
0,6 - 1,0	3	6	6	4	9	7	
1,0 - 1,8	4	7	6	4	9	7	
1,8 - 2,6	5	8	6	4	9	7	
2,6 - 3,3	6	10	*8	6	12	9	
3,3 - 4	7	11	8	6	12	9	
4 - 5	8	12	8	6	12	9	
5 - 6	10	14	10	7	16	13	0,01
6 - 8	12	16	10	7	16	13	
8 - 10	15	19	12	8	20	16	
10 - 12	18	22	12	8	20	16	
12 - 15	22	26	16	12	28	24	
15 - 18	26	30	16	12	28	24	
18 - 22	30	35	20	15	36	31	
22 - 26	35	40	20	15	36	31	0,02
26 - 30	42	47	20	15	36	31	
30 - 35	48	55	25	20	45	40	
35 - 42	55	62	25	20	45	40	
42 - 48	62	69	30	24	56	50	
48 - 55	70	77	30	24	56	50	
55 - 63	78	85	35	29	72	66	
63 - 70	85	92	35	29	72	66	
70 - 78	95	102	40	34	80	74	
78 - 85	105	112	40	34	80	74	
85 - 95	115	122	45	39	90	84	
95 - 105	125	132	45	39	90	84	
105 - 115	140	147	50	44	100	94	
115 - 125	150	157	50	44	100	94	

SABİT DELME BURCU (BAŞSIZ)



Malzeme
Sementasyon çeliği
TS. 2850

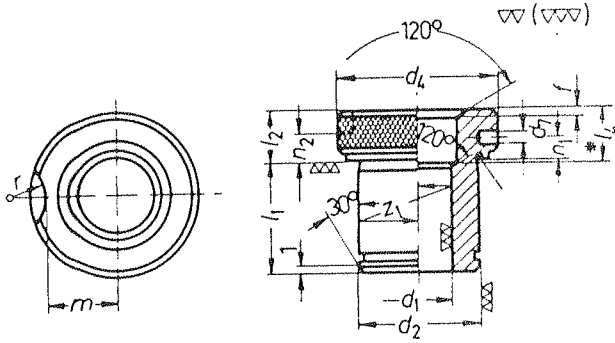
Takım çeliği
TS. 3921

Sertlik
40 HRC

60±3 HRC

d ₁ F7	d ₂ n6	Kısa /	Uzun /	- z - Kaçıklık maksimum
0,4 - 0,6	3	6	—	0,005
0,6 - 1,0	3	6	9	
1,0 - 1,8	4	6	9	
1,8 - 2,6	5	6	9	
2,6 - 3,3	6	8	12	
3,3 - 4	7	8	12	
4 - 5	8	8	12	
5 - 6	10	10	16	0,01
6 - 8	12	10	16	
8 - 10	15	12	20	
10 - 12	18	12	20	
12 - 15	22	16	28	
15 - 18	26	16	28	
18 - 22	30	20	36	
22 - 26	35	20	36	0,02
26 - 30	42	20	36	
30 - 35	48	25	45	
35 - 42	55	25	45	
42 - 48	62	30	56	
48 - 55	70	30	56	
55 - 63	78	35	72	
63 - 70	85	35	72	
70 - 78	95	40	80	
78 - 85	105	40	80	
85 - 95	115	45	90	
95 - 105	125	45	90	
105 - 115	140	50	100	
115 - 125	150	50	100	
125 - 140	160	45	100	
140 - 150	175	50	100	
150 - 160	190	60	120	

DEĞİŞEBİLEN DELME BURCU (SABİT TİP)



Malzeme
Sementasyon çeliği
TS. 2850

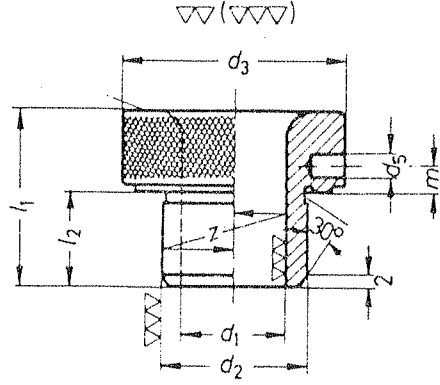
Takım çeliği
TS. 3921

Sertlik
40 HRC

60 ± 3 HRC

d_1 F7	\emptyset d_2 m6	Kısa Orta Uzun	d_4 h13	d_7 H7	n_1	n_2	l_2	l_4	z_1
		l_1							
2,3 - 2,65	8	8	15	2,5	3	4,5	8	—	0,01
		12,5						4,5	
2,65 - 4,75	10	10	18	2,5	3	4,5	8	—	0,01
		16						6	
		25						15	
4,75 - 8,5	15	12,5	24	3	3,5	5,5	10	8	0,015
		20						20	
8,5 - 14	22	16	32	3	3,5	5,5	10	16	0,015
		25						9	
		40						24	
14 - 19	28	20	40	4	4,5	7	12	—	0,015
		32						12	
		50						30	
19 - 25	35	20	50	4	4,5	7	12	—	0,015
		32						12	
		50						30	
25 - 33,5	46	25	60	5	6	9,5	16	—	0,02
		40						15	
		63						38	
33,5 - 45	58	25	74	5	6	9,5	16	—	0,02
		40						15	
		63						38	

DEĞİŞEBİLEN DELME BURCU (KAYAN TİP)

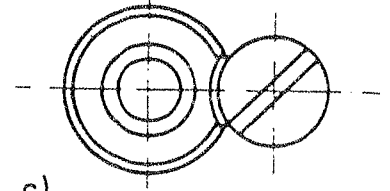
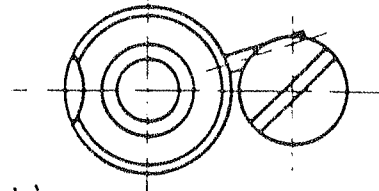
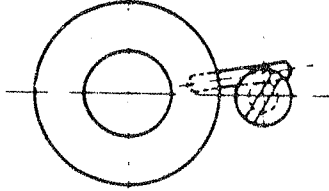
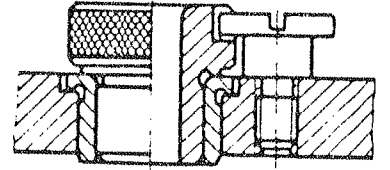
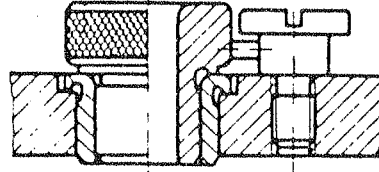
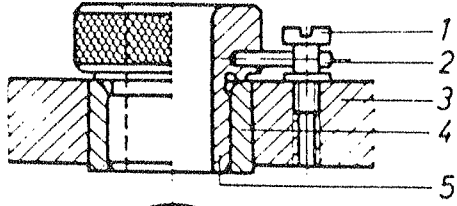


Malzeme
Sementasyon çeliği
TS. 2850

Takım çeliği
TS. 3921

Sertlik
40 HRC
60±3 HRC

Delik çapı d_1 F7	Gövde Çapı d_2 m6	d_3 h13	d_5	m	l_1	l_2	z	Delik ekseninin kitleme civatası eksenine olan mesafesi
2,5 - 4	8	16	2,5	4	20	10	0,01	15
4 - 6	10	19	2,5	4	22	12		16
6 - 8	12	22	3	4	24	12		18
8 - 10	15	26	3	4	28	16		20
10 - 12	18	30	3	4	28	16		22
12 - 15	22	35	5	5	36	20		26
15 - 18	26	40	5	5	36	20		29
18 - 22	30	47	5	5	36	20		32
22 - 26	35	55	6	6	45	25	0,02	38
26 - 30	42	62	6	6	45	25		41
30 - 35	48	69	6	6	50	30		45
35 - 42	55	77	6	6	50	30		49
42 - 48	62	85	8	7,5	55	35		53
48 - 55	70	95	8	7,5	55	35		59
55 - 62	78	100	8	7,5	60	40		62
62 - 70	85	110	8	7,5	60	40		62
70 - 78	95	120	8	7,5	70	45		71
78 - 85	105	130	8	7,5	70	45		76
85 - 95	115	145	8	7,5	75	50		83
95 - 105	125	155	8	7,5	75	50		88

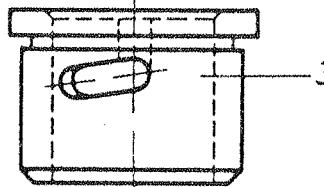
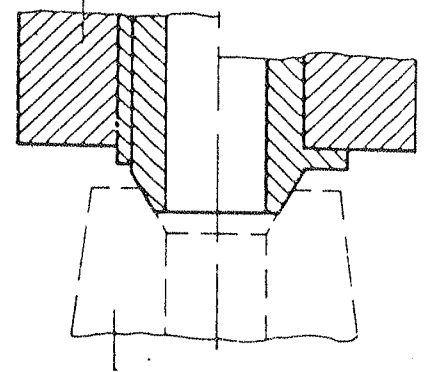
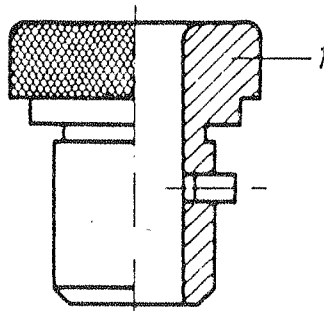
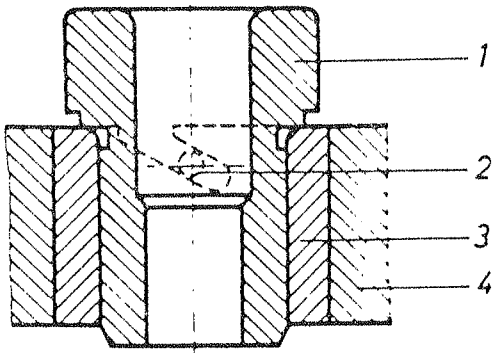


a)

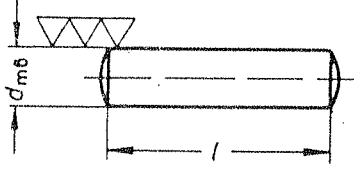
- 1- Kilitleme civatası
- 2- Dayama pimi
- 3- Plaka
- 4- Sabit delme burcu
- 5- Değişebilir delme burcu

b)

c)

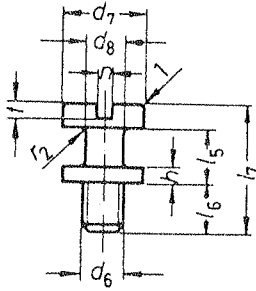


DAYAMA PİMİ



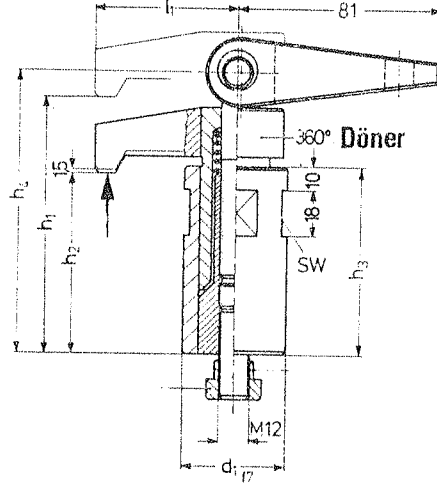
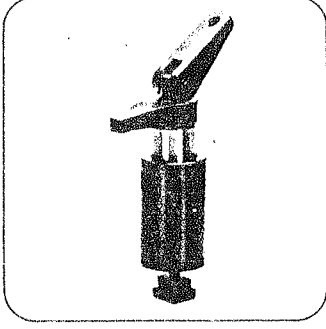
d	l	delme burcu çapı
m6		
2,5	14	8,0
3,0	14	8,0 12,0
5,0	20	12,0 22,0
6,0	24	22,0 42,0
6,0	28	42,0

KİLİTLEME CIVATASI

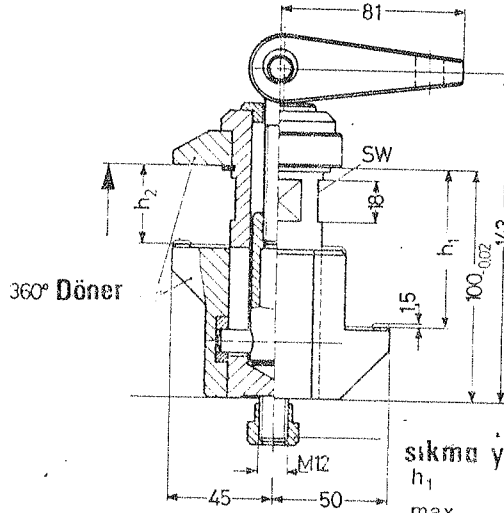
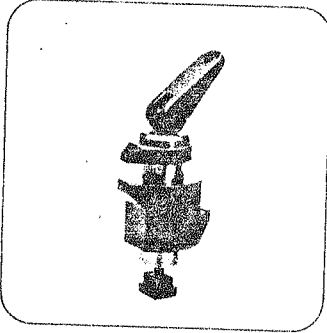


d_6	d_7	d_8	h	l_5	l_6	l_7	n	t	r_2	delme burcu çapı
M 5	10	5	2	6	6	15	1,6	2	1	12,0
M 6	13	6	2	8	8	20	2	2,5	1,6	12,0 - 22,0
M 8	16	8	2,5	10	10	25	2,5	3	2	22,0 - 55,0
M 10	20	10	3	12,5	12	30	2,5	3	3	55,0 - 105,0

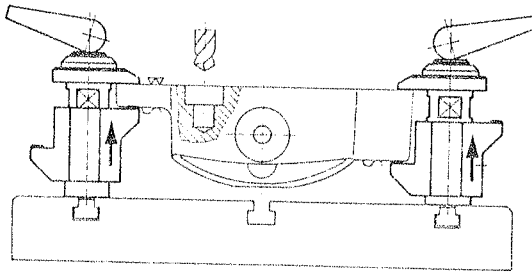
YÜKSEKLİĞİ AYARLANABİLİR KAM SIKMALI BAĞLAMA DÜZENLERİ



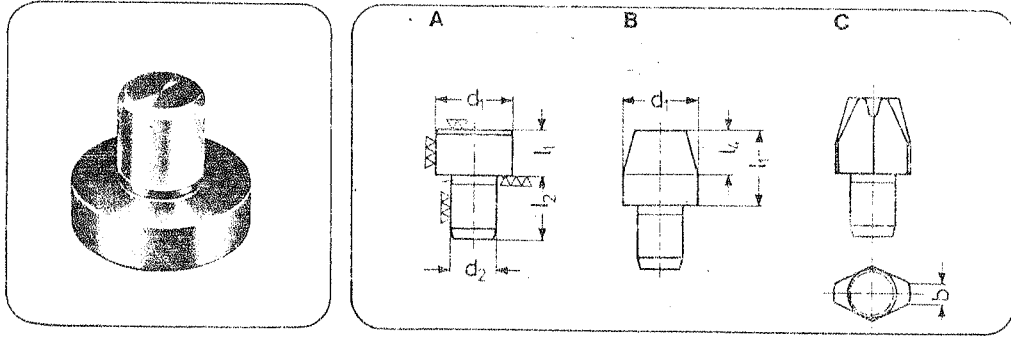
d ₁	sıkma yüksekliği		h ₃	h ₄	l ₁	SW
	max.	min.				
f7	h ₁	h ₂				
40	105	70	72	140	55	36
40	135	100	98	170	55	36
60	135	100	98	170	66	55



sıkma yüksekliği		h ₂	min.	SW
max.	min.			
70	35	35	0	36

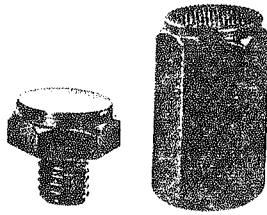


DELİK REFERANS ve YERLEŐTİRME PİMLERİ

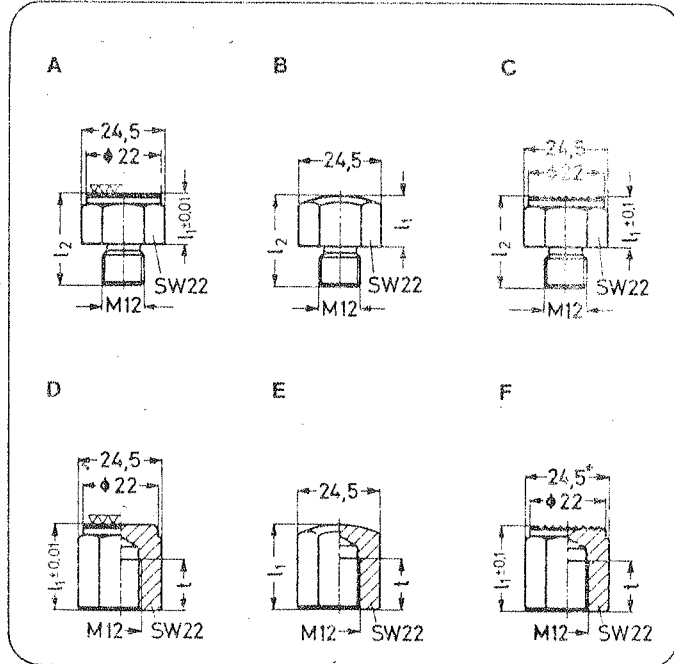


d ₁	l ₁	Form A	Form B	C	b	d ₂	l ₂	l ₄
		kısa		uzun				
g 6	h 9					n 6		
6	5	7	12	1		4	6	4
8	-	10	16	1,6		6	9	6
10	6	10	18	2,5		6	9	6
12	-	10	18	2,5		6	9	6
16	8	13	22	3,5		8	12	8
20	-	15	25	5		12	18	9
25	10	15	25	5		12	18	9

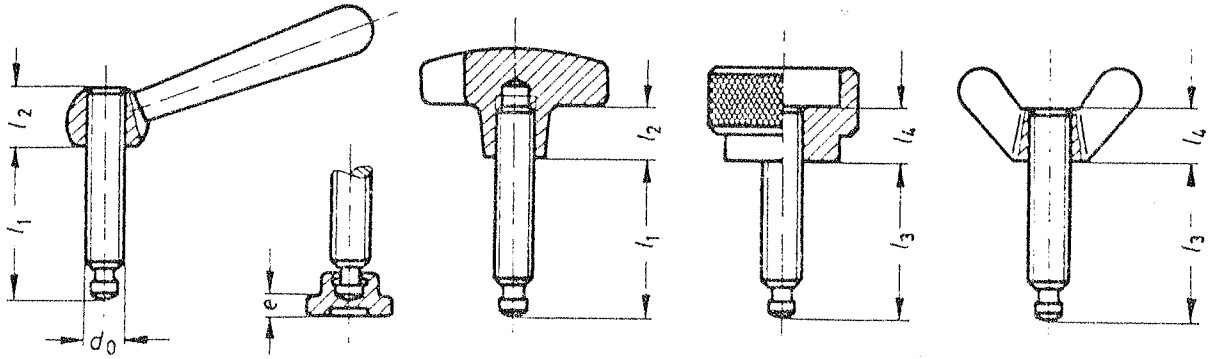
VIDALI DESTEK



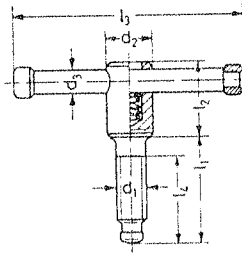
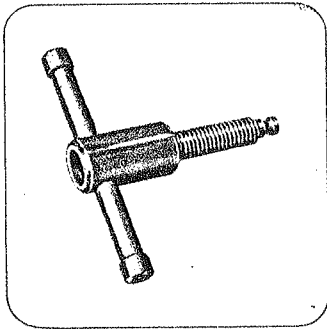
SW	l ₁	l ₂	t
Form A, B, C			
22	10	26	-
22	15	31	-
Form D, E, F			
22	25	-	15
22	30	-	20
22	40	-	25
22	50	-	25



EL'LE SIKILAN VİDALAR



d_0	l_1					l_2	l_3					l_4	$e \approx$
M 6	20	25	30	40		10	22	27	32	42		8	2,2
M 8	23	28	33	38	48	13	25	30	35	40	50	10	3
M 10	35	40	45	50	65	15	38	43	48	53	68	12	3,6
M 12	41	46	51	61	81	19	46	51	56	66	86	14	4,5
M 16	40	45	55	75	100	25							5,3
M 20	50	60	70	95	120	31							5,6



d_1	l_1	d_2	d_3	l_2	l_3	l_4
M 10	40	18	8	32	80	30
	50					40
M 12	50	20	10	35	100	40
	60					50
	70					60
M 16	55	24	13	40	120	45
	70					60
	90					80
M 20	55	30	16	45	140	45
	70					60
	90					80