

**ФЕДЕРАЛЬНОЕ АГЕНТСТВО ПО ОБРАЗОВАНИЮ**  
Московский Государственный Технический Университет  
«МАМИ»

**Кафедра “Теория механизмов и машин”**

Одобрено  
методической комиссией  
общетехнических дисциплин

# **ПЛАНЕТАРНЫЕ МЕХАНИЗМЫ**

(задачник)

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Сборник задач планетарных механизмов по Теории механизмов и машин.  
Кол-во стр. 44; Рис. 155;

Цель сборника заданий – закрепление навыков определения передаточного отношения графическим и аналитическим способами многозвенных зубчатых механизмов с неподвижными и с подвижными осями вращения колес.

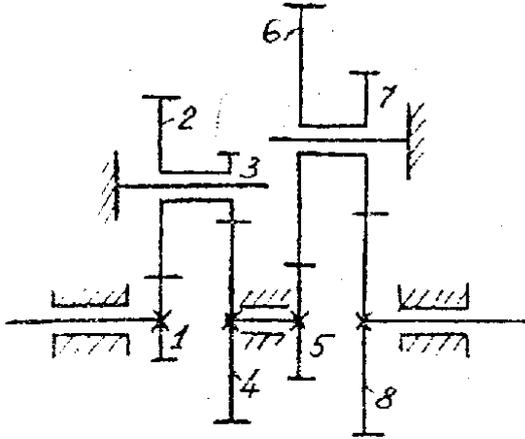
В задачнике даны схемы различных видов планетарных механизмов. Считая радиусы начальных окружностей известными, определить указанные передаточные отношения.

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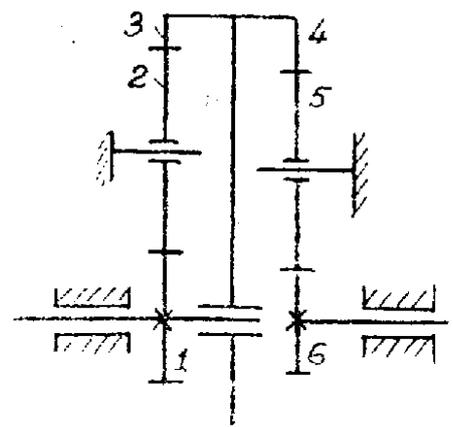
## 1. Передатки с неподвижными осями

①



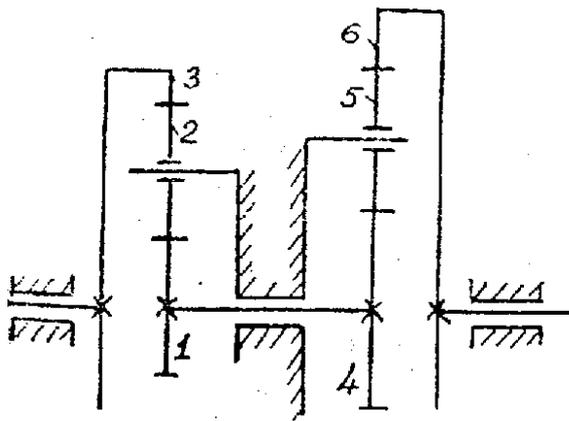
$$U_{18} = \frac{\omega_1}{\omega_8} ?$$

②



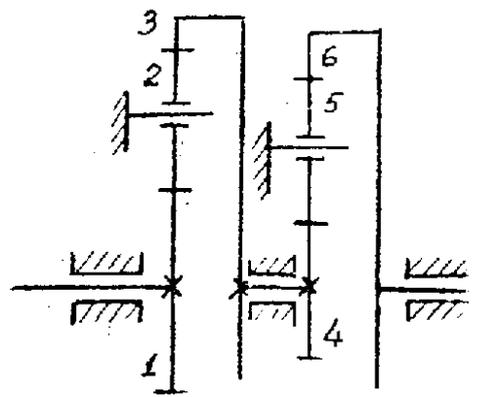
$$U_{16} = \frac{\omega_1}{\omega_6} ?$$

③



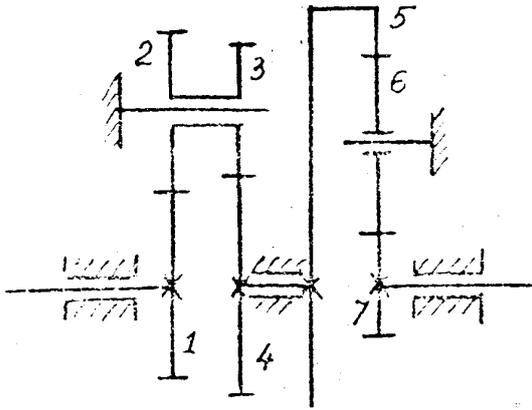
$$U_{36} = \frac{\omega_3}{\omega_6} ?$$

④



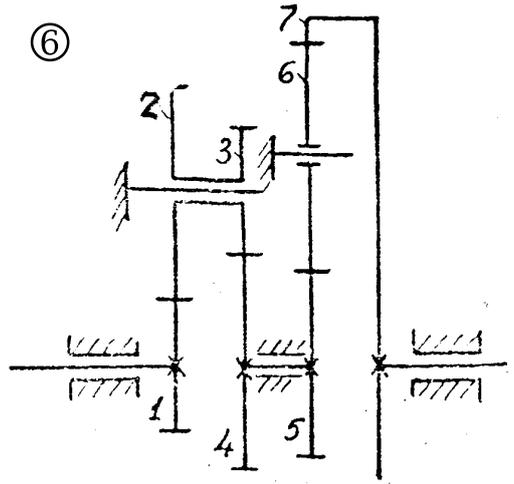
$$U_{16} = \frac{\omega_1}{\omega_6} ?$$

⑤



$$U_{17} = \frac{\omega_1}{\omega_7} ?$$

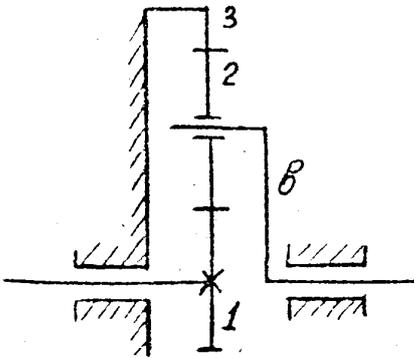
⑥



$$U_{17} = \frac{\omega_1}{\omega_7} ?$$

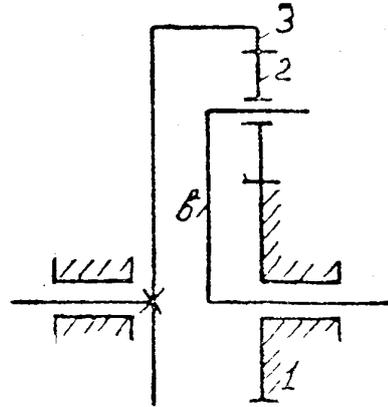
## 2. Простые планетарные механизмы

⑦



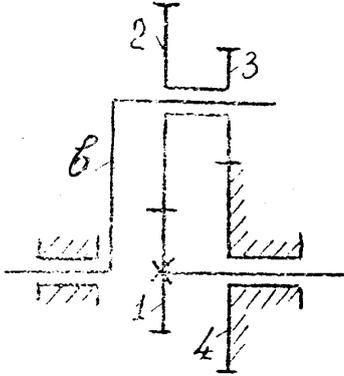
$$U_{16} = \frac{\omega_1}{\omega_6} ?$$

⑧



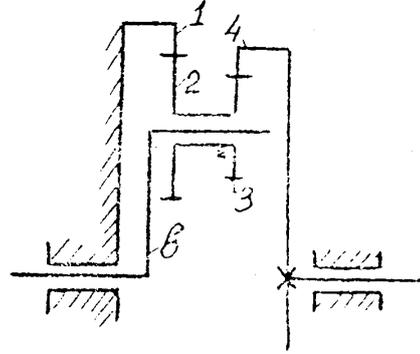
$$U_{36} = \frac{\omega_3}{\omega_6} ?$$

⑨



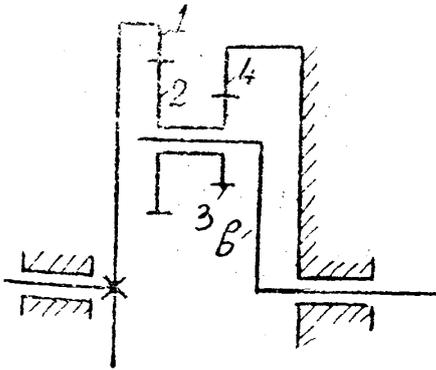
$$U_{e1} = \frac{\omega_B}{\omega_1} ?$$

⑩



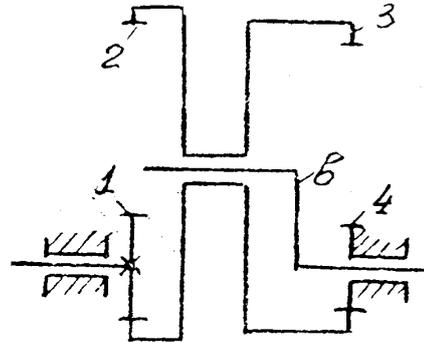
$$U_{e4} = \frac{\omega_B}{\omega_4} ?$$

⑪



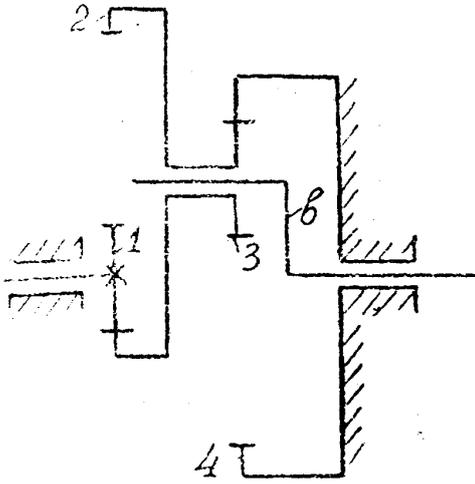
$$U_{e1} = \frac{\omega_{B'}}{\omega_1} ?$$

⑫



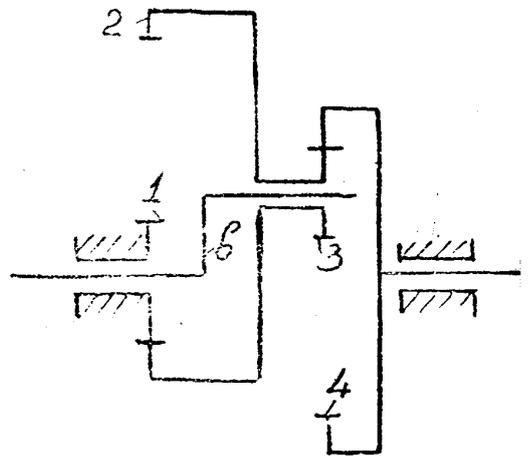
$$U_{e1} = \frac{\omega_B}{\omega_1} ?$$

13



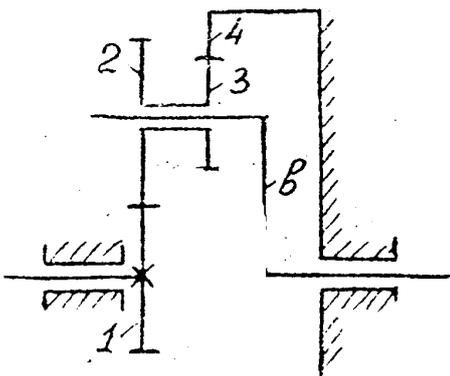
$$U_{64} = \frac{\omega_6}{\omega_4} ?$$

14



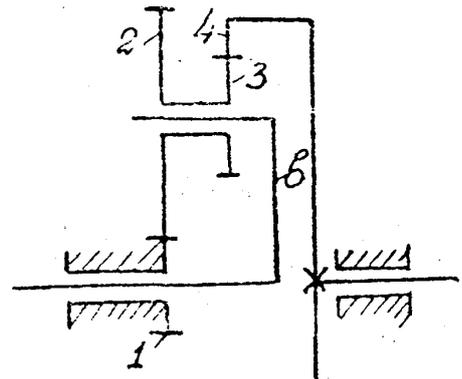
$$U_{64} = \frac{\omega_6}{\omega_4} ?$$

15

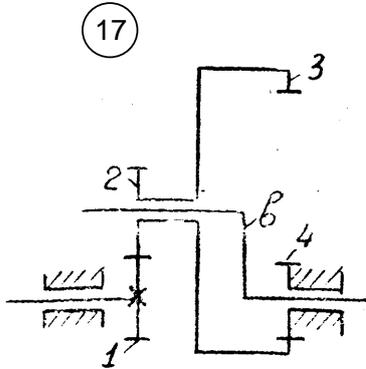


$$U_{16} = \frac{\omega_1}{\omega_6} ?$$

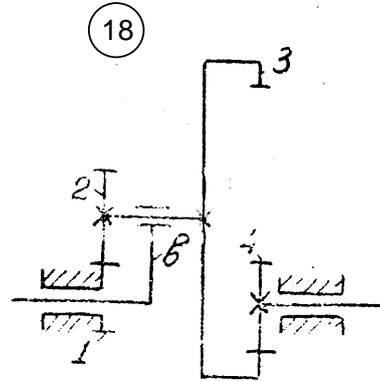
16



$$U_{64} = \frac{\omega_6}{\omega_4} ?$$

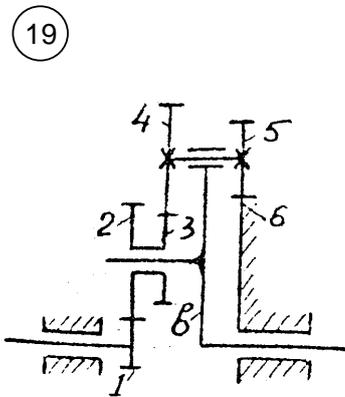


$$U_{e1} = \frac{\omega_6}{\omega_1} ?$$

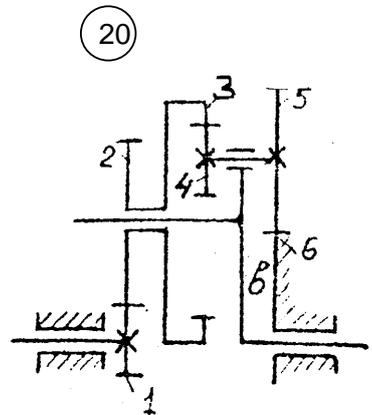


$$U_{e4} = \frac{\omega_6}{\omega_4} ?$$

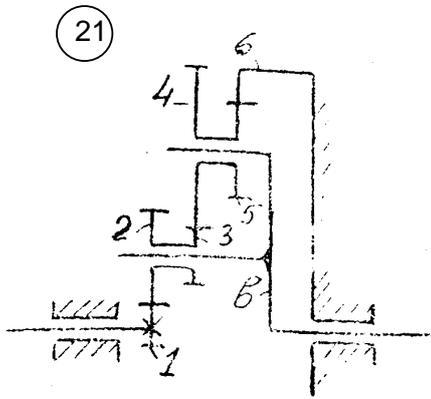
### 3. Планетарные с тройной передачей



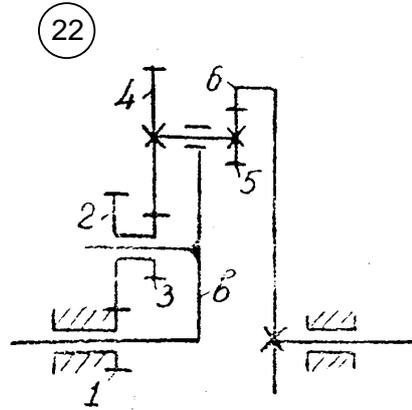
$$U_{16} = \frac{\omega_1}{\omega_6} ?$$



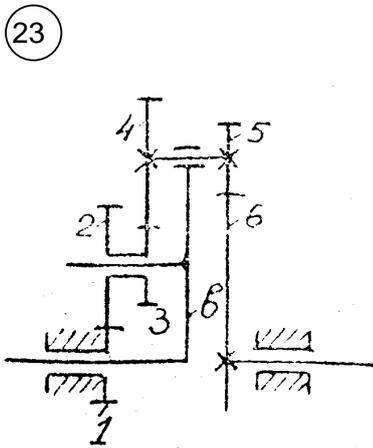
$$U_{16} = \frac{\omega_1}{\omega_6} ?$$



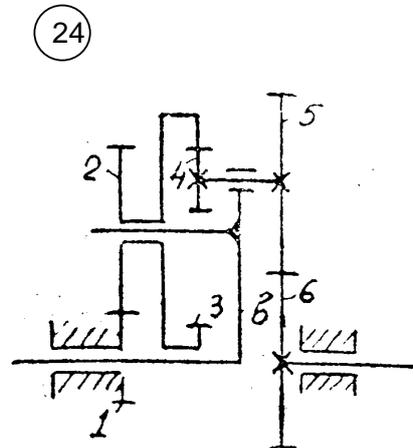
$$U_{16} = \frac{\omega_1}{\omega_6} ?$$



$$U_{6B} = \frac{\omega_6}{\omega_B} ?$$

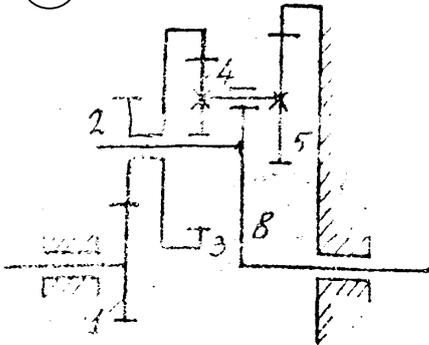


$$U_{6B} = \frac{\omega_6}{\omega_B} ?$$



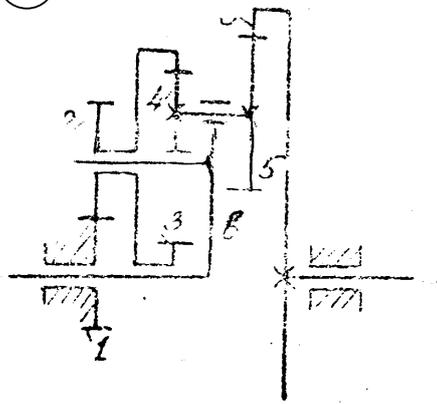
$$U_{6B} = \frac{\omega_6}{\omega_B} ?$$

(25)



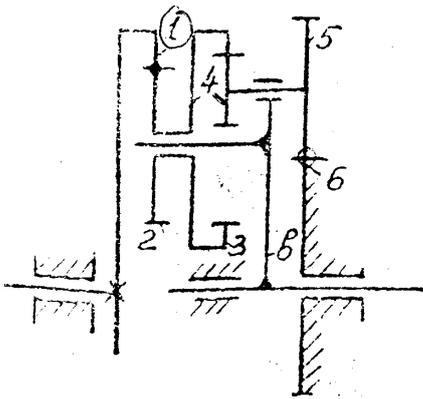
$$U_{16} = \frac{\omega_1}{\omega_6} ?$$

(26)



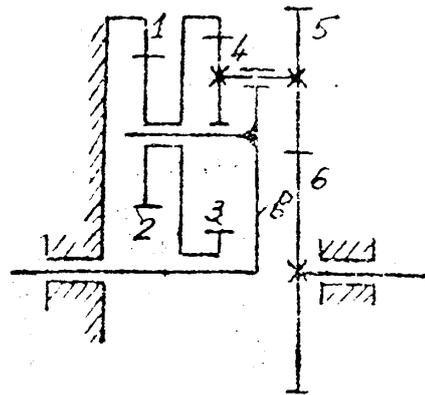
$$U_{66} = \frac{\omega_6}{\omega_6} ?$$

(27)



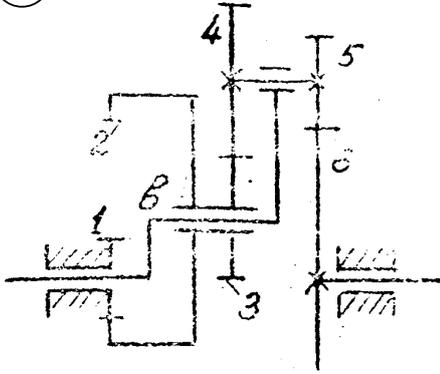
$$U_{16} = \frac{\omega_1}{\omega_6} ?$$

(28)



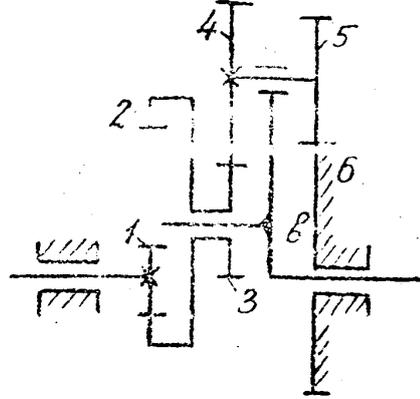
$$U_{66} = \frac{\omega_6}{\omega_6} ?$$

29



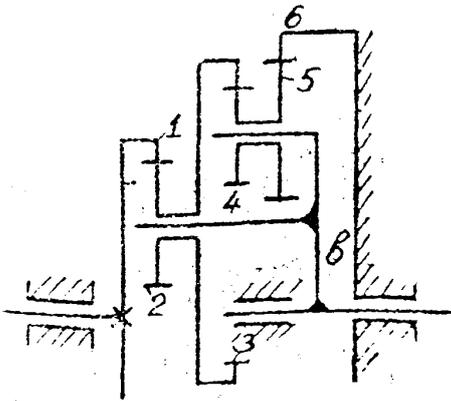
$$U_{6e} = \frac{\omega_6}{\omega_8} ?$$

30



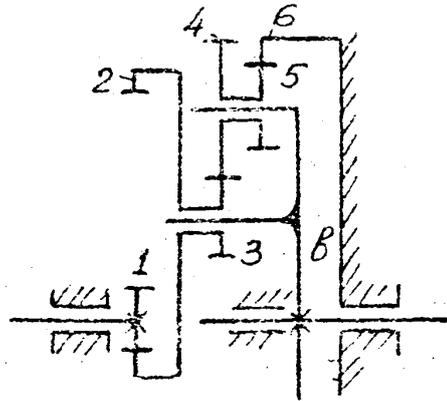
$$U_{1e} = \frac{\omega_1}{\omega_8} ?$$

31



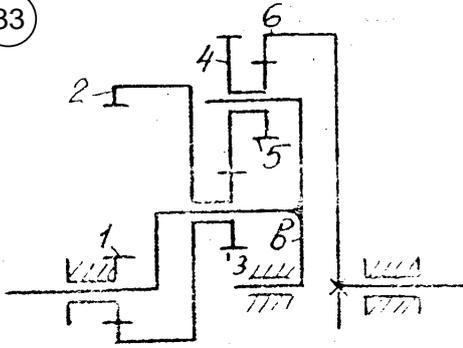
$$U_{1e} = \frac{\omega_1}{\omega_8} ?$$

32



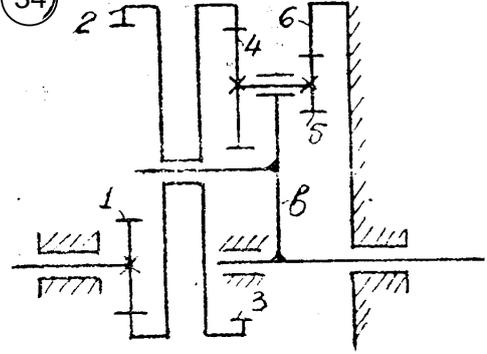
$$U_{1e} = \frac{\omega_1}{\omega_8} ?$$

33



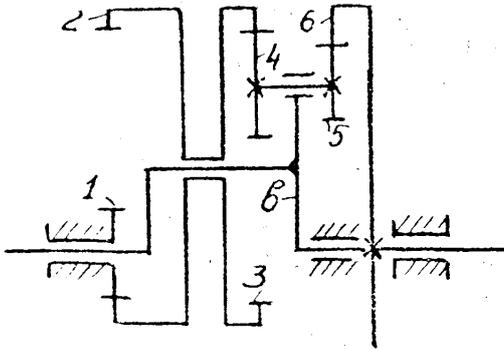
$$U_{6\beta} = \frac{\omega_6}{\omega_\beta} ?$$

34



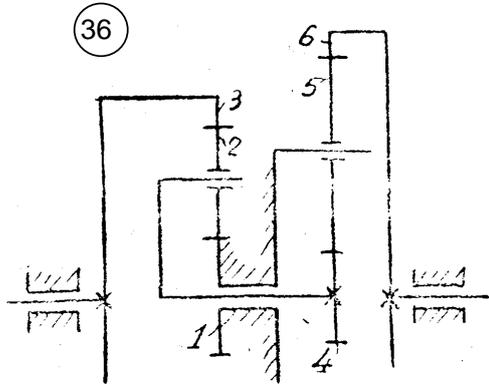
$$U_{6\beta} = \frac{\omega_6}{\omega_\beta} ?$$

35

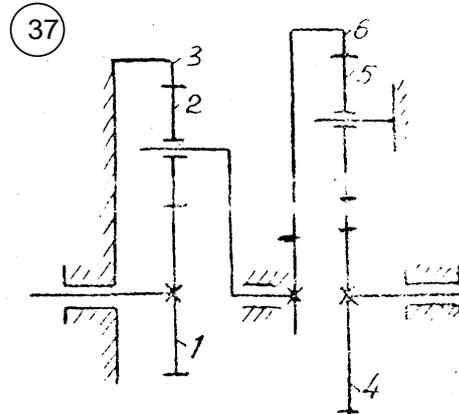


$$U_{6\beta} = \frac{\omega_6}{\omega_\beta} ?$$

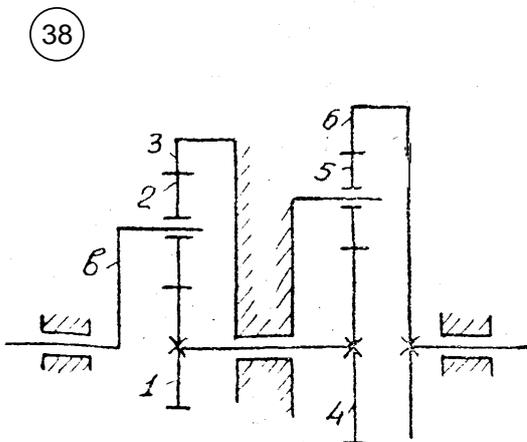
4. Простые планетарные соединенные с многоступенчатыми передачами



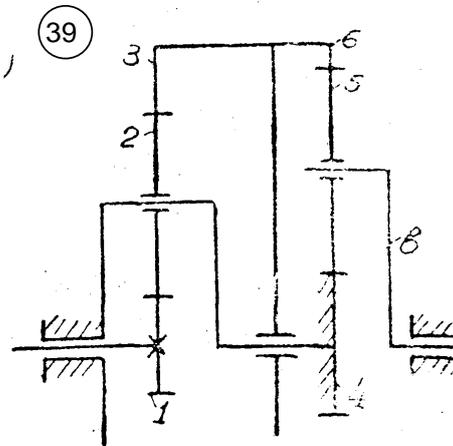
$$U_{36} = \frac{\omega_3}{\omega_6} ?$$



$$U_{14} = \frac{\omega_1}{\omega_4} ?$$

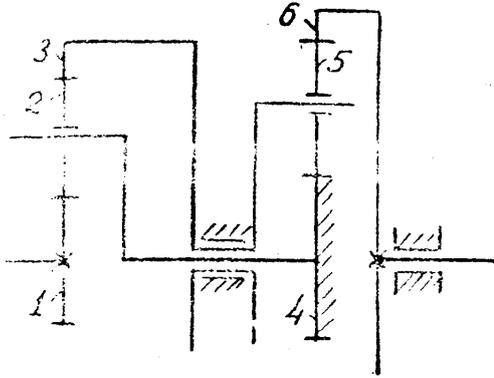


$$U_{66} = \frac{\omega_6}{\omega_6} ?$$



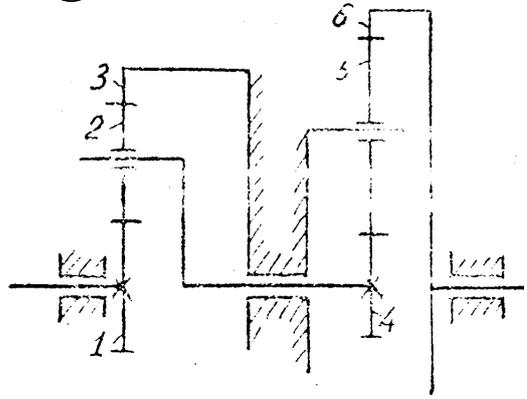
$$U_{16} = \frac{\omega_1}{\omega_6} ?$$

40



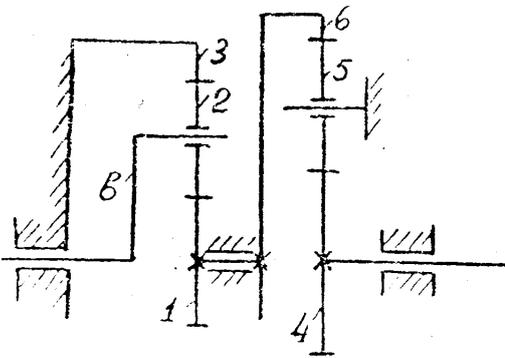
$$U_{16} = \frac{\omega_1}{\omega_6} ?$$

41



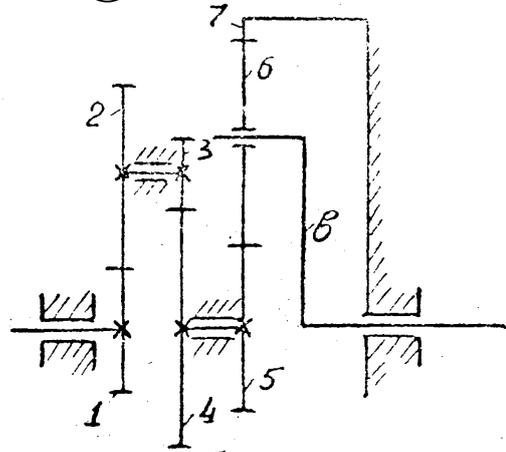
$$U_{16} = \frac{\omega_1}{\omega_6} ?$$

42

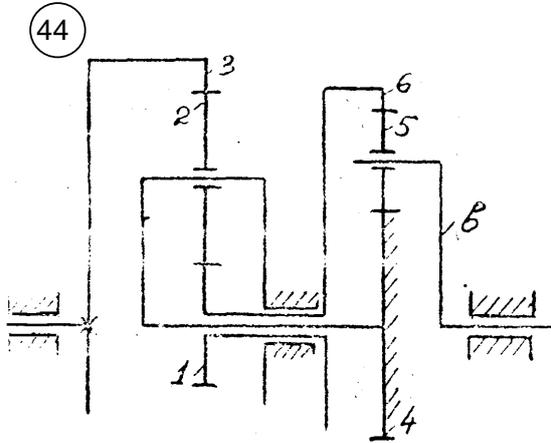


$$U_{64} = \frac{\omega_6}{\omega_4} ?$$

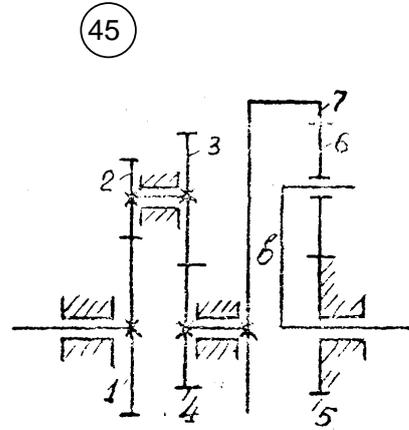
43



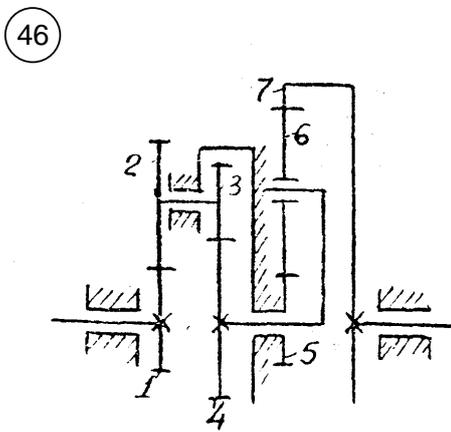
$$U_{16} = \frac{\omega_1}{\omega_6} ?$$



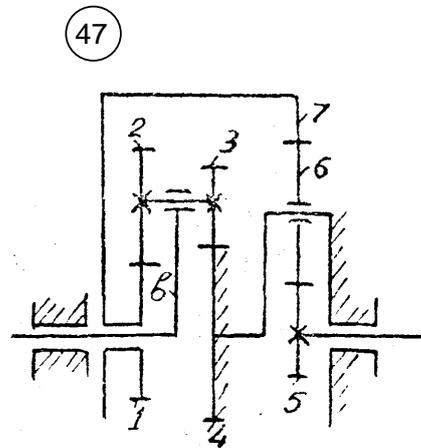
$$U_{36} = \frac{\omega_3}{\omega_6} ?$$



$$U_{16} = \frac{\omega_1}{\omega_6} ?$$

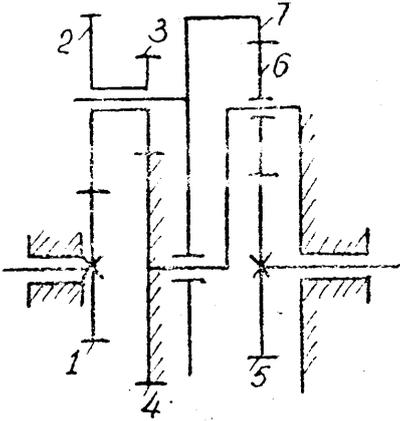


$$U_{17} = \frac{\omega_1}{\omega_7} ?$$



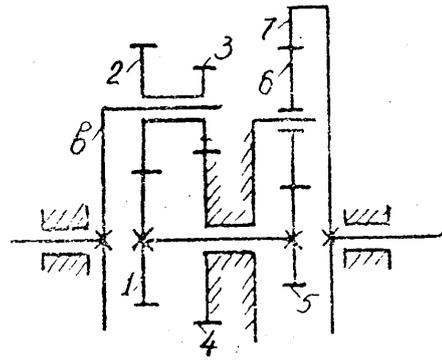
$$U_{65} = \frac{\omega_6}{\omega_5} ?$$

(48)



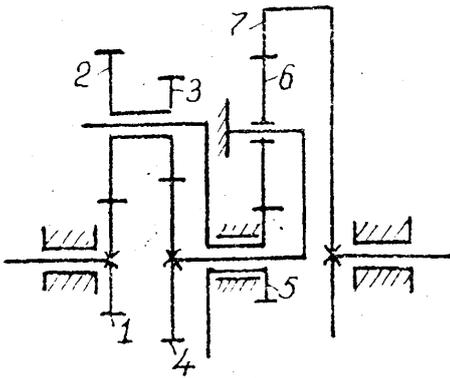
$$U_{15} = \frac{\omega_1}{\omega_5} ?$$

(49)



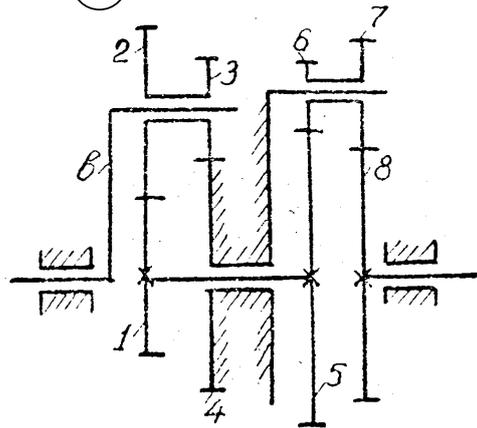
$$U_{67} = \frac{\omega_6}{\omega_7} ?$$

(50)



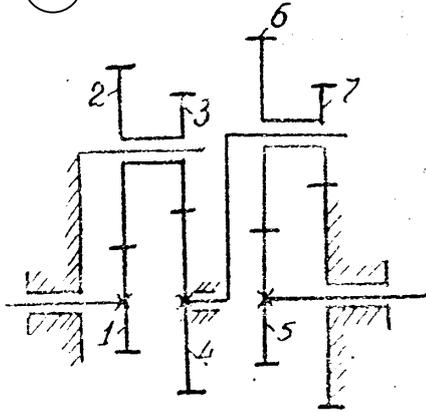
$$U_{17} = \frac{\omega_1}{\omega_7} ?$$

(51)



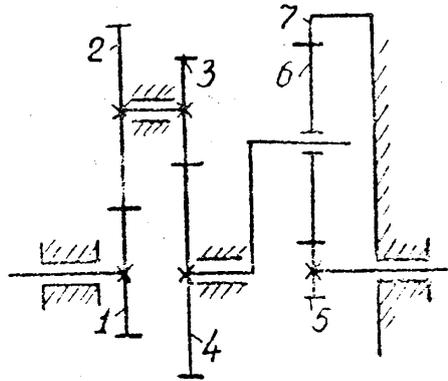
$$U_{68} = \frac{\omega_6}{\omega_8} ?$$

52



$$U_{15} = \frac{\omega_1}{\omega_5} ?$$

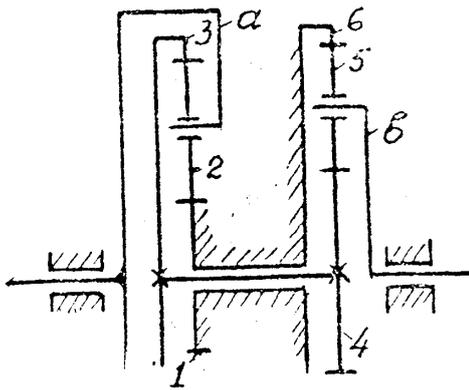
53



$$U_{15} = \frac{\omega_1}{\omega_5} ?$$

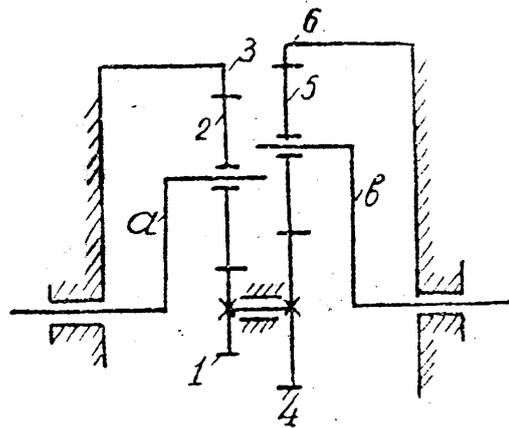
5. Планетарные двухкратные

54



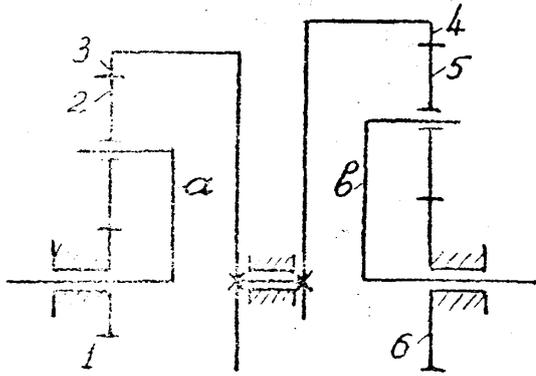
$$U_{a\beta} = \frac{\omega_a}{\omega_\beta} ?$$

55



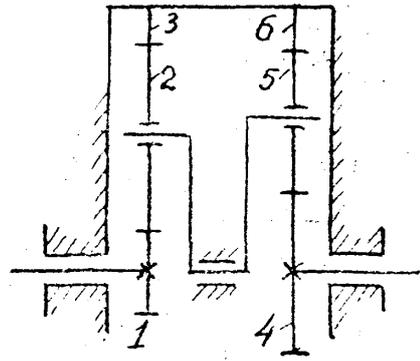
$$U_{a\beta} = \frac{\omega_a}{\omega_\beta} ?$$

56



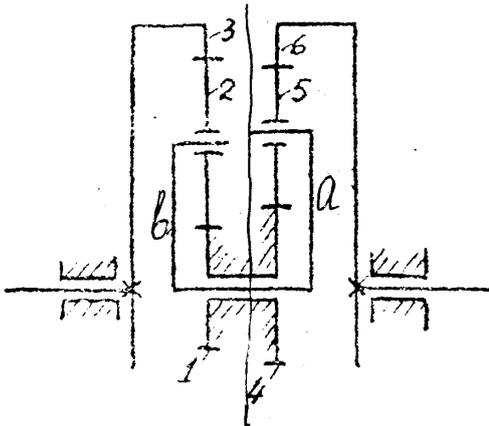
$$U_{a6} = \frac{\omega_a}{\omega_6} ?$$

57



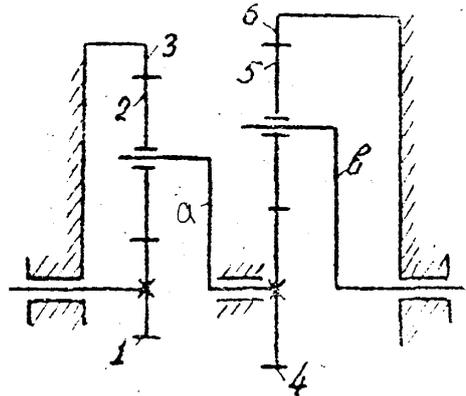
$$U_{14} = \frac{\omega_1}{\omega_4} ?$$

58



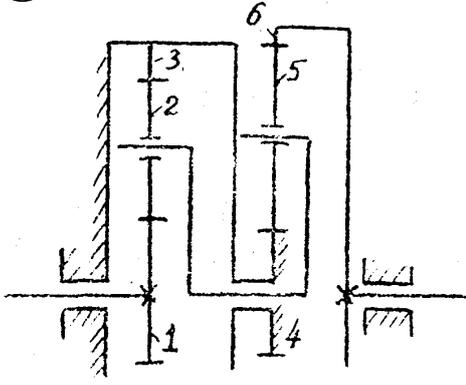
$$U_{36} = \frac{\omega_3}{\omega_6} ?$$

59



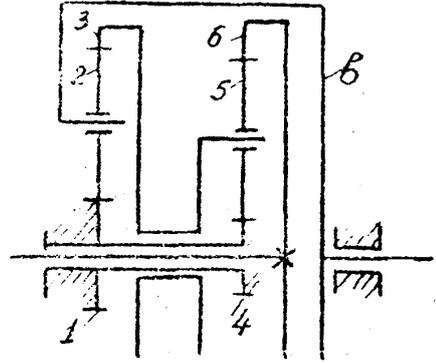
$$U_{16} = \frac{\omega_1}{\omega_6} ?$$

60



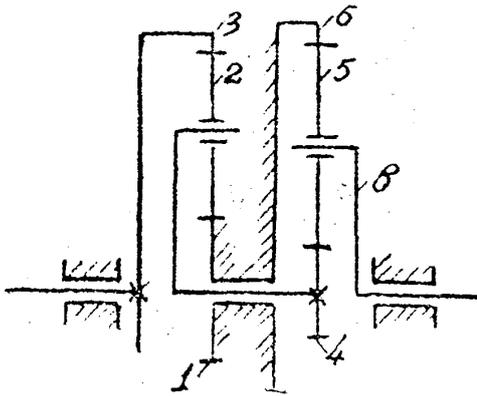
$$U_{16} = \frac{\omega_1}{\omega_6} ?$$

61



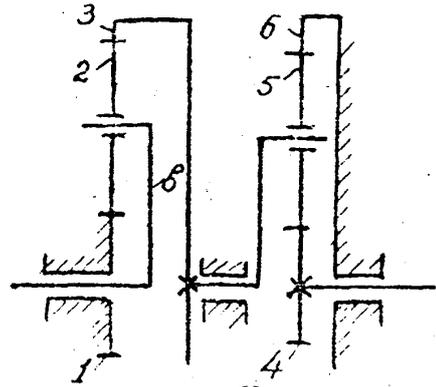
$$U_{68} = \frac{\omega_6}{\omega_8} ?$$

62



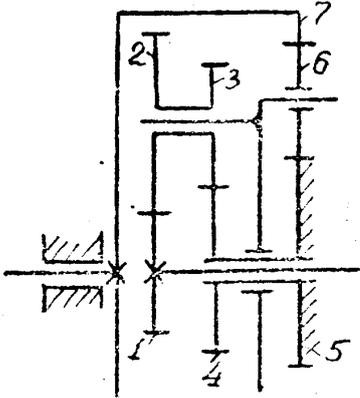
$$U_{38} = \frac{\omega_3}{\omega_8} ?$$

63



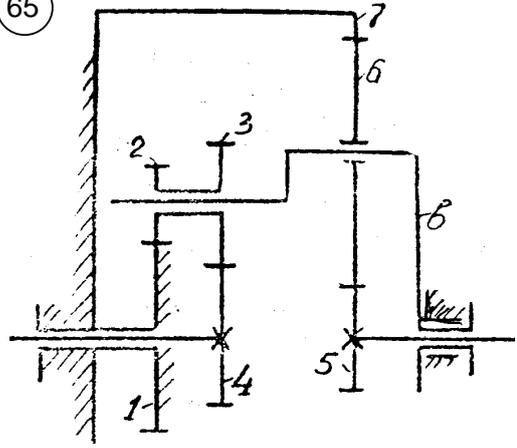
$$U_{64} = \frac{\omega_6}{\omega_4} ?$$

(64)



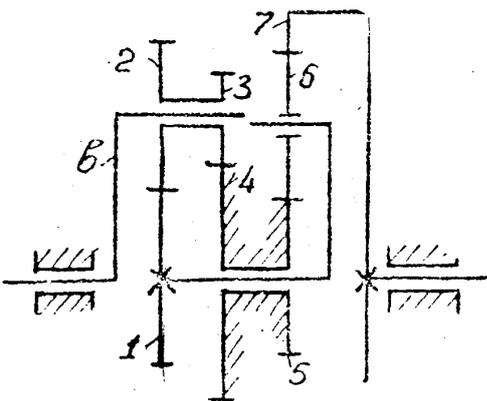
$$U_{71} = \frac{\omega_7}{\omega_1} ?$$

(65)



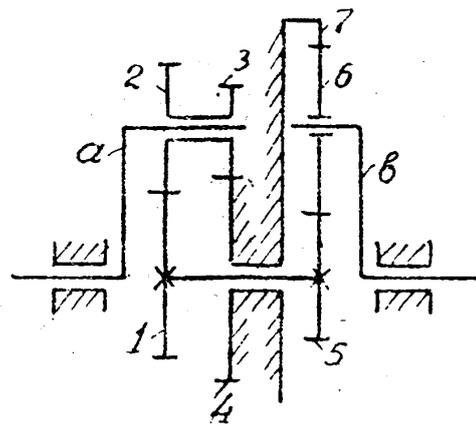
$$U_{45} = \frac{\omega_4}{\omega_5} ?$$

(66)



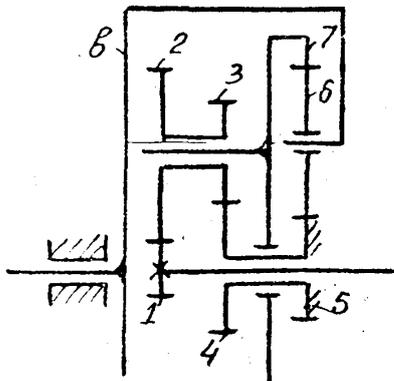
$$U_{67} = \frac{\omega_6}{\omega_7} ?$$

(67)



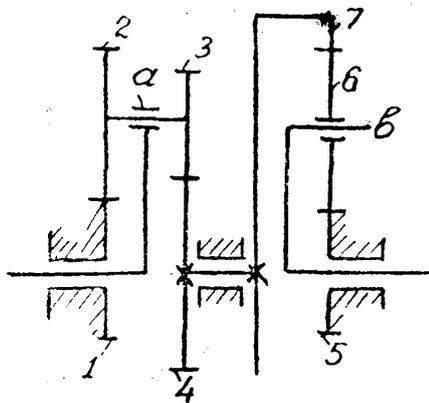
$$U_{a6} = \frac{\omega_a}{\omega_6} ?$$

(68)



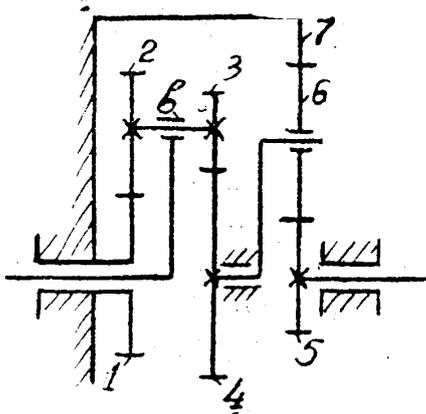
$$U_{1b} = \frac{\omega_1}{\omega_b} ?$$

(69)



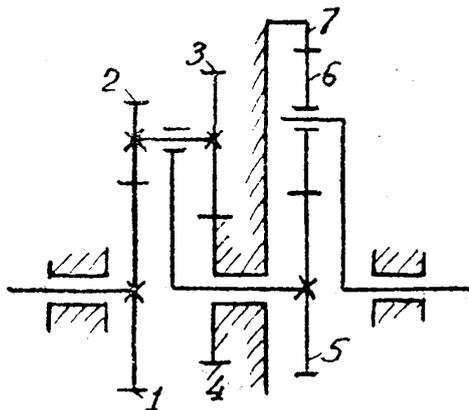
$$U_{a6} = \frac{\omega_a}{\omega_6} ?$$

(70)



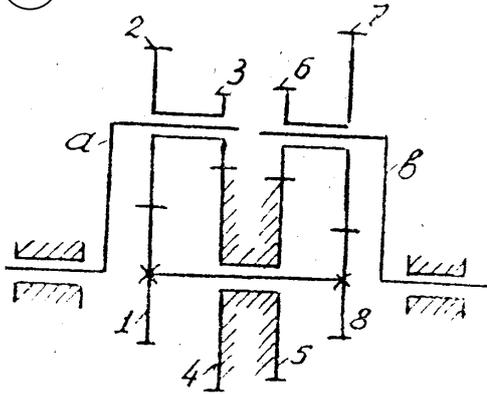
$$U_{65} = \frac{\omega_6}{\omega_5} ?$$

(71)



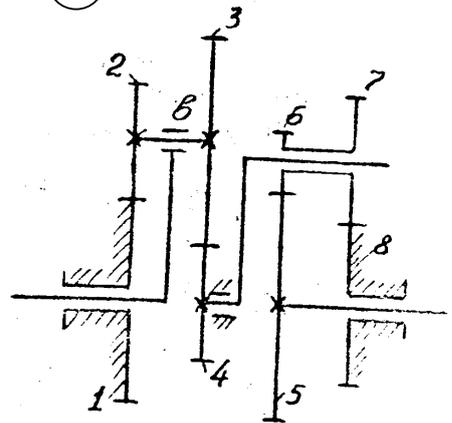
$$U_{1b} = \frac{\omega_1}{\omega_b} ?$$

72



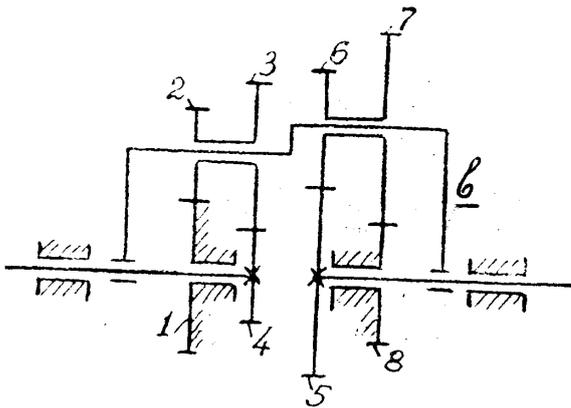
$$U_{a6} = \frac{\omega_a}{\omega_6} ?$$

73



$$U_{65} = \frac{\omega_6}{\omega_5} ?$$

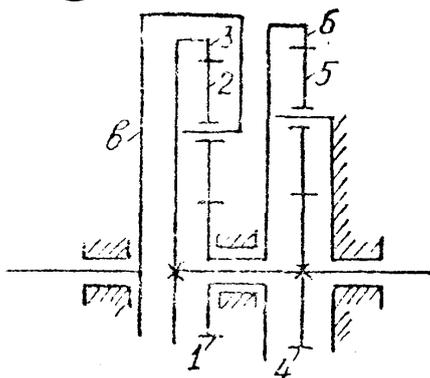
74



$$U_{45} = \frac{\omega_4}{\omega_5} ?$$

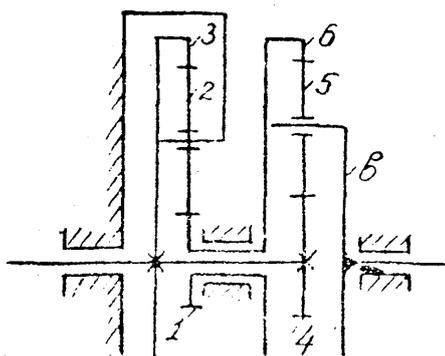
## 6. Дифференциалы с замыкающей цепью

75



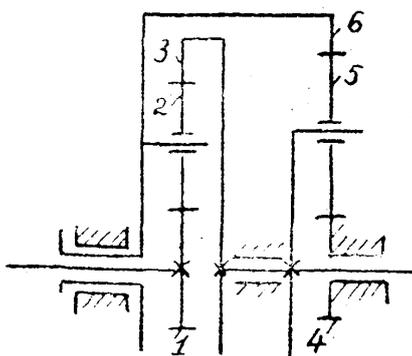
$$U_{46} = \frac{\omega_4}{\omega_6} ?$$

76



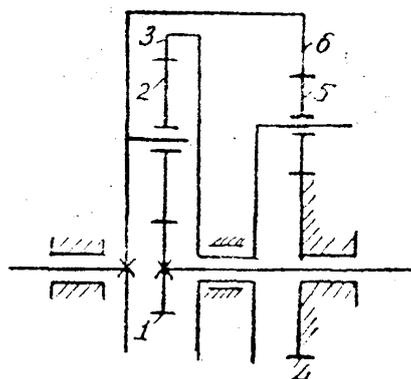
$$U_{36} = \frac{\omega_3}{\omega_6} ?$$

77

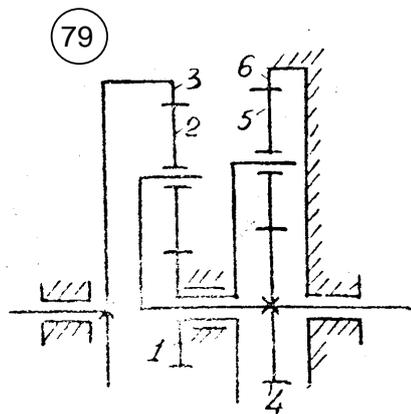


$$U_{13} = \frac{\omega_1}{\omega_3} ?$$

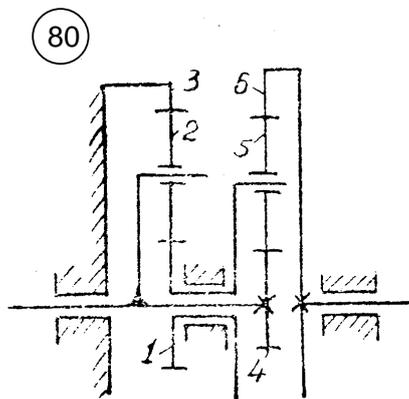
78



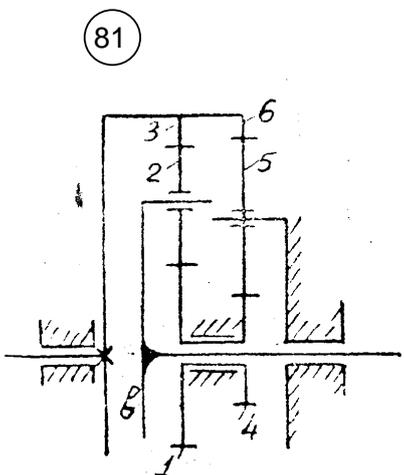
$$U_{61} = \frac{\omega_6}{\omega_1} ?$$



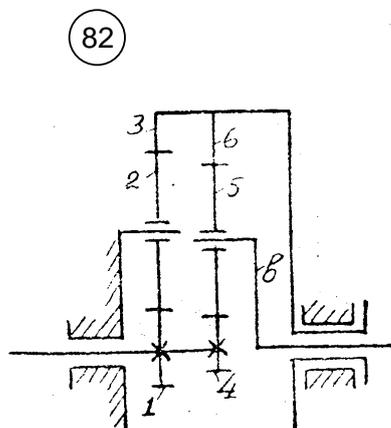
$$U_{34} = \frac{\omega_3}{\omega_4} ?$$



$$U_{46} = \frac{\omega_4}{\omega_6} ?$$

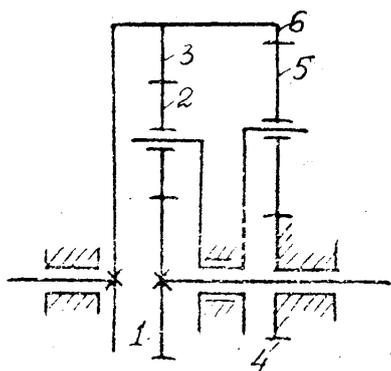


$$U_{36} = \frac{\omega_3}{\omega_6} ?$$



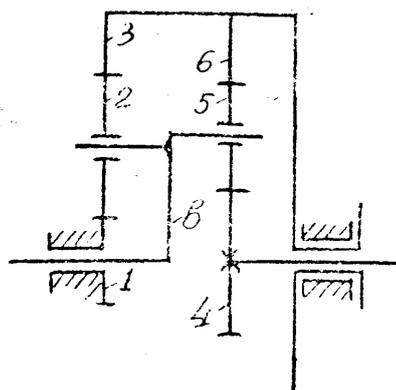
$$U_{16} = \frac{\omega_1}{\omega_6} ?$$

83



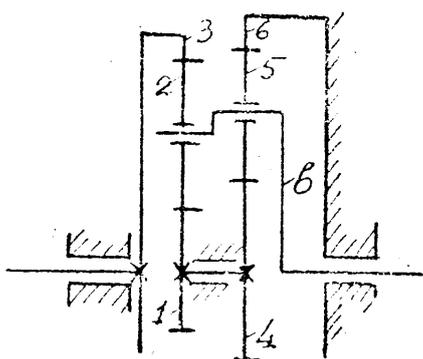
$$U_{31} = \frac{\omega_3}{\omega_1} ?$$

84



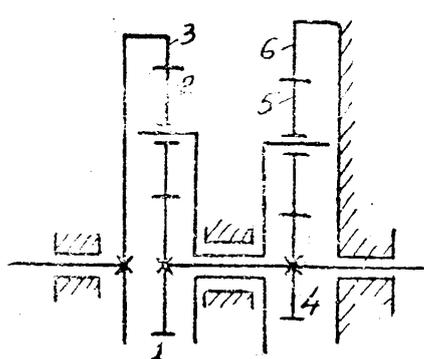
$$U_{64} = \frac{\omega_6}{\omega_4} ?$$

85



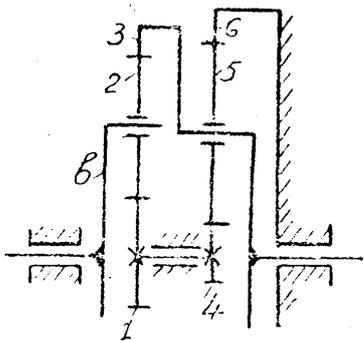
$$U_{36} = \frac{\omega_3}{\omega_6} ?$$

86



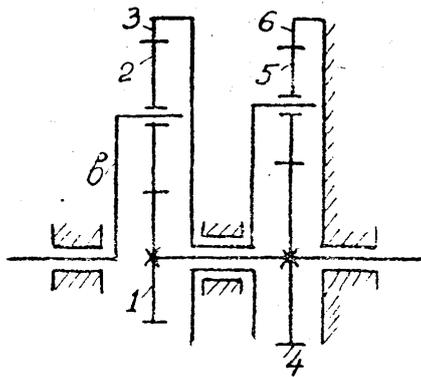
$$U_{34} = \frac{\omega_3}{\omega_4} ?$$

(87)



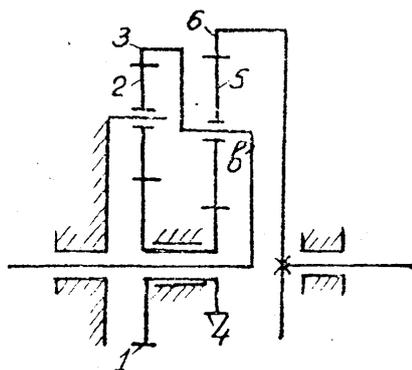
$$U_{63} = \frac{\omega_6}{\omega_3} ?$$

(88)



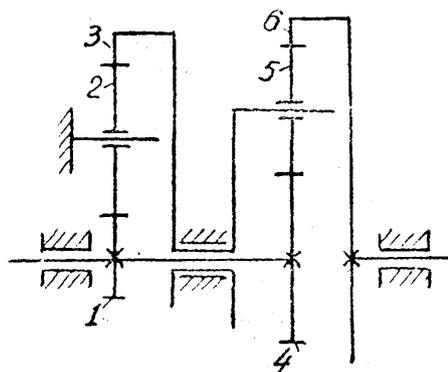
$$U_{64} = \frac{\omega_6}{\omega_4} ?$$

(89)



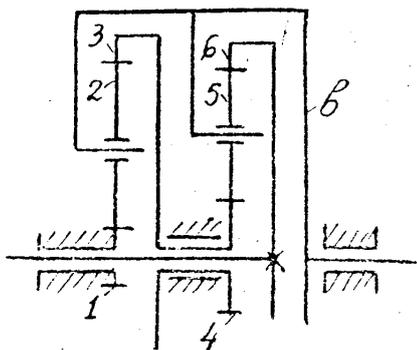
$$U_{36} = \frac{\omega_3}{\omega_6} ?$$

(90)



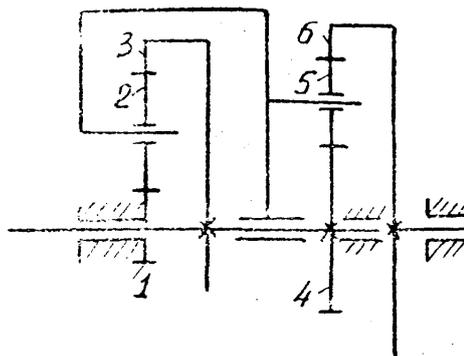
$$U_{16} = \frac{\omega_1}{\omega_6} ?$$

91



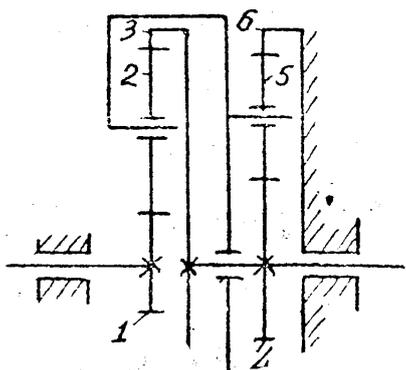
$$U_{66} = \frac{\omega_6}{\omega_6} ?$$

92



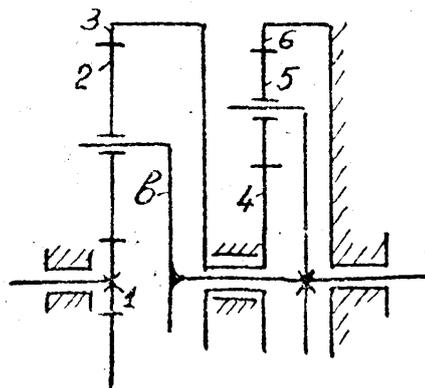
$$U_{36} = \frac{\omega_3}{\omega_6} ?$$

93



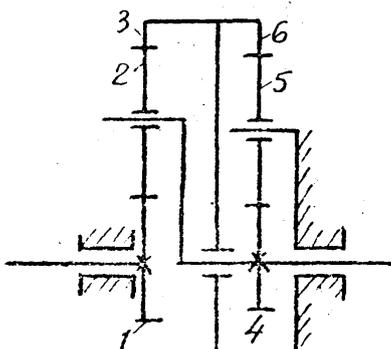
$$U_{14} = \frac{\omega_1}{\omega_4} ?$$

94



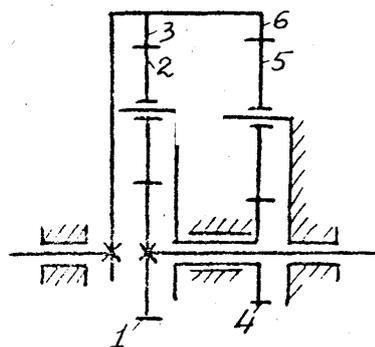
$$U_{16} = \frac{\omega_1}{\omega_6} ?$$

95



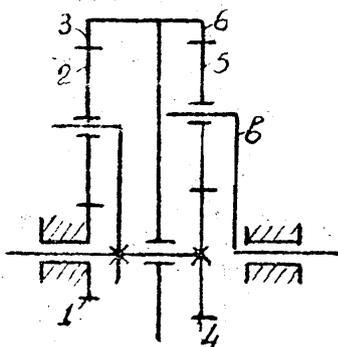
$$U_{14} = \frac{\omega_1}{\omega_4} ?$$

96



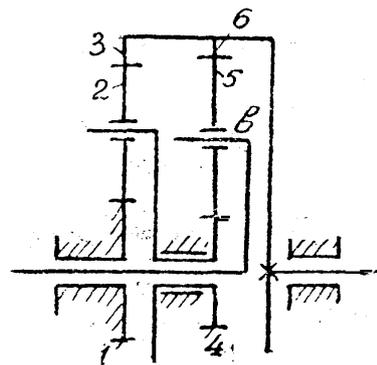
$$U_{31} = \frac{\omega_3}{\omega_1} ?$$

97



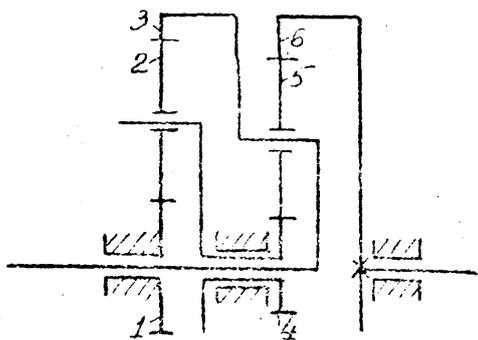
$$U_{46} = \frac{\omega_4}{\omega_6} ?$$

98



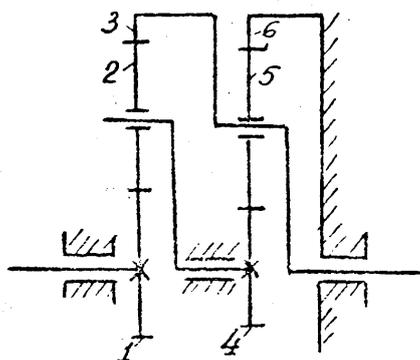
$$U_{66} = \frac{\omega_6}{\omega_6} ?$$

(99)



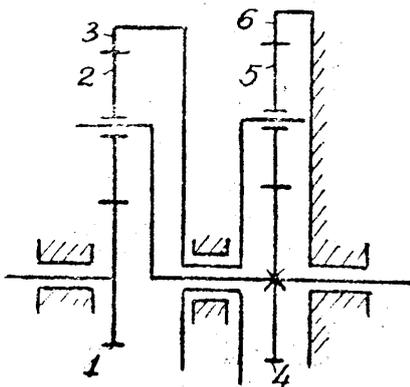
$$U_{36} = \frac{\omega_3}{\omega_6} ?$$

(100)



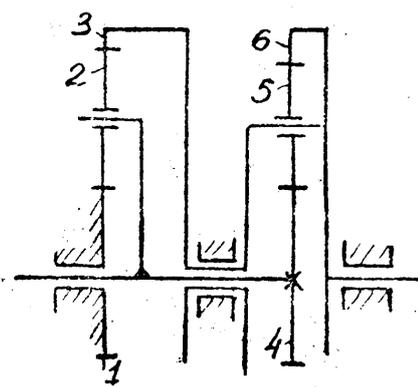
$$U_{13} = \frac{\omega_1}{\omega_3} ?$$

(101)



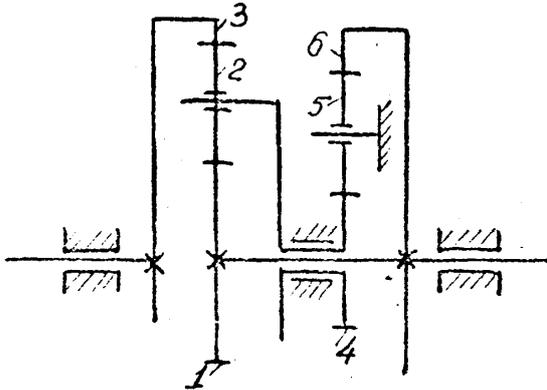
$$U_{14} = \frac{\omega_1}{\omega_4} ?$$

(102)



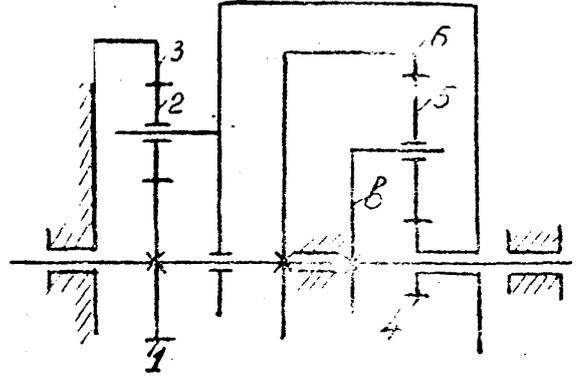
$$U_{46} = \frac{\omega_4}{\omega_6} ?$$

103



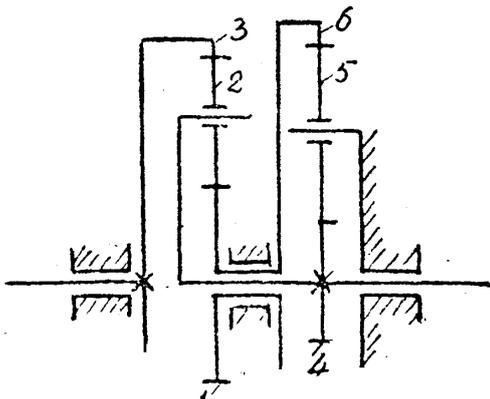
$$U_{13} = \frac{\omega_1}{\omega_3} ?$$

104



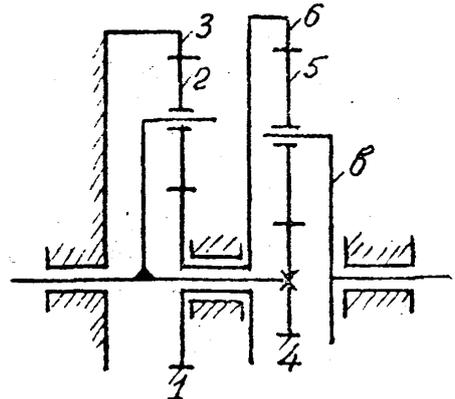
$$U_{16} = \frac{\omega_1}{\omega_6} ?$$

105



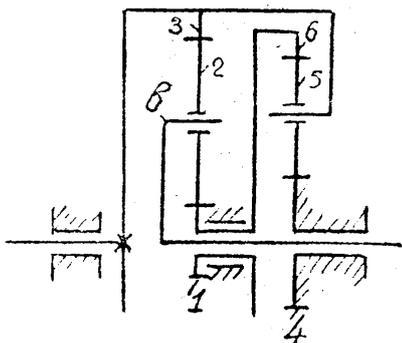
$$U_{34} = \frac{\omega_3}{\omega_4} ?$$

106



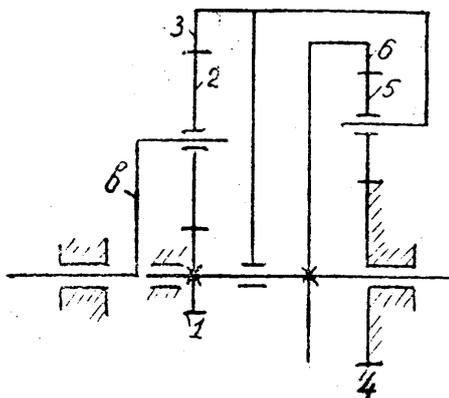
$$U_{46} = \frac{\omega_4}{\omega_6} ?$$

107



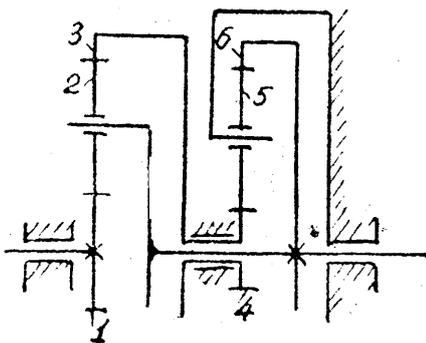
$$U_{3e} = \frac{\omega_3}{\omega_6} ?$$

108



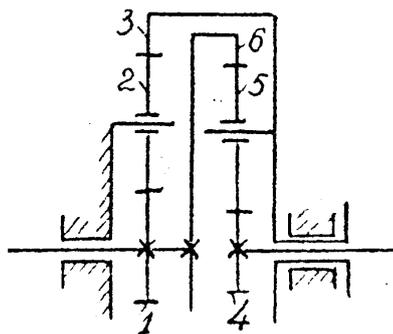
$$U_{6e} = \frac{\omega_6}{\omega_6} ?$$

109



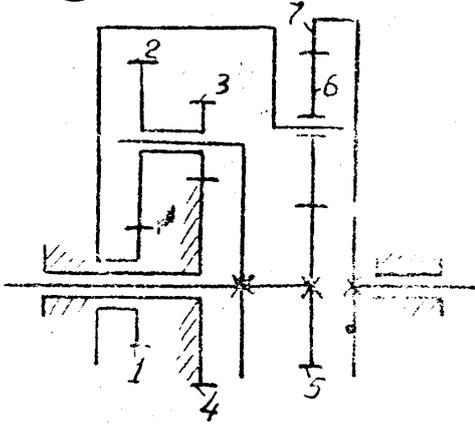
$$U_{1e} = \frac{\omega_1}{\omega_6} ?$$

110



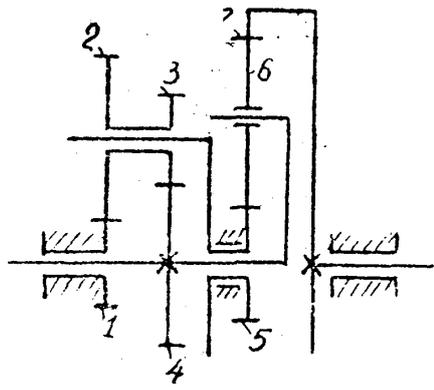
$$U_{14} = \frac{\omega_1}{\omega_4} ?$$

111



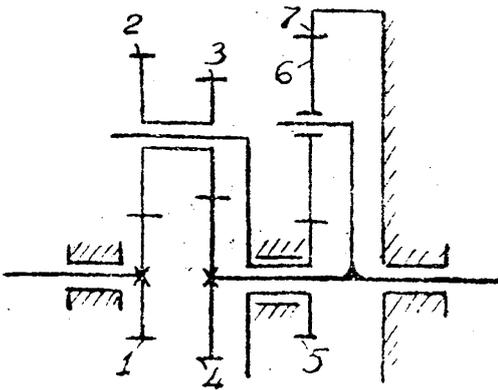
$$U_{57} = \frac{\omega_5}{\omega_7} ?$$

112



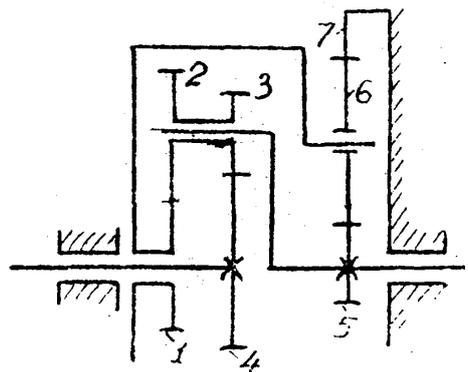
$$U_{47} = \frac{\omega_4}{\omega_7} ?$$

113



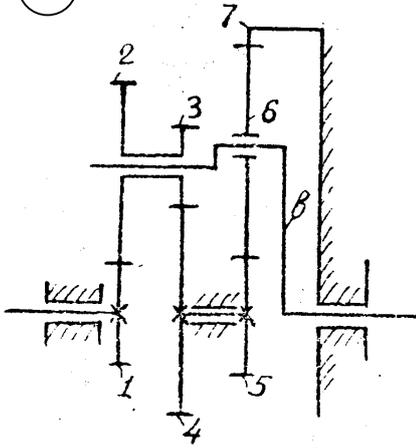
$$U_{14} = \frac{\omega_1}{\omega_4} ?$$

114



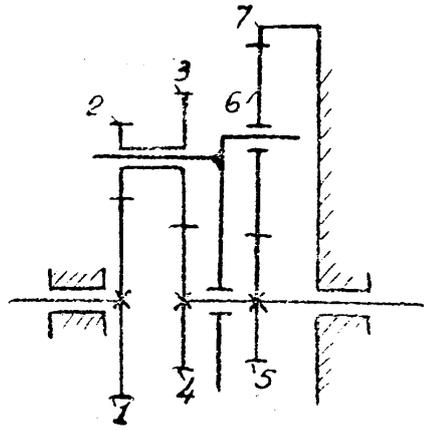
$$U_{45} = \frac{\omega_4}{\omega_5} ?$$

(115)



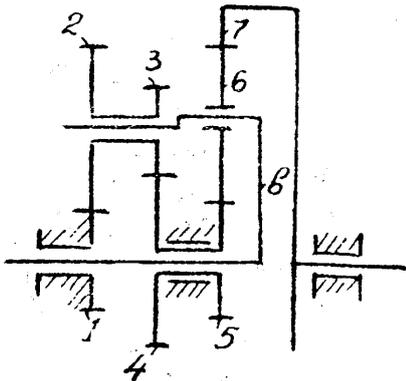
$$U_{15} = \frac{\omega_1}{\omega_5} ?$$

(116)



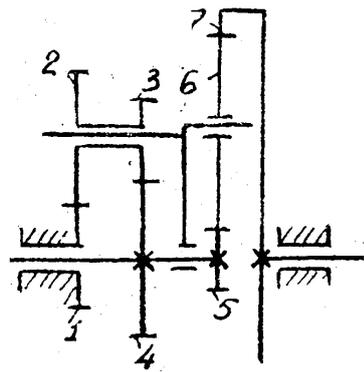
$$U_{15} = \frac{\omega_1}{\omega_5} ?$$

(117)



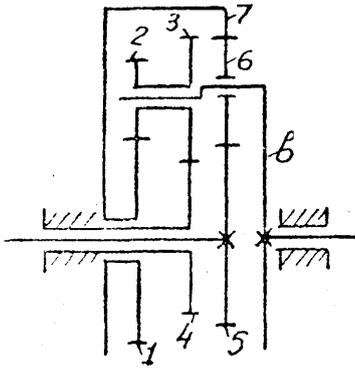
$$U_{67} = \frac{\omega_6}{\omega_7} ?$$

(118)



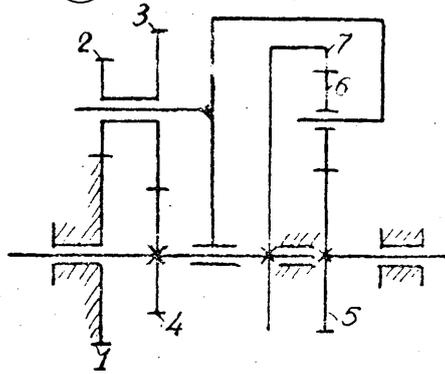
$$U_{47} = \frac{\omega_4}{\omega_7} ?$$

(119)



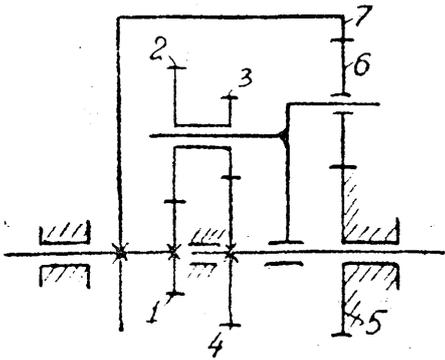
$$U_{5e} = \frac{\omega_5}{\omega_6} ?$$

(120)



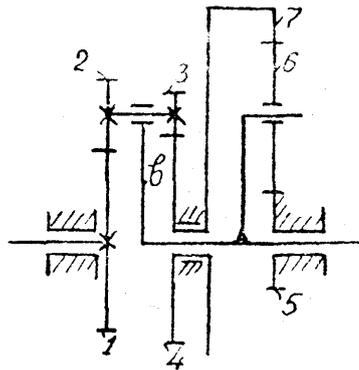
$$U_{45} = \frac{\omega_4}{\omega_5} ?$$

(121)

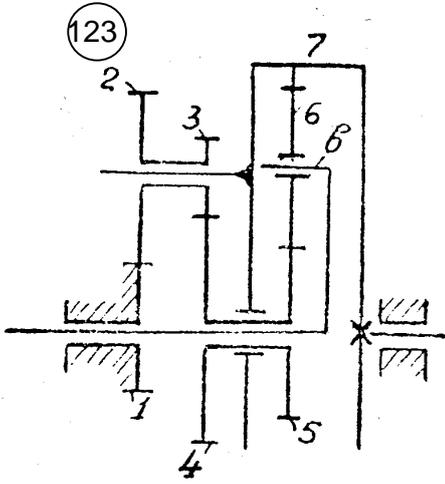


$$U_{14} = \frac{\omega_1}{\omega_4} ?$$

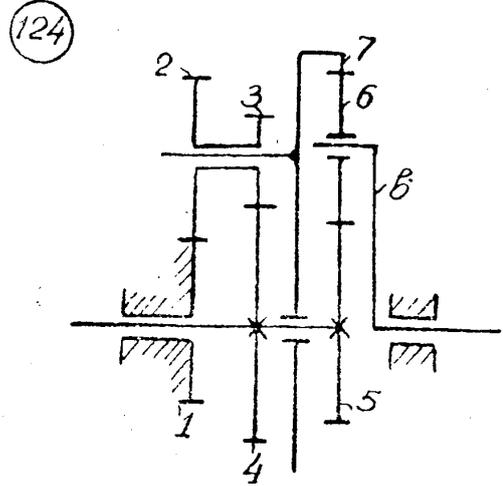
(122)



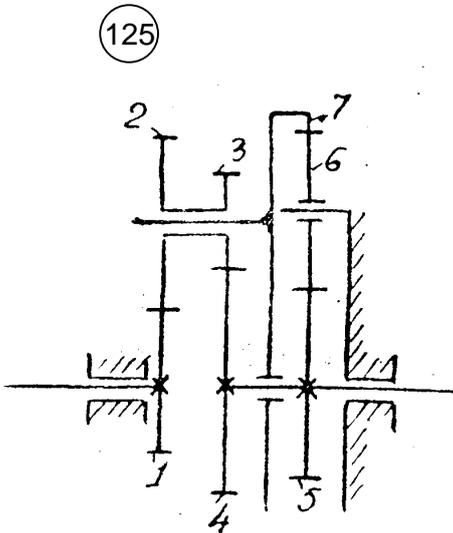
$$U_{16} = \frac{\omega_1}{\omega_6} ?$$



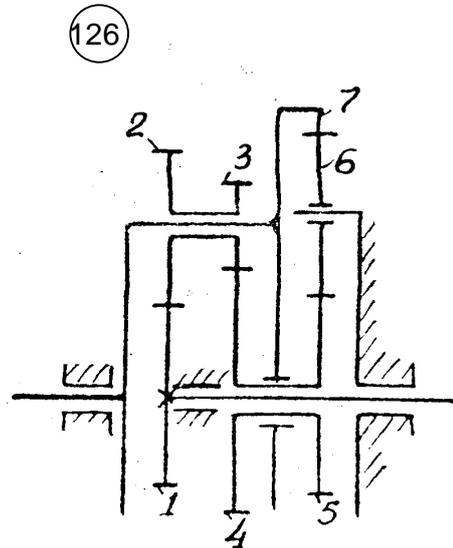
$$U_{67} = \frac{\omega_6}{\omega_7} ?$$



$$U_{46} = \frac{\omega_4}{\omega_6} ?$$

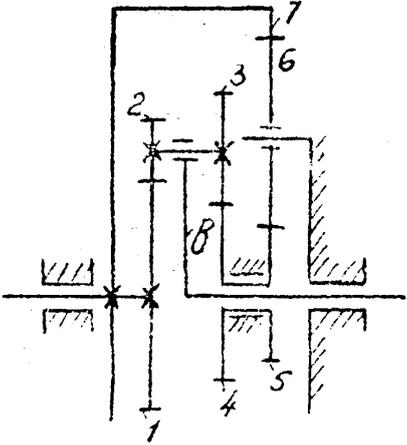


$$U_{15} = \frac{\omega_1}{\omega_5} ?$$



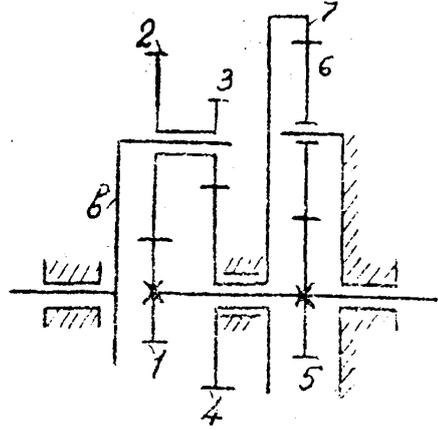
$$U_{71} = \frac{\omega_7}{\omega_1} ?$$

(127)



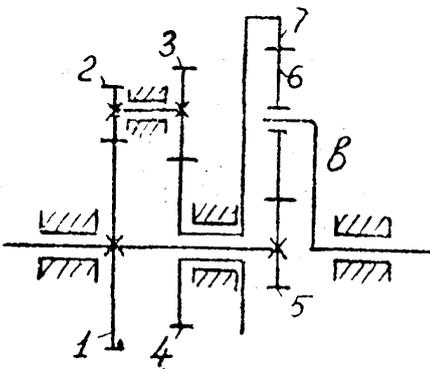
$$U_{16} = \frac{\omega_1}{\omega_6} ?$$

(128)



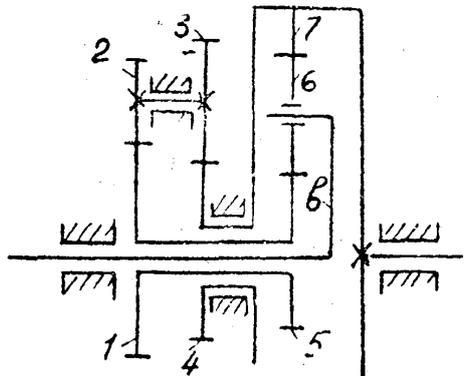
$$U_{65} = \frac{\omega_6}{\omega_5} ?$$

(129)



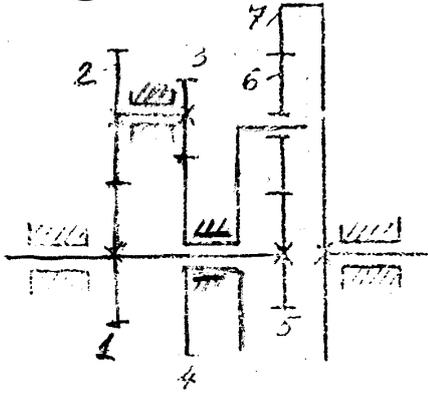
$$U_{16} = \frac{\omega_1}{\omega_6} ?$$

(130)



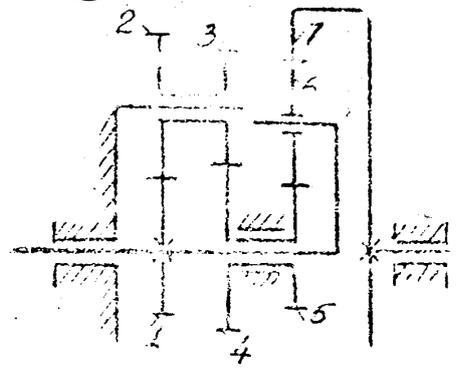
$$U_{67} = \frac{\omega_6}{\omega_7} ?$$

(131)



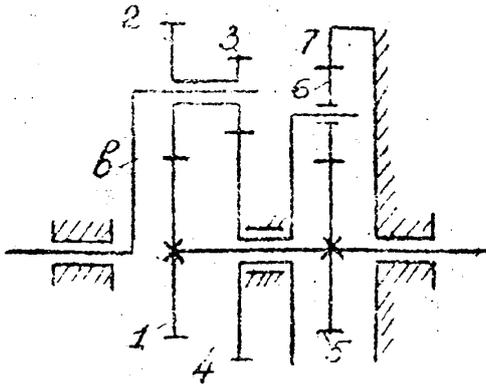
$$U_{17} = \frac{\omega_1}{\omega_7} ?$$

(132)



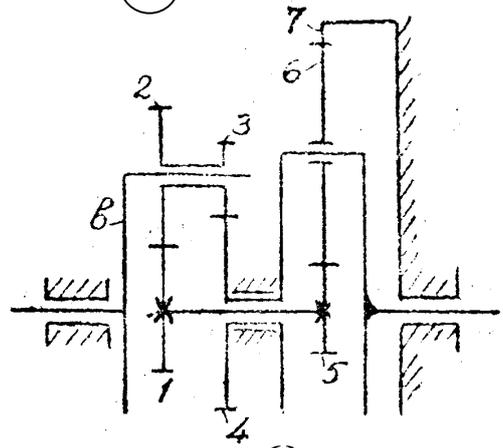
$$U_{17} = \frac{\omega_1}{\omega_7} ?$$

(133)



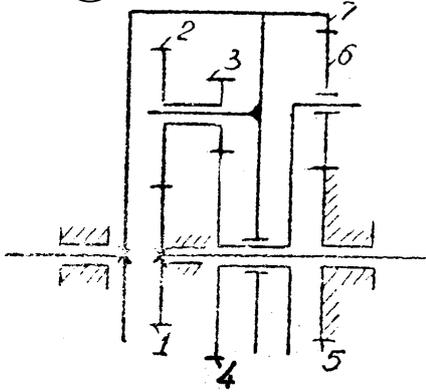
$$U_{65} = \frac{\omega_6}{\omega_5} ?$$

(134)



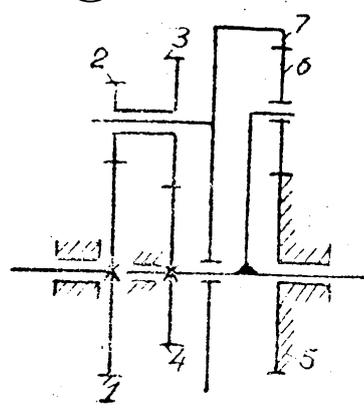
$$U_{64} = \frac{\omega_6}{\omega_4} ?$$

(135)



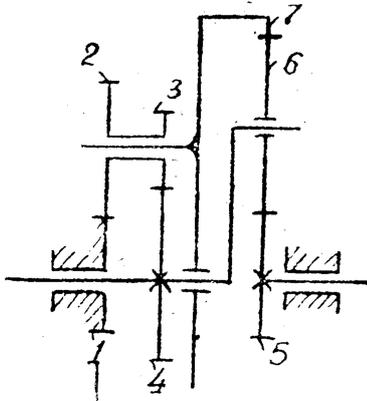
$$U_{71} = \frac{\omega_7}{\omega_1} ?$$

(136)



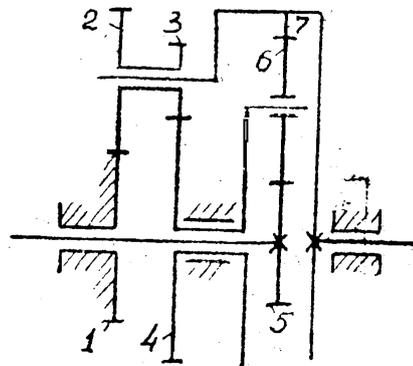
$$U_{14} = \frac{\omega_1}{\omega_4} ?$$

(137)



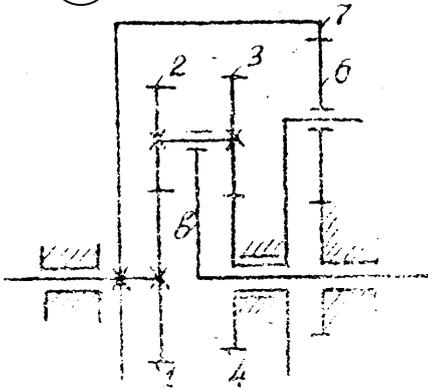
$$U_{45} = \frac{\omega_4}{\omega_5} ?$$

(138)



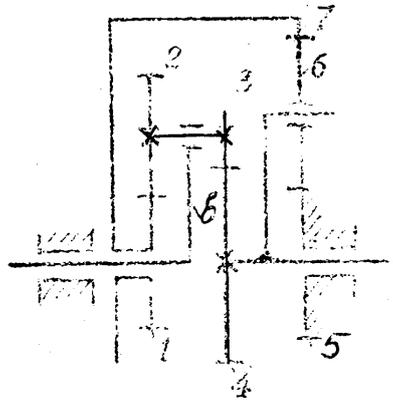
$$U_{57} = \frac{\omega_5}{\omega_7} ?$$

(139)



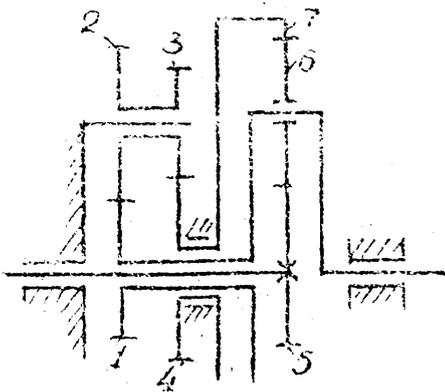
$$U_{16} = \frac{\omega_1}{\omega_6} ?$$

(140)



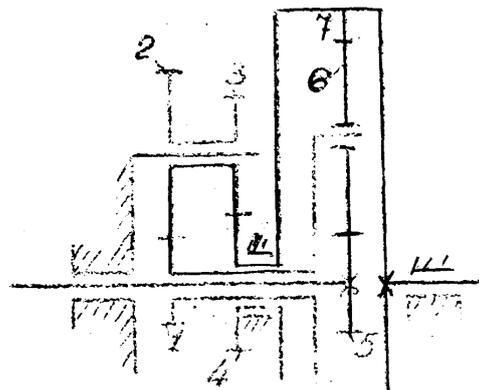
$$U_{64} = \frac{\omega_6}{\omega_4} ?$$

(141)



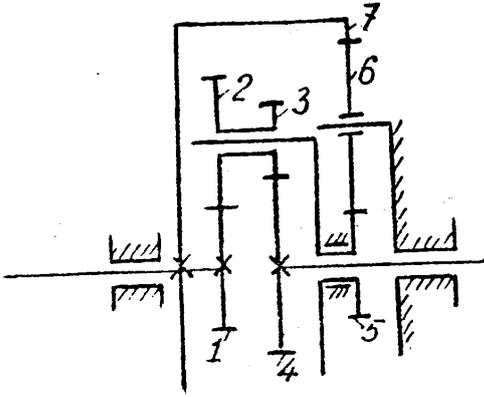
$$U_{51} = \frac{\omega_5}{\omega_1} ?$$

(142)



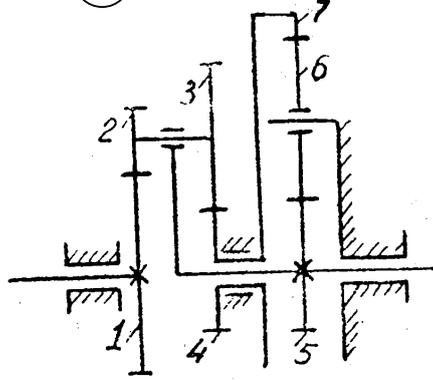
$$U_{57} = \frac{\omega_5}{\omega_7} ?$$

(143)



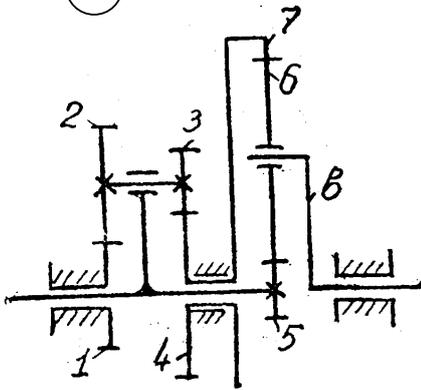
$$U_{14} = \frac{\omega_1}{\omega_4} ?$$

(144)



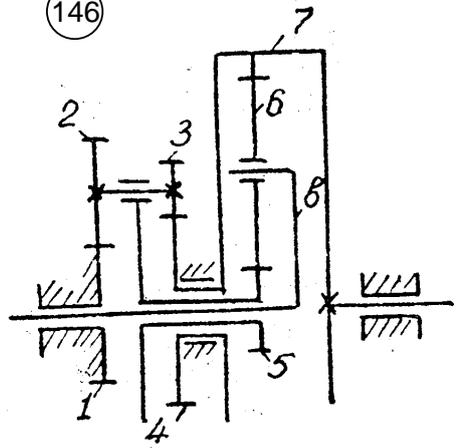
$$U_{15} = \frac{\omega_1}{\omega_5} ?$$

(145)



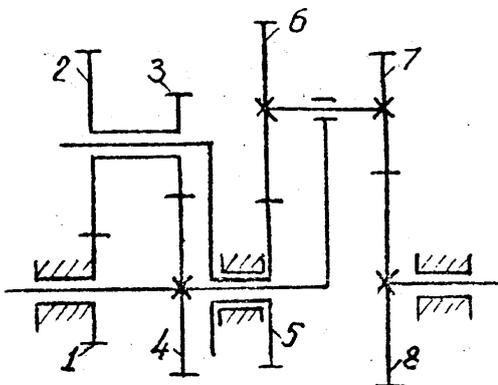
$$U_{56} = \frac{\omega_5}{\omega_6} ?$$

(146)



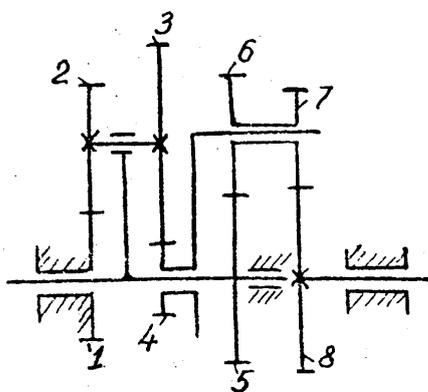
$$U_{67} = \frac{\omega_6}{\omega_7} ?$$

147



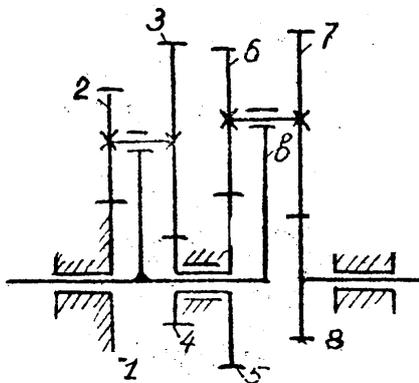
$$U_{18} = \frac{\omega_1}{\omega_8} ?$$

148



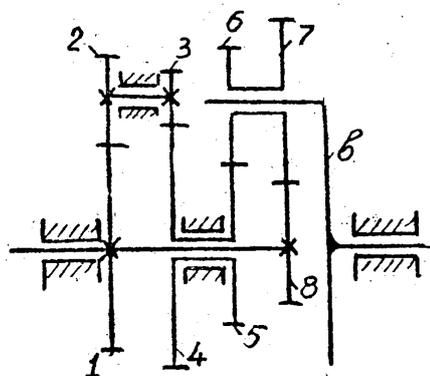
$$U_{58} = \frac{\omega_5}{\omega_8} ?$$

149



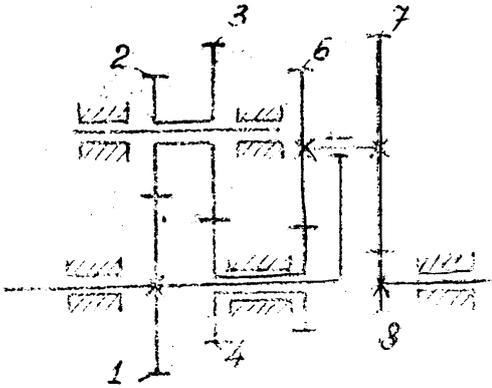
$$U_{68} = \frac{\omega_6}{\omega_8} ?$$

150



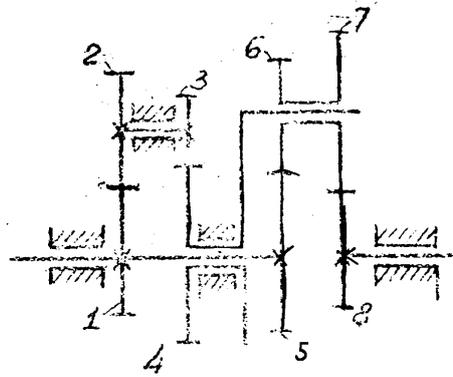
$$U_{16} = \frac{\omega_1}{\omega_6} ?$$

(151)



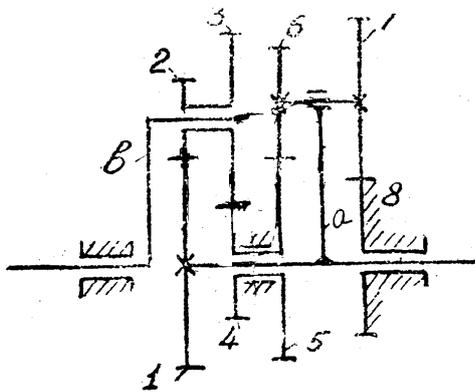
$$U_{18} = \frac{\omega_1}{\omega_8} ?$$

(152)



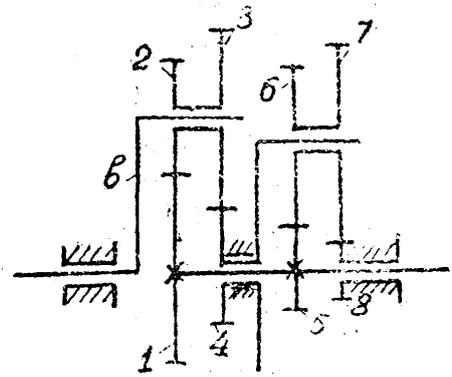
$$U_{18} = \frac{\omega_1}{\omega_8} ?$$

(153)



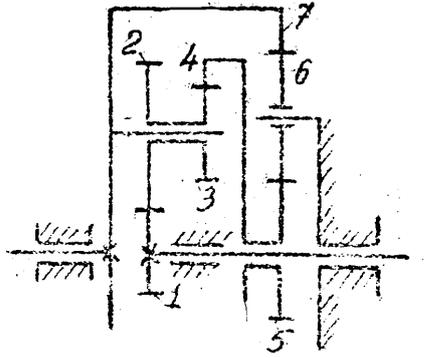
$$U_{61} = \frac{\omega_6}{\omega_1} ?$$

(154)



$$U_{61} = \frac{\omega_6}{\omega_1} ?$$

(155)



$$U_{17} = \frac{\omega_1}{\omega_7} ?$$

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