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(12) **United States Design Patent**
Kawaguchi et al.

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(54) **POWERED EXOSKELETON**

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(52) **U.S. Cl.**
USPC **D15/199**

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CPC B25J 9/102; B25J 9/104; B25J 17/0241;
Y10T 74/20317; Y10T 74/20323
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

- 5,002,242 A * 3/1991 Nagai B25J 17/0241
248/49
- 5,099,707 A * 3/1992 Tori B25J 9/02
384/296
- 5,107,716 A * 4/1992 Torii B25J 9/02
384/296
- 5,119,753 A * 6/1992 Milad B23Q 1/5406
114/338
- 5,342,254 A * 8/1994 Sula B25J 9/102
475/223

- 5,593,293 A * 1/1997 Machino B25J 9/0009
414/729
- 5,740,699 A * 4/1998 Ballantyne B25J 17/0266
403/120
- 5,893,296 A * 4/1999 Rosheim G05G 5/03
74/490.03
- 6,151,981 A * 11/2000 Costa B25J 9/023
74/490.03
- 6,220,813 B1 * 4/2001 Launiere B23Q 1/50
198/468.6
- 6,240,799 B1 * 6/2001 Yau B23Q 1/5462
74/479.01
- 7,013,750 B1 * 3/2006 Kazami B25J 9/08
74/490.03

(Continued)

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PC

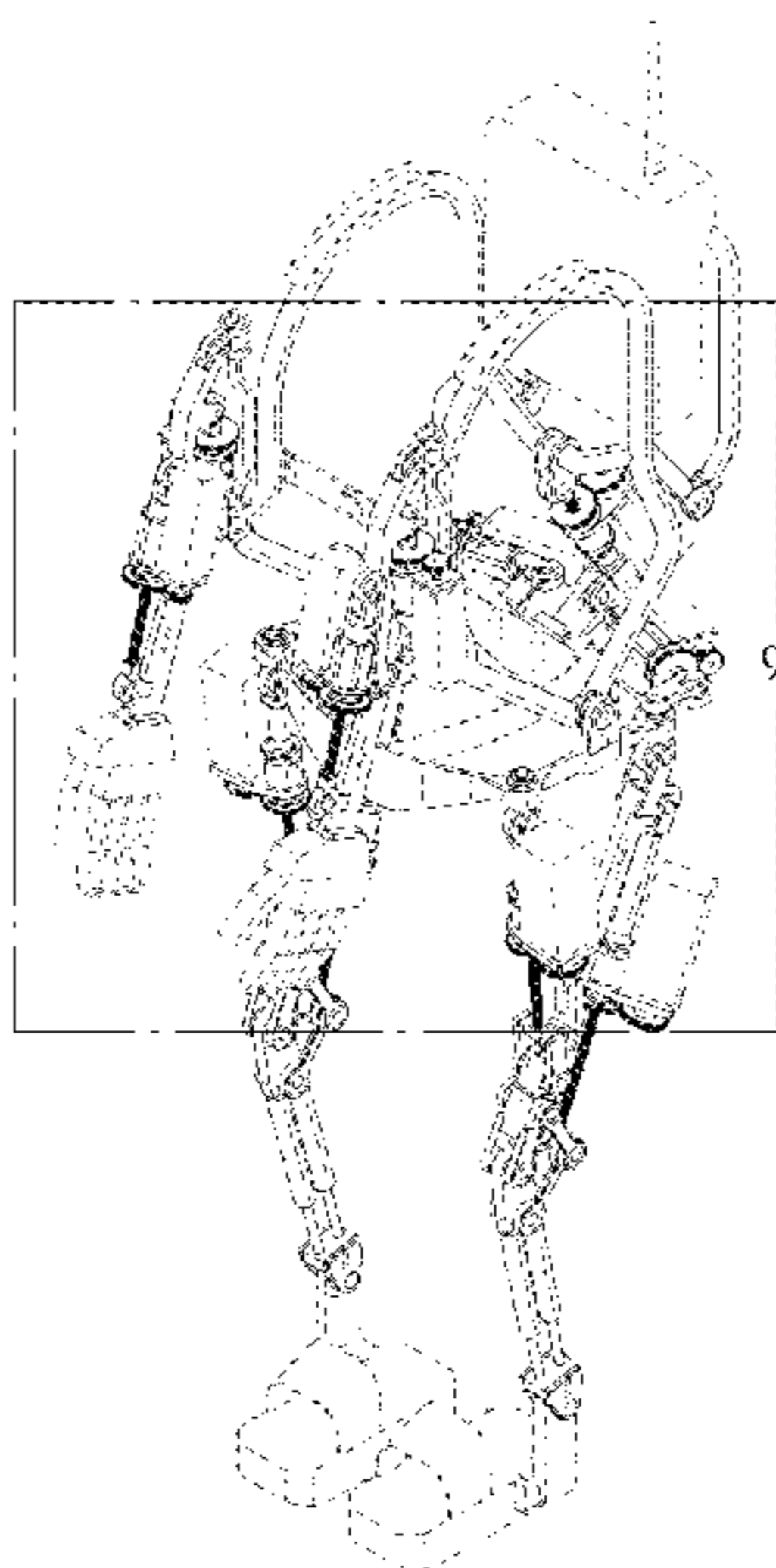
(57) **CLAIM**

The ornamental design for a powered exoskeleton, as shown and described.

DESCRIPTION

FIG. 1 is a front, top, and right side perspective view of a powered exoskeleton showing our new design;
 FIG. 2 is a rear, bottom, and left side view thereof;
 FIG. 3 is a front view thereof;
 FIG. 4 is a rear view thereof;
 FIG. 5 is a top view thereof;
 FIG. 6 is a bottom view thereof;
 FIG. 7 is a left side view thereof;
 FIG. 8 is a right side view thereof;
 FIG. 9 is an enlarged view of FIG. 1 thereof;
 FIG. 10 is an enlarged view of FIG. 2 thereof;
 FIG. 11 is an enlarged view of FIG. 7 thereof; and,
 FIG. 12 is a reference view showing state in use.
 The broken lines in the drawings depict portions of the powered exoskeleton which form no part of the claimed design.

1 Claim, 10 Drawing Sheets



(56)

References Cited

U.S. PATENT DOCUMENTS

9,512,912 B1 * 12/2016 Edsinger F16H 48/12
 9,568,074 B2 * 2/2017 Gosselin B25J 9/102
 9,849,925 B2 * 12/2017 Outa B62D 53/02
 10,040,206 B2 * 1/2018 Jeong et al.
 D810,801 S * 2/2018 Hsu et al.
 10,144,464 B1 * 12/2018 Buerger et al.
 2002/0078778 A1 * 6/2002 Grover B25J 9/042
 74/490.03
 2005/0275367 A1 * 12/2005 Buehler B25J 9/102
 318/568.12
 2007/0062321 A1 * 3/2007 Chablat B23Q 1/5462
 74/479.01
 2009/0308188 A1 * 12/2009 Yang B25J 9/104
 74/89.27
 2010/0122602 A1 * 5/2010 Marcroft B25J 17/0216
 74/490.03
 2010/0162846 A1 * 7/2010 Lee B25J 9/1045
 74/490.04
 2010/0170357 A1 * 7/2010 Kim B25J 9/102
 74/89.32
 2011/0048158 A1 * 3/2011 Maisonnier B25J 17/0275
 74/490.03
 2011/0056321 A1 * 3/2011 Sim B25J 9/1025
 74/490.04
 2011/0067518 A1 * 3/2011 Park B25J 9/102
 74/490.04
 2011/0113914 A1 * 5/2011 Zhang B25J 9/107
 74/490.01
 2011/0126651 A1 * 6/2011 Pan B25J 9/102
 74/89.2
 2011/0137423 A1 * 6/2011 Ouyang B25J 9/102
 623/18.11
 2011/0214524 A1 * 9/2011 Jacobsen A61F 2/68
 74/490.04
 2011/0314949 A1 * 12/2011 Long B25J 19/0029
 74/490.04
 2012/0011956 A1 * 1/2012 Lundberg B25J 9/04
 74/490.03
 2012/0048047 A1 * 3/2012 Zhang B25J 9/046
 74/425

2012/0067150 A1 * 3/2012 Zhang B25J 9/102
 74/423
 2012/0204670 A1 * 8/2012 Ryland B08B 9/045
 74/490.03
 2012/0271207 A1 * 10/2012 Schoen A61F 5/0102
 601/34
 2012/0291582 A1 * 11/2012 Kang B25J 19/0016
 74/490.03
 2013/0104676 A1 * 5/2013 Yang B25J 9/06
 73/865.8
 2013/0282174 A1 * 10/2013 Xi B25J 9/1682
 700/248
 2013/0296746 A1 * 11/2013 Herr A61H 3/00
 601/34
 2014/0007730 A1 * 1/2014 DeLouis B25J 15/0009
 74/490.03
 2014/0123800 A1 * 5/2014 Choi F16H 48/10
 74/490.03
 2014/0213409 A1 * 7/2014 Yoon F16H 1/203
 475/343
 2015/0114163 A1 * 4/2015 Rosheim B25J 9/0045
 74/490.03
 2015/0122071 A1 * 5/2015 Lee B25J 9/06
 74/490.04
 2015/0190246 A1 * 7/2015 Ryu G06F 3/011
 74/89.22
 2015/0272811 A1 * 10/2015 Choi B25J 17/00
 623/27
 2016/0038313 A1 * 2/2016 Kim B25J 9/102
 623/24
 2016/0114479 A1 * 4/2016 Rosheim B25J 9/0075
 74/490.03
 2016/0288319 A1 * 10/2016 Kfoury B25J 9/104
 2017/0120453 A1 * 5/2017 Roy B25J 5/04
 2017/0297197 A1 * 10/2017 King B25J 9/126
 2017/0319421 A1 * 11/2017 Julin A61H 3/00
 2017/0348852 A1 * 12/2017 Sarh B25J 9/106
 2018/0009116 A1 * 1/2018 Jeong et al.
 2018/0079084 A1 * 3/2018 Woo et al.
 2018/0133894 A1 * 5/2018 Choi et al.
 2018/0140441 A1 * 5/2018 Poirters
 2018/0193172 A1 * 7/2018 Smith et al.
 2018/0236655 A1 * 8/2018 Nakanishi

* cited by examiner

Fig. 1

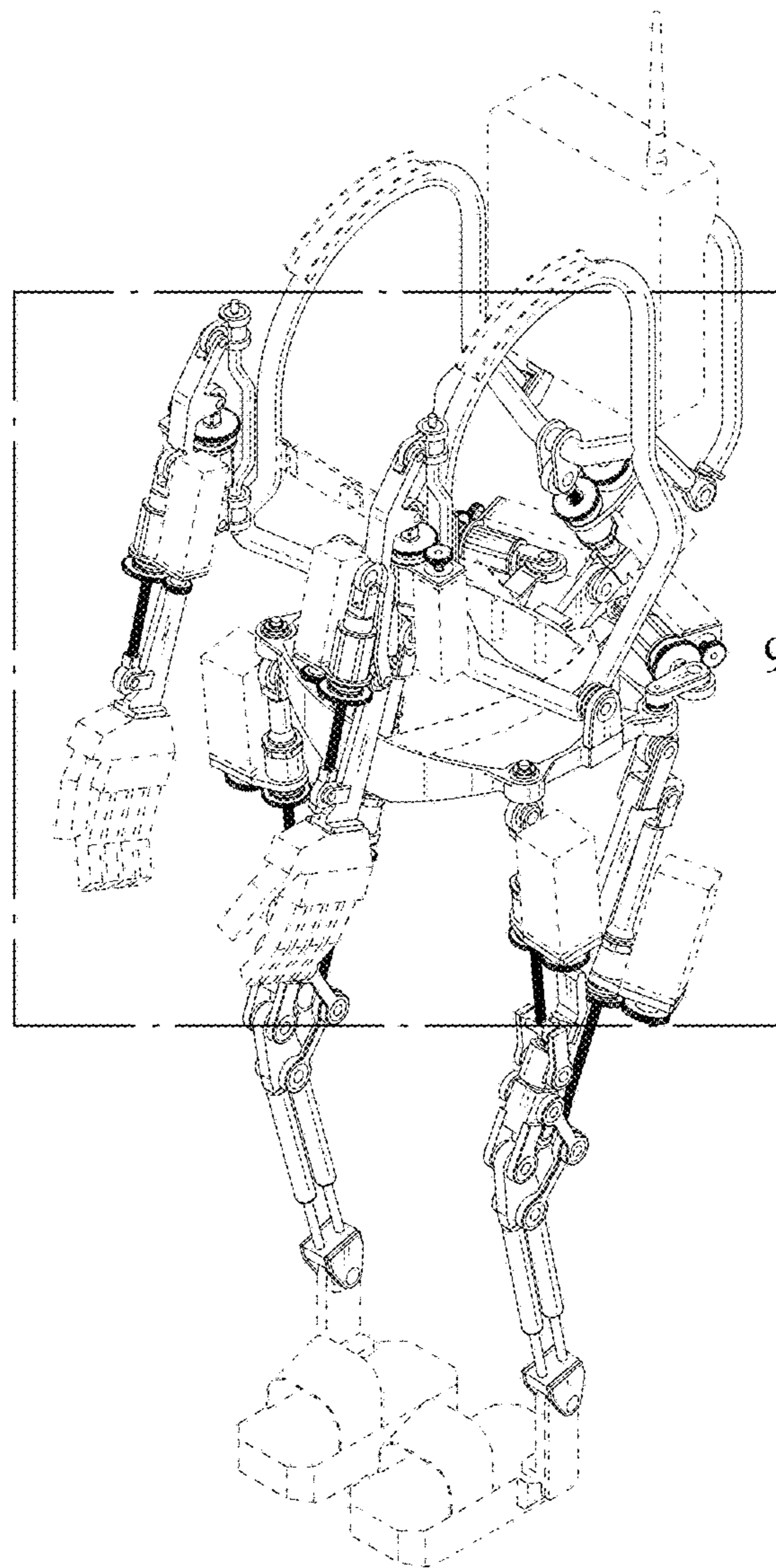


Fig. 2

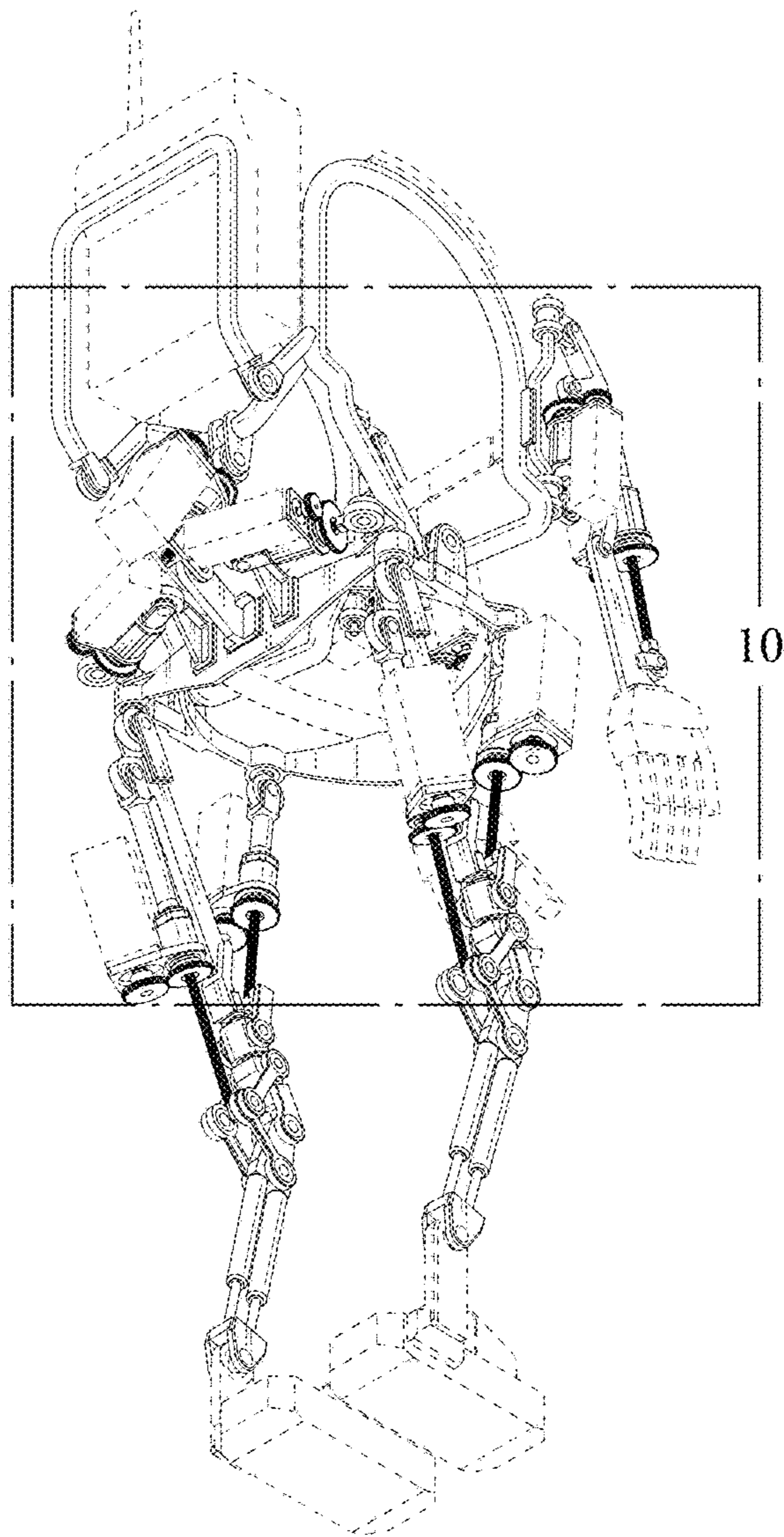


Fig. 3

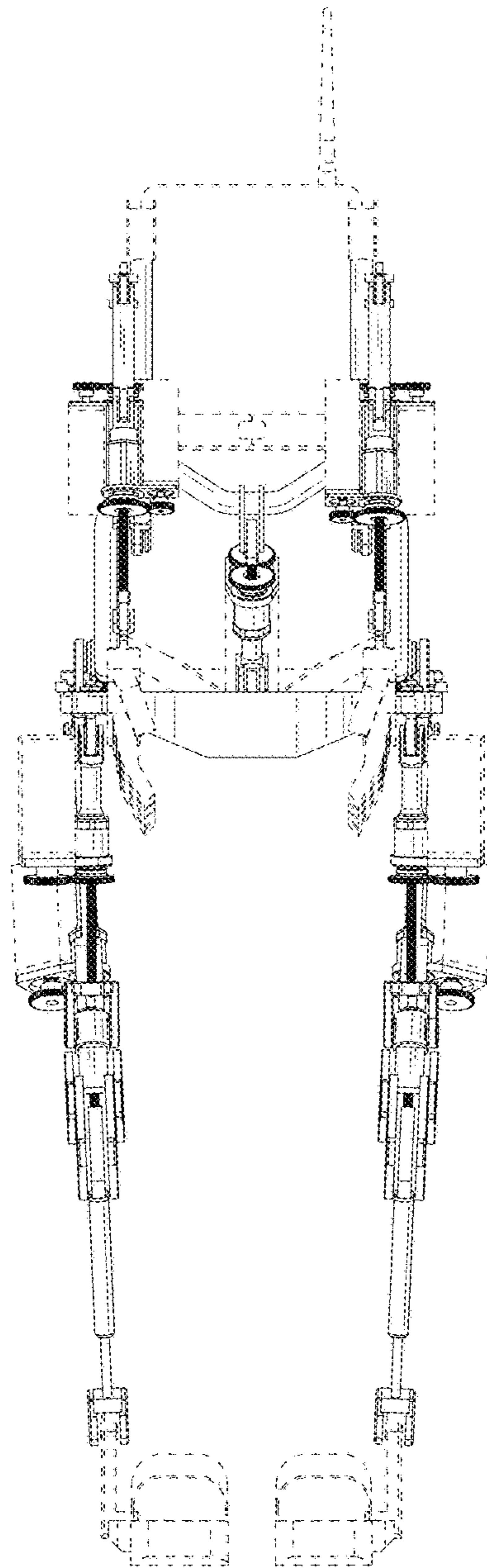


Fig. 4

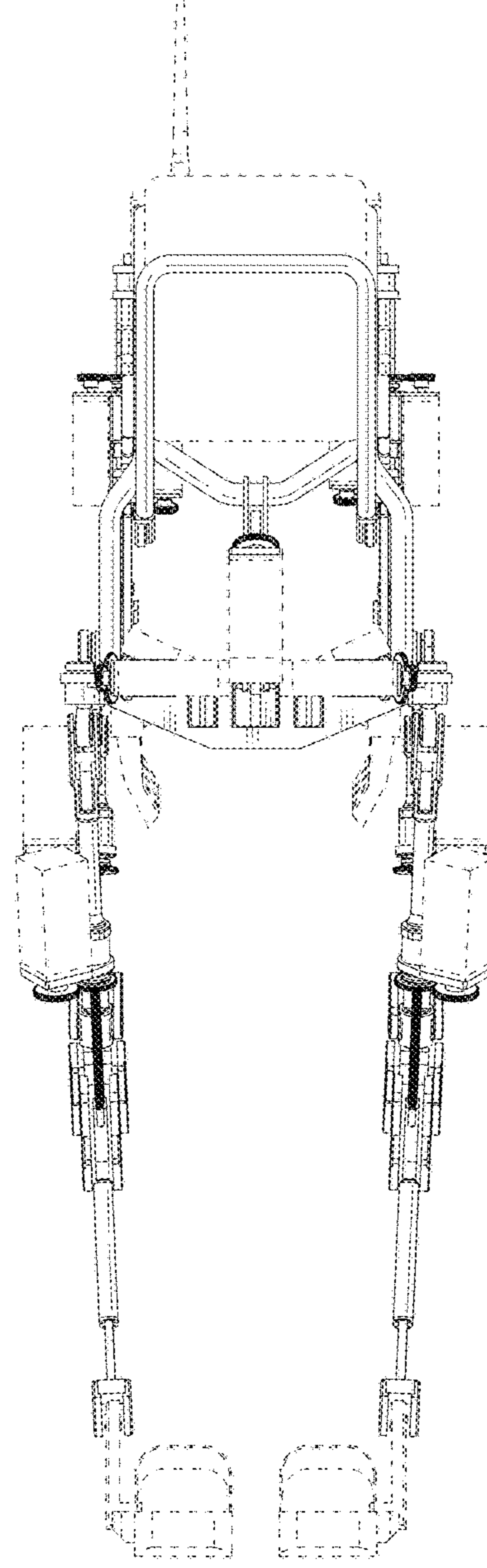


Fig. 5

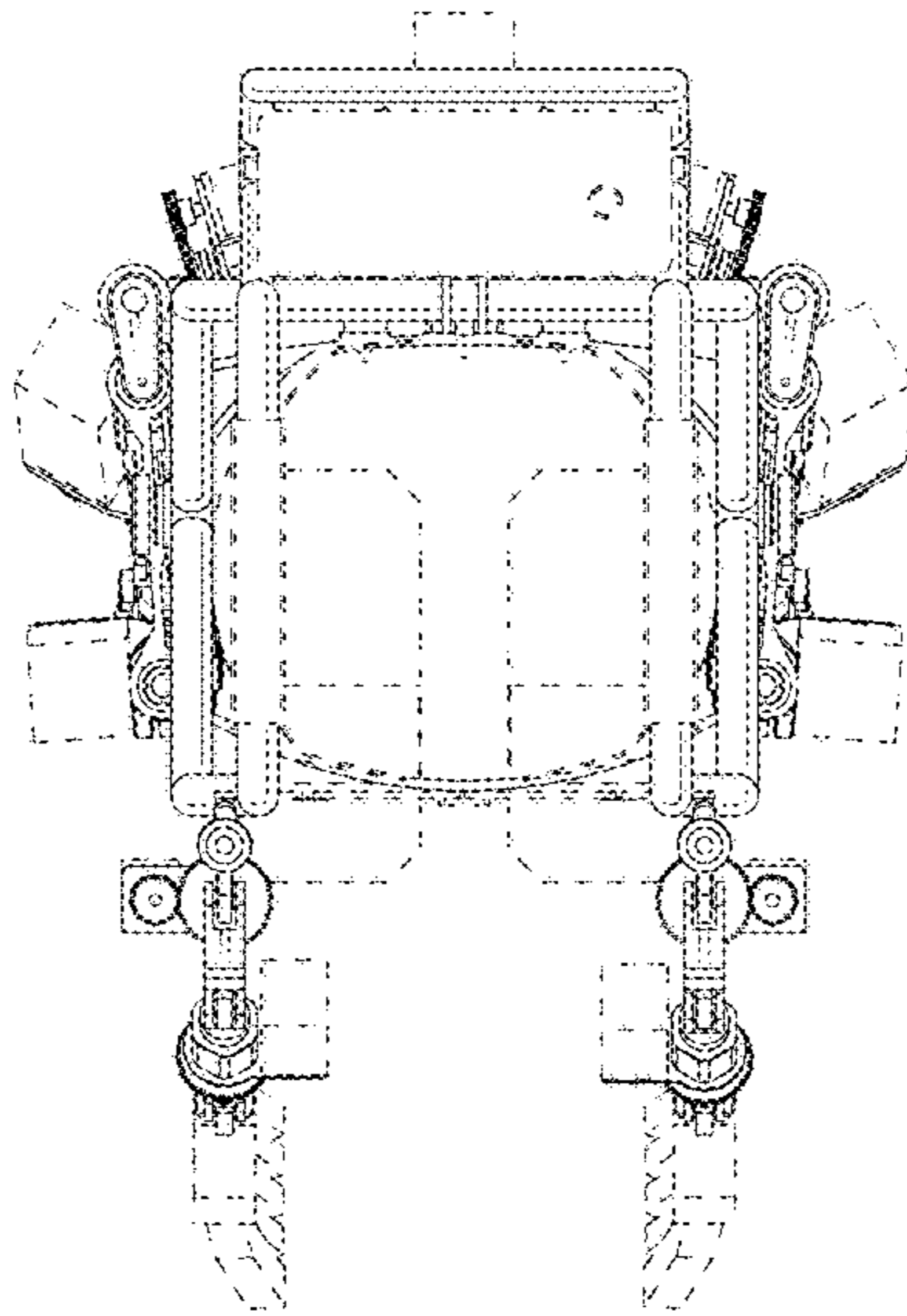


Fig. 6

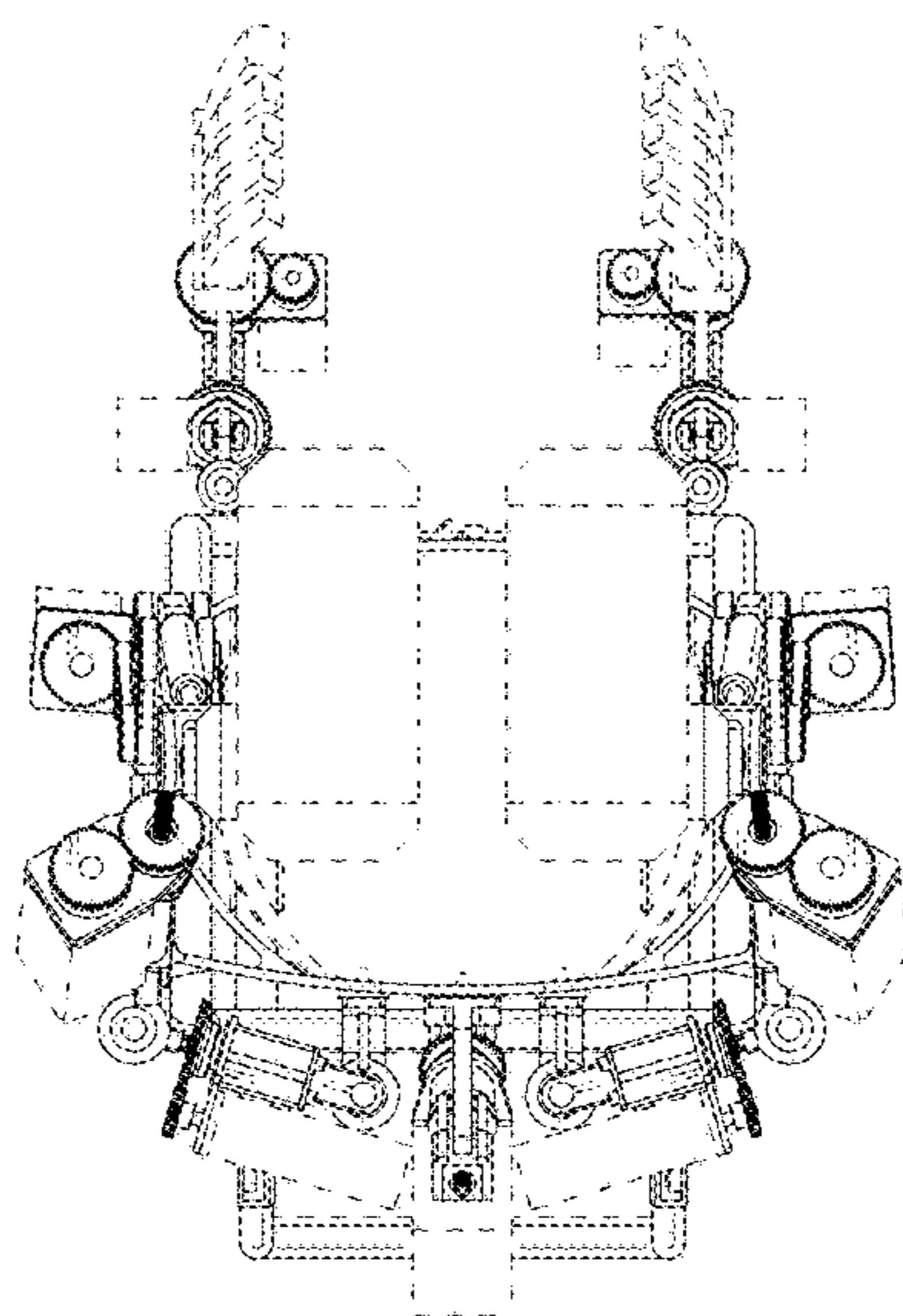


Fig. 8

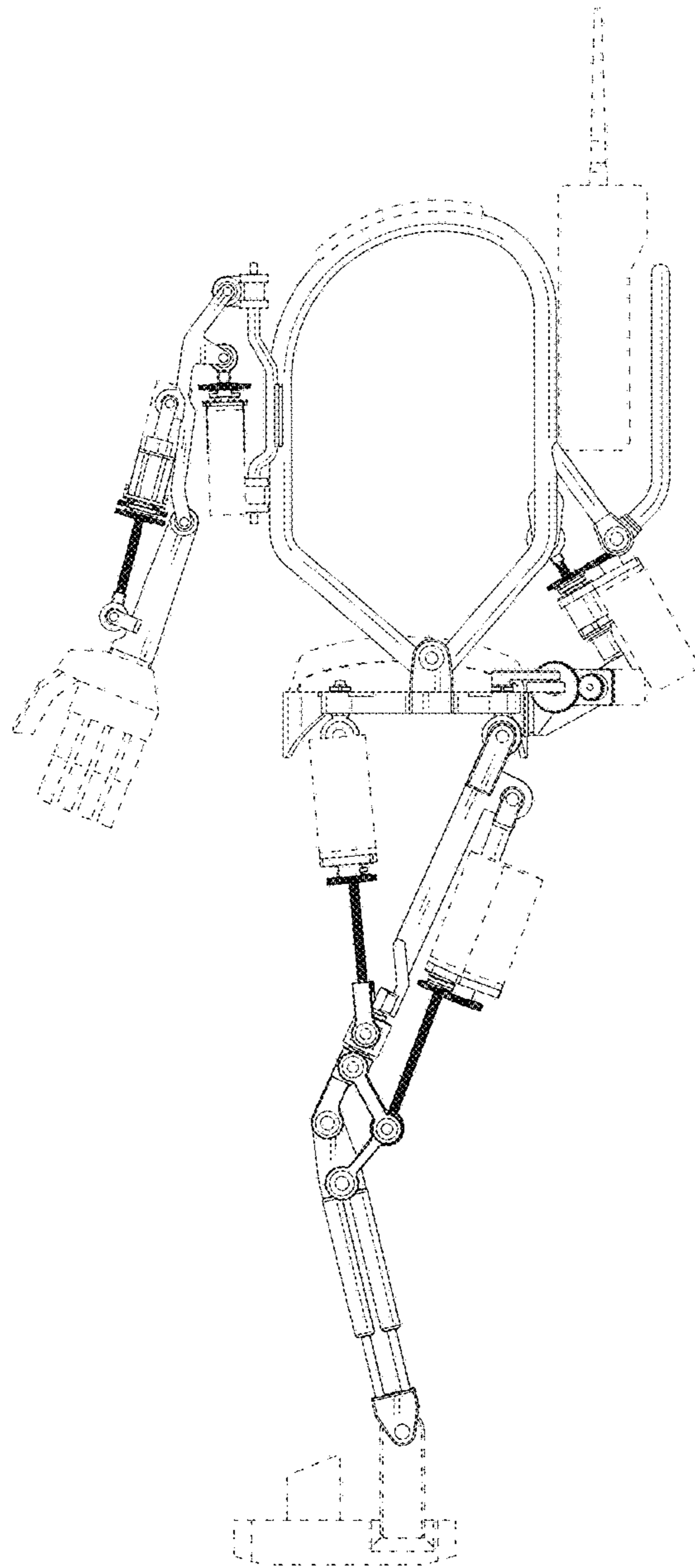


Fig. 9

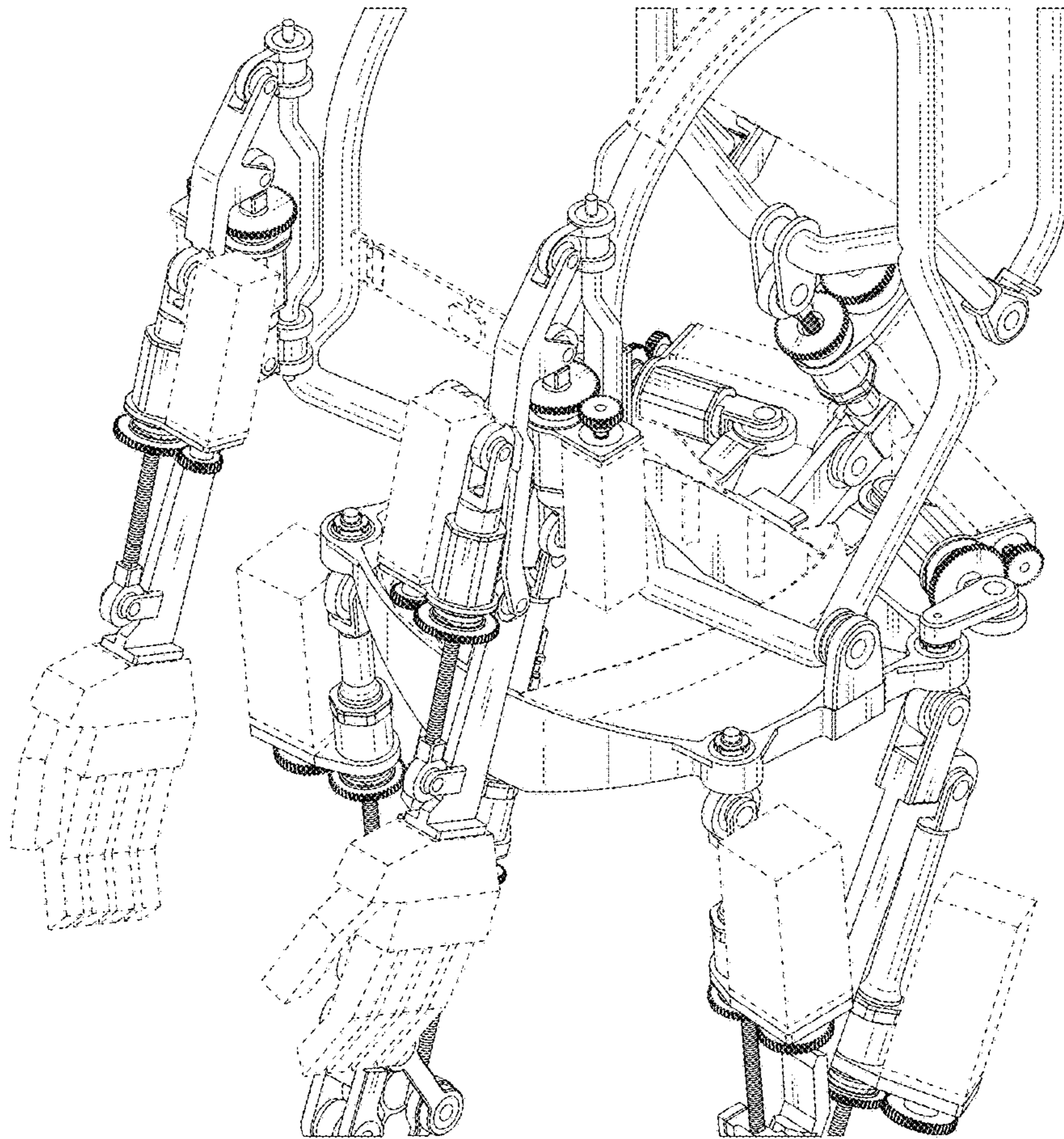


Fig. 10

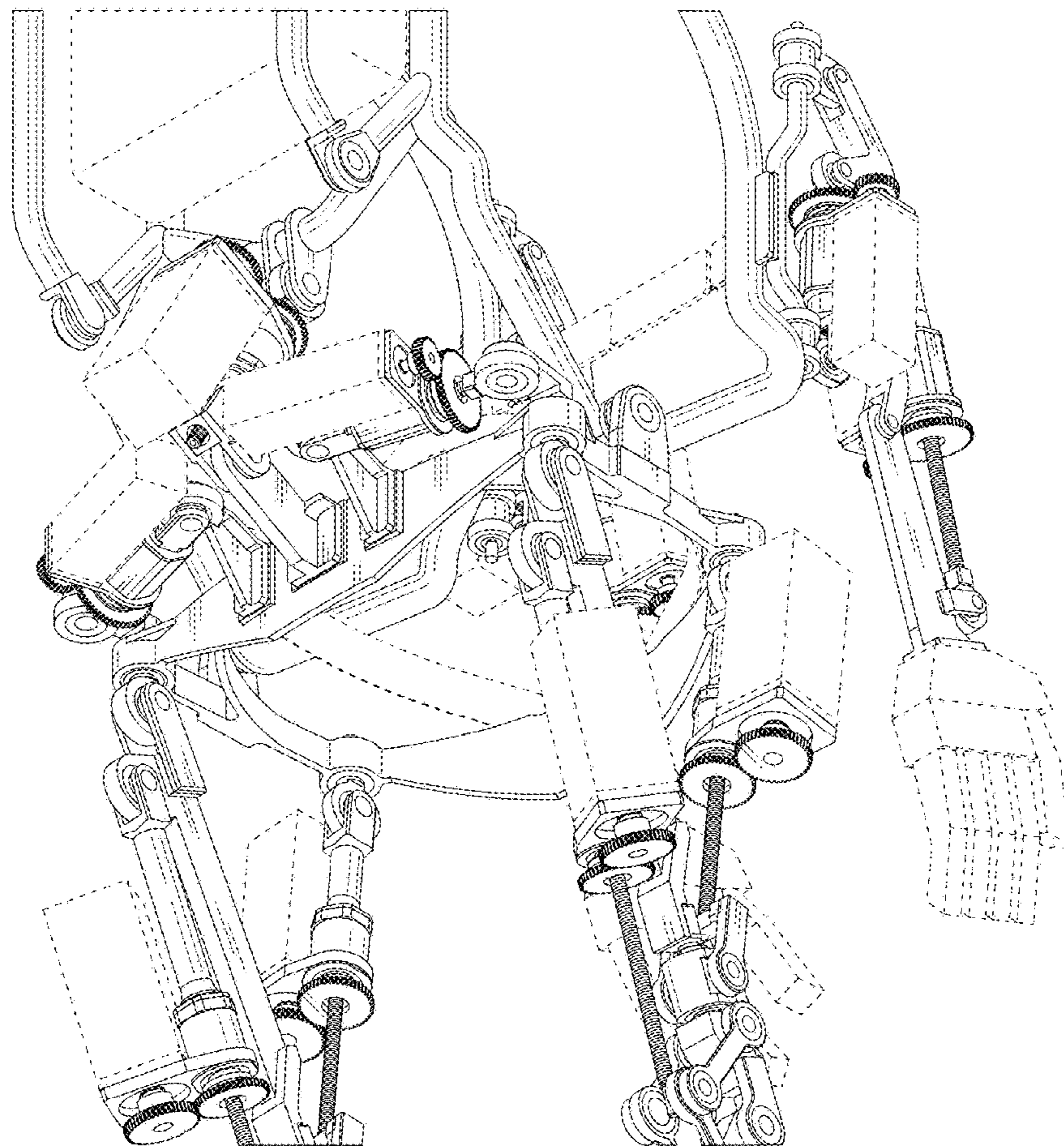


Fig. 11

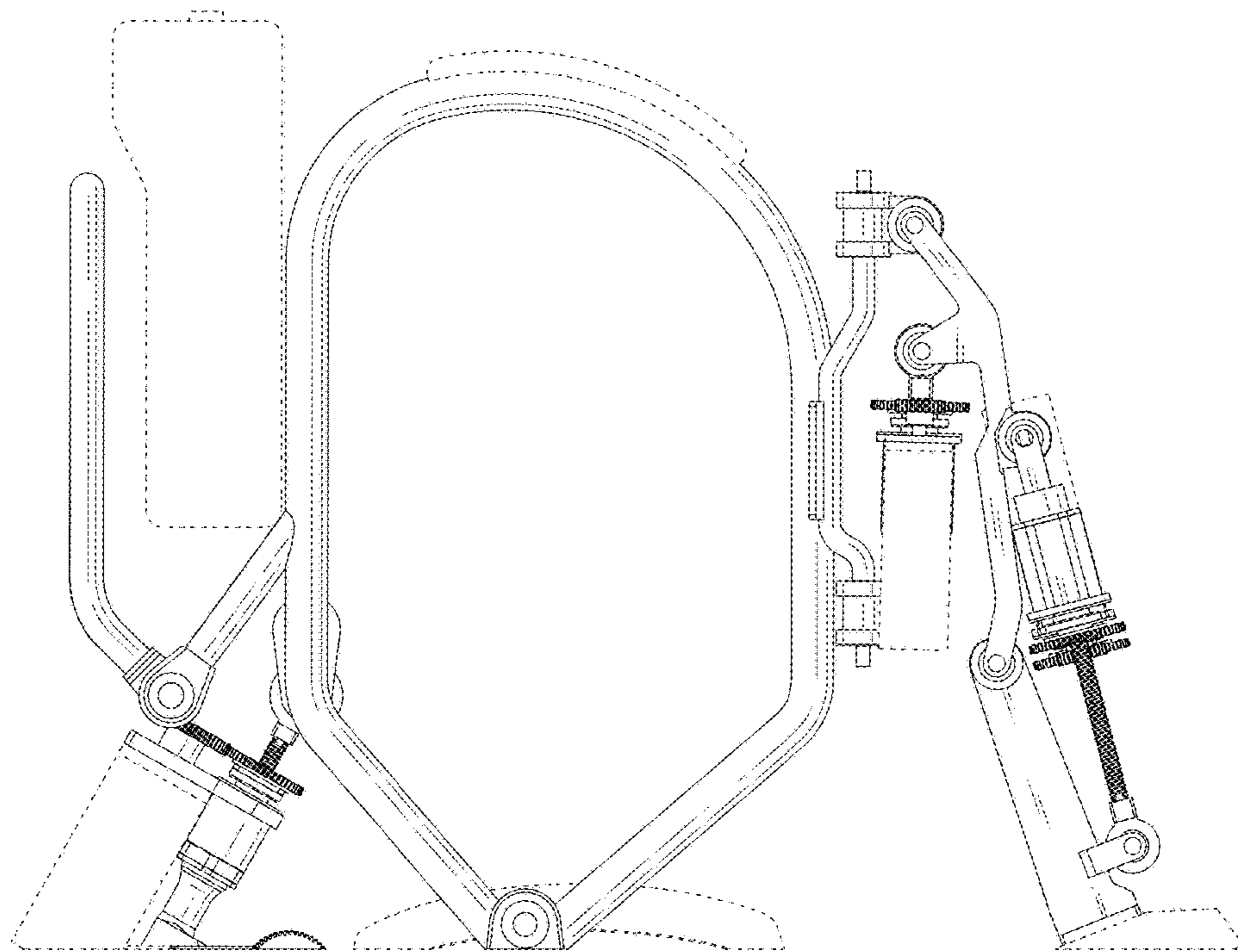


Fig. 12

